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Valuation guideline for the Suggestion System of Volkswagen Navarra S.A.

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ABSTRACT

The objective of this project is to understand the Suggestion System of Volkswagen Navarra, one of the most important tools of the Continuous Improvement strategy. It analyzes the benefits of the system for the plant; cost savings, production and efficiency improvements, and for the employees; optimization of the working place and individual recognition.

On the other hand, it explains the problems of the system and how the Suggestion Workshop eliminates most of them. The evaluation guideline emerges from this Workshop, as a way to evaluate the suggestions objectively and orienting them to the critical points of the plant and the improvements that generate value added.

In conclusion, the Suggestion System keeps alive the employee-company relationship, creating a win-win situation that benefits both of them.

KEYWORDS

- Continuous Improvement
- Valuation guideline
- Suggestion System
- Suggestion Workshop
- Volkswagen Navarra

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1. INTRODUCTION

This project is about my contribution, as an intern, to the Suggestion Office of Volkswagen Navarra. The principal objective is to explain the evaluation guideline of the suggestions in Volkswagen Navarra, a tool that I helped to create. This is the most important activity I have been involved into, during my internship.

Volkswagen Navarra receives yearly around 6.500 suggestions and introduces around 3.000. From the total of suggestions introduced, 95% are no-quantifiable and the remaining 5% are quantifiable. The objective of the Suggestion Office is to reverse this situation, the managers want to be able to quantify 90% of suggestions introduced in 2025.

The suggestion guideline is created in order to quantify and evaluate the no-quantifiable suggestions more accurately and objectively than the actual system. With this tool, it is also expected to orient the suggestions to the critical points of the plant and the points that generate value added.

In order to understand where it emerges from, it is important to explain basic concepts about Volkswagen Navarra. For this reason, the project is divided into three parts.

First, the project gives a background about Volkswagen Group, the actual market position of the company and its competitors, its market volume and so on. It explains how the actual economy is affecting the automotive sector and how affects to Volkswagen consumers. To conclude the section, it goes over the global evolution of the manufacturing process until the rise of the Lean concept, which has allowed the company to be the biggest seller in the world. It also explains, the rise of Lean Production in Volkswagen Navarra.

The second part is focused on the Continuous Improvement System. It gives a background of the System; when it started in Volkswagen Navarra and how its introduction was. Then, it explains the two tools of Continuous Improvement most used in the plant; the Workshop and the Suggestions System. In this section, the Suggestion System is deeply analyzed. It shows the benefits of this system and some of its problems, which are addressed in the Suggestion Workshop.

The third and last part, explains my contribution to Volkswagen Navarra as an intern, what I did during the suggestion Workshop and how I collaborated to introduce the new rules of the Suggestion System and to create the valuation guideline of the suggestions.

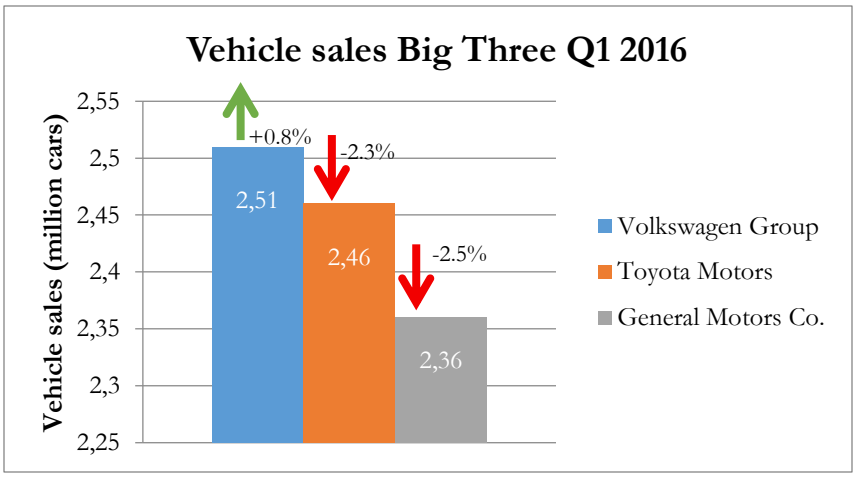
2. THE VOLKSWAGEN GROUP

2.1. Background

The Volkswagen Group is the biggest carmaker in Europe and one of the world's leading car manufacturers, controlling 12.3% of the global market share (Annex 1). It is composed by 12 brands headquartered in 7 different European countries, producing from motorcycles to low-consumption small vehicles and luxury cars (Statista, 2016).

The Group has 610.076 employees operating in 119 production plants around the world. They produce nearly 42.000 cars in a daily basis of 310 different models. These vehicles are exported to 153 countries.

Even though the emission scandal beat the Volkswagen Group, the company has been the biggest car seller in the first quarter of 2016 after overtaking Toyota, which suffered a production stoppage due to the earthquakes of Japan (Gold, 2016). The next graph shows the vehicle sales of Volkswagen Group and its bigger competitors in the first quarter of 2016:



Graph 1. Vehicle Sales Big three. First quarter 2016.

Due to the diesel deception scandal of 2015 in the plant of Chattanooga (US), VW reported a net operating loss of €4.1 billion. The initial impact could be seen when sales volume in 2015 dropped to 10 million cars (2014: 10.217 million). The losses involve government fines, private settlements and the costs of fixing the affected vehicles (Ruddick, 2015). However, the biggest fear for the company is the fall in customer perception, which is hard to forecast, but the impact is already evident and harmful (Annex 2).

Spain is the second largest car manufacturer in Europe after Germany. The automotive sector represents 10% of the Spanish GDP and 19% of all the national exports. The European

market is the main importer because it is receiving monetary helps from the governments as a strategy to renew the vehicle fleet. Fortunately, in this market, the Volkswagen Polo is one of the models with highest demand. In the rest of the world, Volkswagen market entry can be divided between countries with high market entry like Brazil and China, and countries with low market entry like US, Russia, India and other Asian countries. The biggest competitor of the Group in countries where the market entry is low is Hyundai-Kia (Invest in Spain, 2016).

Volkswagen Navarra produces the VW Polo since 1984. Its workforce has 8.593 employees and it is divided between direct employees (4.748) and indirect employees (3.845). In 2015, this model was the most produced and exported of Spain, the plant exported 91% of the production to more than 50 countries. Germany is the first importer of the Polo "made in Spain", with 19.5% of the production, followed by France with 12.5%. The factory reported a benefit of €60.77 million, increasing 14.7% the results of 2014. During the past year, they also invest €129.36 million to prepare the plant for the launch of the new Polo in 2017.

2.2. The actual economy and the automotive sector

Nowadays, the world's economy is recovering from the crisis which implies that all the economy sectors are recomposing themselves, including the automotive sector. The automaker companies have plants all around the world and each of them have been economically affected in different ways. The variation of the exchange rates and the fluctuation of raw materials' value are constant, besides, the consistent politic crisis makes the situation worse.

With this economic and politic framework, the automakers cannot pursue the competition in costs lowering prices, they need to find other characteristics that increase consumer value, like for example, connectivity. Designing "intelligent" cars allows them to increase prices and differentiate themselves from the competition.

Another factor that affects to the European carmakers is the low productivity they present due to the excess capacity installed. But this overcapacity could be explained as a tactic decision to difficult the entry to other manufacturers, as I learnt in the Strategy class.

With all the characteristics that this sector presents, it is very difficult for the companies to spread to other continents like America or Asia. In the Asian market, the Volkswagen Group has only conquered China, where it is the sales leader. Regarding to the American market, the

company has not been able to achieve its expectations. The characteristics of the American market and European market are different. For this reason, the Group has the next challenges;

- Build a strong brand.
- Adequate the products to the American demand (and overtake it).
- Achieve economies of scale with higher volume orders.
- Get financial assistance to establish the brand in the country.

At the moment, the biggest competitors for Volkswagen in North America are the US and Japanese automakers which makes difficult to other manufacturers to entry in the market.

An example of the difficult situation that Volkswagen is facing in the US is the plant in Chattanooga. Setting aside the emissions scandal in this plant, Volkswagen has other problems. The models that the company is producing are different to the American demand. American cars are bigger, consumers do not normally buy diesel engines due to the oil reserves available in the country, most of them have automatic gear and regulations with respect to homologation and security are less strict than European rules. For these reasons, Volkswagen has designed a bigger version of two models; VW Touran and Touareg, including many variants to adequate the product to the American consumers (Zhang, 2016).

To avoid these problems while producing the new VW PoloA07, it is essential to consult the workforce that has been directly working with the previous model because they can propose the best ideas in order to optimize the process and avoid errors that had occurred. It is also important to check their opinions, if they think that the new model is adequate to the market. The integration of all workers in the process is necessary to unify efforts and achieve the goal that is the launch of the new model.

In the long run, the involvement of the workers in these common objectives is very important. That is why, Volkswagen has decided to rely on them because they know the problems directly so they can propose better improvement ideas. The company also checks their opinion about the product and strategy in each country, if they think it is adequate.

In the European market the situation is not like in America. Volkswagen Navarra is now the leading factory, this means that the rest of factories (South Africa and China) that produce the VW Polo take Volkswagen Navarra as a reference. There is a continuous exchange of information between them. The plant in Navarra coordinates the launch with them, they establish the manufacturing standards together and they share the modifications of the process

and product, among other things. Becoming the leading plant has been a rough way, but it has been possible thanks to be the first in introducing a new system of production, the Lean Production system.

2.3. The rise of Lean Production

In order to understand the production system of Volkswagen it is important to analyze the transition of the motor industry starting with craft production in 1894 that evolved into mass production in 1908 with Ford's Model T design and reaching Eiji Toyoda's lean production concept. I studied this evolution process in the Economic History class.

Everything started with the craft production model. In 1894, the first cars appeared in Paris. These cars were handmade and customized by the clients. The principle characteristics of craft production were; highly skilled work force, organizational decentralization because most of the components and vehicle's designs came from little machine shops, the use of general-purpose machine tools and low production volume.

An advantage of this model is that it was hard to exercise a monopoly over these resources. However, production costs were high and did not drop as volume increased, so not everyone could afford a car.

The system's weaknesses became the inspiration in the 1920's for Henry Ford to build a model and overcome those problems. He called it mass production. The new model had two main characteristics: higher product quality at a lower production costs.

Ford's competitors were amazed with the new improvements. Achieving perfect part interchangeability and implementing the continuous-flow assembly line cut the cycle time and increased productivity. Besides, he designed a manual to ease operability and maintainability of the car so average consumers could afford it. However, at that time Ford produced a standardized product, the Model T. So, when it started to expand the car around Europe and North America, it was not suitable for everybody.

After World War II, in the island of Japan, Eiji Toyoda and Taiichi Ohno at the Toyota Motor Company created a new model called lean production. This new concept included further improvements on mass production; manufacturing defects were reduced to the minimum and workforce became a very important pillar in the company. This production model is nowadays used by the Volkswagen Group and Volkswagen Navarra and it is going to be analyzed deeper in the next section (Womack, Jones, & Daniel, 1991).

2.4. From Mass production to Lean production in Volkswagen Navarra

The assembly line appeared in Volkswagen Navarra in 1913 and it lasted until 1980 when the automation era arrived. It is in 1990 when the plant started to introduce the Lean Production system.

The evolution from Mass Production to Lean production is based on eliminating all kind of waste. There are 7 types of waste in manufacturing; overproduction, unnecessary motion, waste of inventory, defects, waiting time, underemployed workers and shipping time.

One of the most important changes of the new system is the role of the workforce in the assembly line; they stopped being just simple workers having more responsibilities. In the lean process, the company assembles small teams that are then assigned to a development project for its life. This time, without a foreman giving orders to its employees. The teams at the end of the project, has to encounter ways to improve the work done (Womack & Jones, 1996).

Before the Lean system arrived, the assembler-supplier relation was less efficient and presented some problems. The Mass-production system had usually rapid shifts in the mix of products that consumers demanded, increasing the unpredictability of the production. For this reason, suppliers tend to have large stocks of both finished parts and parts in process and it was hard for them to optimize the shipping. At the same time, suppliers could do little to improve the design of the parts because they were brought in late in the design process. Besides, the competition between suppliers was stiff, so it was hard to find better ways to produce the parts or invest in R&D. All of these drawbacks increased the costs to the assembler. When the Lean system started in Volkswagen Navarra, the supply chain changed because they introduced the Just In Time (JIT) principle. The idea behind JIT is that the shipment schedule has to be predicted in advance to allow suppliers to prepare the parts, meet the quality and thus, reduce costs.

Until 1990, the plant had engineers with very specific specialties and they worked in that specific area. Nowadays, the company prefers people with a broad range of skills. The approach to lean engineering improved productivity, product quality and had responsiveness to changing consumer demand. The families began to acquire more than one vehicle and people no longer wanted the standardized car or truck. Buyers started to report that the most important characteristics of their vehicle were reliability and differentiation. Furthermore, Volkswagen's flexible production system and its ability to reduce production-engineering costs

let the company supply the variety of vehicles that consumers wanted with almost no cost penalty.

Another principle of the Lean system is the importance of the link between the customer and the production system. At the beginning, Volkswagen and the dealers held back information to maximize bargaining position. But finally, the company built up a network of distributors, some completely owned and others in which Volkswagen held a little equity stake. The dealer became part of the production system sending sequenced orders to the factory and building up a massive data base on households and their buying preferences to increase sales.

All these changes generated a new way to understand the production system. The goal is not producing parts to have large stocks and have them always available, the goal is to produce only when there is an order. (Womack, Jones, & Daniel, 1991)

The base of the Lean production system is the pursuit of perfection in everything the company does. In the next section I will develop the concept of Continuous Improvement and all the processes that Volkswagen Navarra does to implement it.

3. CONTINUOUS IMPROVEMENT

3.1. Definition

Continuous Improvement is a system that pursuits "zero defects". This implies seeking continuously alternatives to improve the different processes and a workforce pursuing quality in everything they do.

The objective of Continuous Improvement is to improve quality eliminating problems and waste in the production system or during other working processes inside the factory.

This system follows a methodology represented in the circle P-D-C-A (Plan-Do-Check-Act) that describes the four basic steps to follow and achieve an incremental improvement strategy. When the four steps are fulfilled, a standard is set up and the cycle begins again.

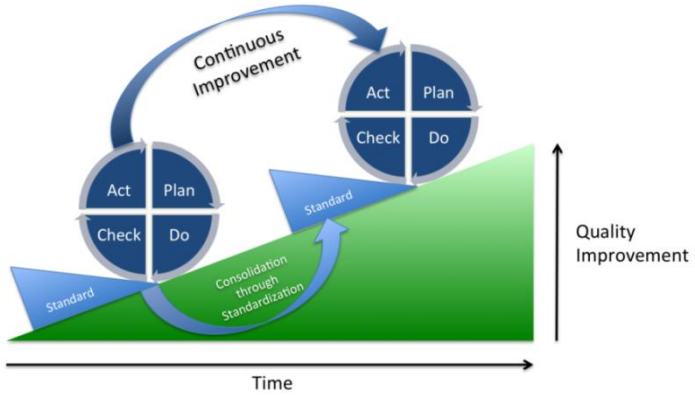


Figure 1. Cycle P-D-C-A. **Source: Volkswagen Navarra**

The cycle is composed of four steps that are analyzed next;

- Plan: First, it is necessary to look for activities that need improvements and then set specific objectives to achieve. When seeking possible improvements there are different possibilities and one of them is creating work teams, as the Workshops.
- Do: The next step is to do all the changes proposed in order to introduce the improvements encountered in the previous step.
- Check: During a specific period of time the new improvements are tested to confirm their correct operation. If the results do not meet what it was established initially, it is necessary to adjust them to obtain the objectives.
- Act: In case the results meet the objectives established, the improvements are definitely introduced. In case the results are not satisfactory, the improvements must be either adjusted or rejected.

Once the improvement is introduced definitely, a standard is established. This standard can affect only to Volkswagen Navarra or to the Group if the improvement is very significant. The standard makes the improvement be maintained over time.

Once the process is finished, it has to begin again to look for possible improvements, getting this way a Continuous Improvement process (MindTools, 2015).

3.2. Historical evolution

Between 1950 and 1970 Continuous Improvement is related to produce more cars, more quality, produce them faster and so on. In short, performing better.

In the 80's the Lean Production system is introduced, therefore, the plant begins to have a well-defined production system and a well-defined direction to improve.

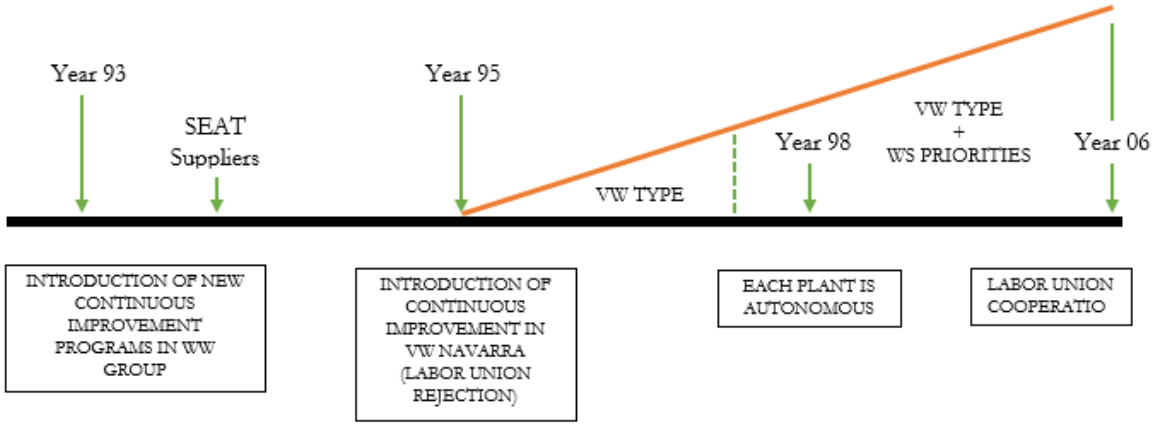


Figure 2. Continuous Improvement evolution **Source: Volkswagen Navarra**

Continuous Improvement is implemented in Volkswagen Navarra in 1995. At the beginning labor unions refused to introduce this strategy for fear of possible layoffs. They thought that reducing the production time or reducing the number of rework[1], would result in a reduction of workforce.

In 2005 labor unions began to participate during the problem solving meetings. With their participation, all the groups got more satisfactory results.

3.3. Introduction

When implementing Continuous Improvement, the support of the General Management is very important for the created department. If this department receives the support, the plant will avoid problems with intermediary managers, indirect workers… who are reluctant to introduce this system until they see the advantages of it.

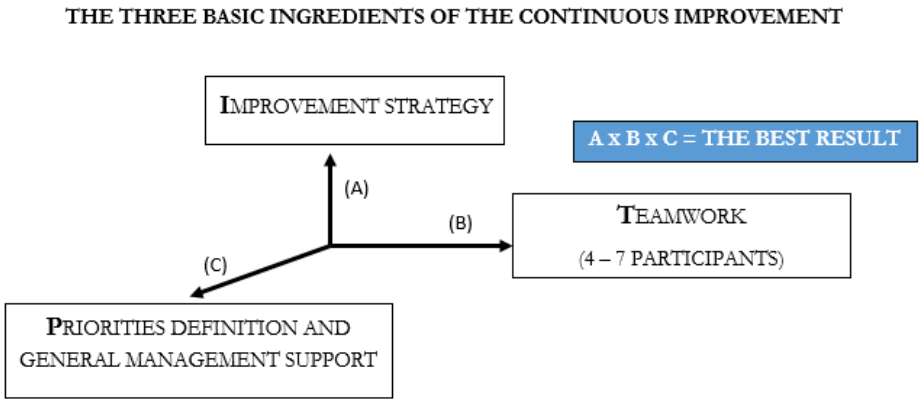


Figure 3. The three basic ingredients of Continuous Improvement.

In Volkswagen Navarra, the created department begins relying on the General Management. But later on, when there exists a culture of systematic meetings every week, the department relies on the Production Management. Once the department is official, it becomes an independent organizational unit.

The most used Continuous Improvement tools in Volkswagen Navarra are the Workshops and the Suggestion System.

4. WORKSHOP

The workshop is made up of a multidisciplinary work team that has to deal with different issues. The objective is to improve a given situation or eliminate an existent problem. The

[1] Rework: Fix production errors.

duration is between three and five days (one week) and it is presented the next Friday after the resolution.

The solutions are implemented when the work team presents them. Precisely, one of the most important principles with respect to these meetings is that they are act oriented. This means that they are oriented to the immediate implementation of the improvements.

In these meetings creativity takes precedence over investment because the investment must pay off in less than one year.

One of the biggest advantages that brings celebrating these meetings is that the improvements are agreed between all the work team members. This creates a bigger implication during the improvement introduction.

In the Workshops, the team seeks practical sense to the problems. For example, it is preferred a solution that solves 50% of the problem than a different one that solves 100% of it but is unlikely to be introduced.

The requirements needed to participate in a Workshop are;

- Seeking the group interest above the personnel interest.
- Have all the activities organized and planned.
- Participate actively.
- Accept the entrusted tasks.
- Have the manager's support to take decisions.

The advantages of this work system are next;

- Stimulates innovation
- Eliminates barriers between departments and improves communication between them.
- Promotes team culture (Teamkultur).
- Encourages a positive attitude when facing problems.
- Allows different departments to confront projects together.

The different type of Workshops that Volkswagen Navarra carry out are Kaskade, Problemlöse and 3P.

4.1. Kaskade

The Workshop Kaskade is also known as a wave of the process, for this reason, it is also called Wave Workshop. It is principally oriented to the direct production areas.

The tool used to do the wave is the KVP-Kaskade.

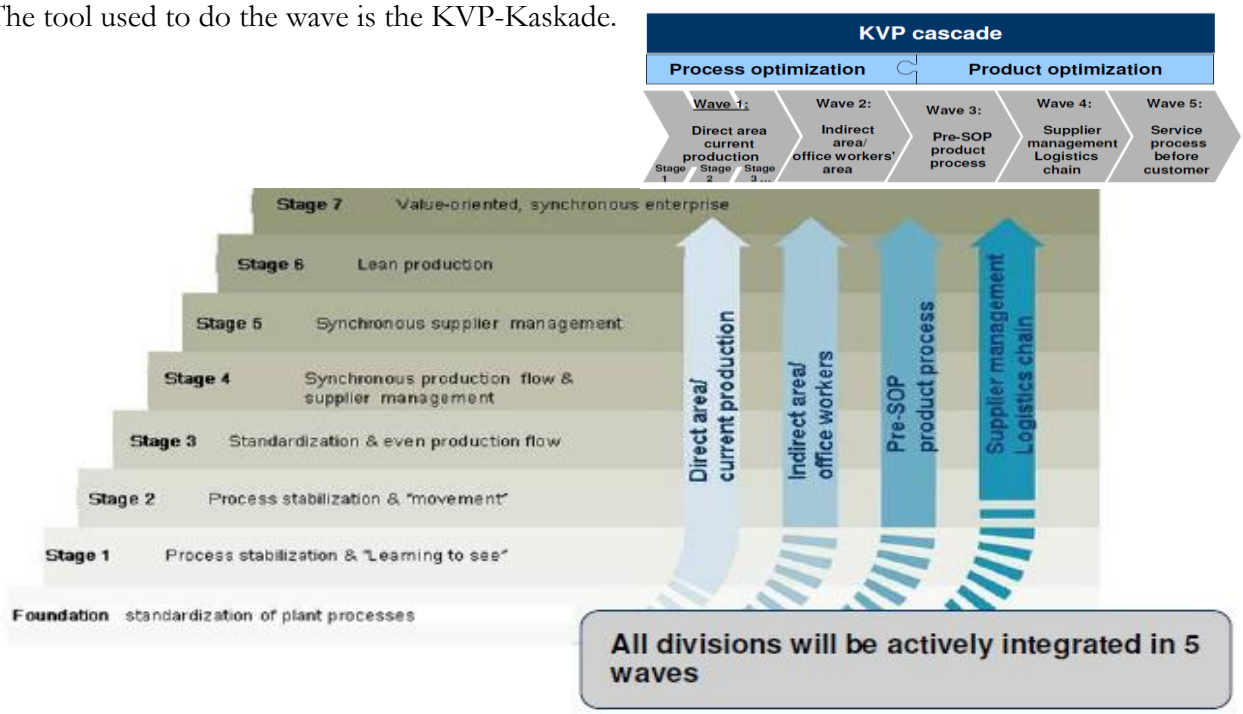


Figure 4. KVP-Kaskade **Source: Volkswagen Navarra**

The seven levels of the picture show the way to follow in order to become a synchronized company. These seven levels have the aim of increasing the value added and they are described below;

- Level 1: Identify and reduce waste in the immediate surroundings of the workstation.
- Level 2: Increase the value added reducing the unnecessary motions of workers and material.
- Level 3: Standardization of manufacturing processes and quality production.
- Level 4: Elimination of Workshops and synchronized flow production achievement.
- Levels 5 and 6: Synchronized production and value added oriented.
- Level 7: View of a synchronized company and value added oriented.

The five waves illustrated in the picture are the necessary tools to implement all the levels, for this reason, they are progressively initiated.

In Volkswagen Navarra they have started from Production, which is a direct area. In order to go through all levels, the starting point must be where the value added is originated. Nowadays, the plant is working on the wave 4, which makes reference to the logistic chain and suppliers.

4.2. Workshop Problemlöse

The Workshop Problemöse is created to solve a particular problem in a specific department. For example, when there is a bottleneck[2] in one installation and the objective is to reduce the cycle time one second.

The managers of that specific department have to decide if it is necessary to start this kind of Workshop. It can be also used to solve problems from indirect areas or designs that are not directly related to the processes. For example, how to reduce the management time of the introduced suggestions in the Suggestion System or how to calculate the value of eliminating an ordinary error in a quality audit.

The measures decided to implement after the Workshop are effective when they are presented in front of the General Managers and they accept them.

4.3. Workshop 3P

This kind of Workshop is carrying out before the model launching. In Volkswagen Navarra the next workshops use the Workshop 3P:

Body shop	Assembly
Engine assembly	Paint shop

In this work teams the participants establish guidelines to produce the new model, as for example, operations to perform, how to distribute the workload, logistics location, needed tools, and so on. The people who participate in this team are:

Production	Processes	Infrastructures	Supervisor	Operator
Maintenance	Industrial Engineering	Logistics	Moderator	

The objective of the Workshop 3P is to decide how the production process will be when the plant has to produce a new model. In the paint shop, for example, they only decide the manual processes in the parts of the line where there are workers because the rest is completely automated.

The next section analyzes the Suggestion System of Volkswagen Navarra. First, I explain how it works. After this, I analyze with graphs the evolution and actual situation of the system to show the advantages and weak points that will be addressed in later sections.

[2] Bottleneck: It is a production time constraint.

5. THE SUGGESTION SYSTEM

5.1. What is a suggestion?

The definition of suggestion that appears in the existing rules of Volkswagen Navarra is the next one; *"a suggestion is an original and specific, individual or collective proposal. Its implementation solves a problem or improves efficiently a given situation, generating economic benefits or other advantages".*

The Suggestion System was introduced in Volkswagen Navarra in 1989 and it is one of the most important tools of the Continuous Improvement strategy. Before the system was implemented, there were quality circles in the plant. This quality circles were a reduced number of work teams, where the participants suggested, discussed and managed ideas. The difference between the actual and previous system is the involvement of the factory, nowadays, the Suggestion System requires complete involvement. This system helps actively to improve the future of Volkswagen, for this reason, the company heavily supports the introduction of suggestions. Only the employees of Volkswagen Navarra can participate.

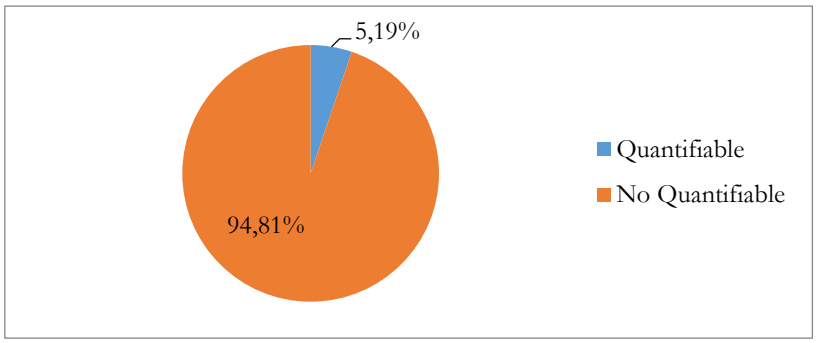
5.2. Type of suggestions

There are three types of suggestions: A, B and C.

- Suggestions of type A are those with quantifiable savings. For example, changing the supplier of a part is quantifiable because you can compare costs.
- Suggestions of type B are those with no-quantifiable savings, for example, changing a plug to a more comfortable place for the operators. It is hard to quantify the economic savings of this action, for this reason, the savings are no-quantifiable.
- Suggestions of type C are those which their solution is the logical result of the problem and does not provide an original idea, but its introduction generates advantages or economic savings. It can generate quantifiable or no-quantifiable savings.

In Volkswagen Navarra, more than 90% of the suggestions introduced are no-quantifiable suggestions and the rest are quantifiable. The electronic database of the Suggestion System in the plant, divides the suggestions in quantifiable or no-quantifiable in the yearly report.

The next pie chart represents the average of the introduced suggestions classified in quantifiable and no-quantifiable from 2012 to 2015.



Graph 2. Average Quantifiable, No-Quantifiable suggestions 2012-2015.

5.3. How to present a suggestion

If one worker or more want to present a suggestion, he or they must fill in one suggestion template. It can be a hard copy but it is preferable the electronic format (Annex 3). This is a real example of a suggestion;

- Title: Computer Information point
- Actual state: The CPU of the computer next to the column "X58" is on the floor.
- Proposed state: Put a table in the trilogiq[3] (as in the picture) and place the CPU on it.
- Expected improvements: Maintain the standards of order and cleanliness.
- Picture, diagram or clarifying drawing:

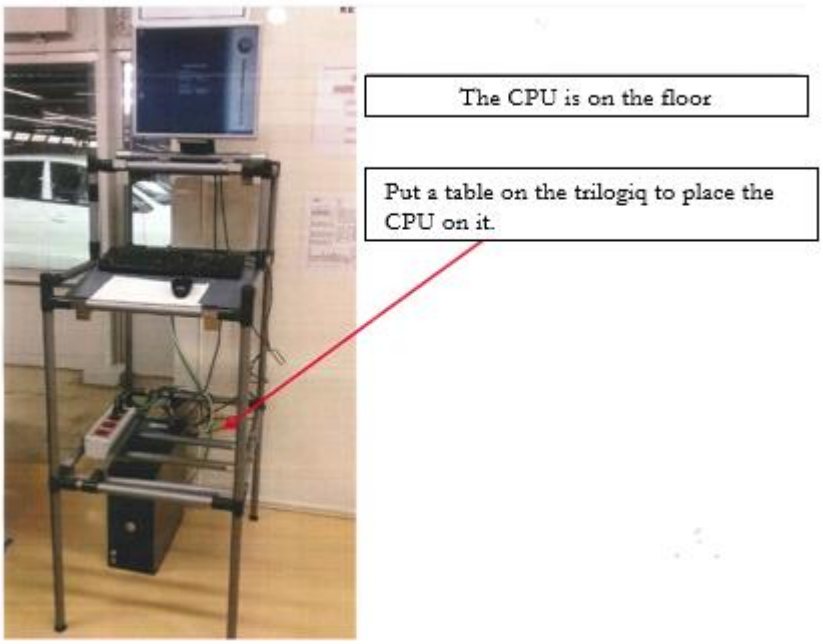


Figure 5. Picture representing the suggestion.

[3] Trilogiq: Tubular structure that serves as a support for computer peripheral systems.

The introduction of suggestions benefits the company and the workforce. On the one hand, when suggestions generate production and quality improvements, the costs are reduced and the company becomes in a better competitor and more attractive employer. On the other hand, employees can increase their level of identification with the company, they see their efforts recognized and rewarded and they can also optimize their working place.

5.4. Suggestion flow

The process that a suggestion follows from the time it is presented until it is introduced or rejected it is explained in the Suggestion System's flow diagram (Annex 4). It is easier to understand how the suggestion flow works with the next real example;

1. The employee presents his idea. The participant thinks that it is possible to save gas changing the air-conditioning system and presents his idea.
2. The Suggestion Office. In this office, we are responsible for reading the idea and evaluate if it meets the requirements. If all the requirements are met we send it to its corresponding area to see if it is possible to introduce. In this case, the suggestion belongs to the infrastructures area.
3. The Team. It is a work team compounded by the managers of the Suggestion Office and the experts of the affected area. The Team has to study the idea and communicate if they agree and if they are interested in implementing it. In this case, the Infrastructures Team agrees, so they have to send the idea to the consultant so he can process it.
4. The Consultant. Is the expert who analyzes the proposal to see if it is feasible to implement or not. In this case, as the consultant agrees with the participant, he sends a purchase request to hire a company and make the reforms.
5. Controlling. As this suggestion has quantifiable savings, it has to go through controlling to evaluate them. If it is a type B or C suggestion, it skips this step. Controlling, after evaluating this suggestion states that it has €152.800 of savings (equivalent to 4.303.013Kwh gas/year).
6. The Team. The Team receives the evaluation from Controlling and they introduce the prize in the computer system. The participant will receive the economic prize in his next payroll. The participant of this suggestion will receive €45.840 (30% of €152.800).

5.5. Prizes

Once the suggestion is introduced, the participant or participants will receive a prize. The award depends on the type of suggestion.

- Type A:

  Prize = Annual Savings × 0.3 × Responsibility Coefficient × Recovery coefficient

  When the suggestion introduced is of type A, the prize is 30% of the year savings. The result is multiplied by the responsibility coefficient, a coefficient that depends on the degree of relation between the participant and the area of the plant to whom he belongs to.

  If the participant is direct labor, the coefficient is 1.

	If the issue is neither manager's nor participant's responsibility	If the issue is manager's responsibility but not of the participant	If the issue is both manager's and participant's responsibility
INDIRECT LABOR	0.9	0.6	Between 0.3 and 0. (Depends on the Team's criteria)

  Finally, if the suggestion needs an investment to introduce it, the Team has to calculate the recovery coefficient.

  As a general rule, suggestions with a payback period superior to 12 months are not introduced. However, there are occasions when suggestions are introduced for reasons other than strictly economic.

Payback period < 12 months	Payback period between 12 and 24 months	Payback period > 24 months
0.3	0.2	Type B suggestion

The Suggestion Office decided all these coefficients after comparing the system of Volkswagen Navarra with other systems of different plants of the Group.

- Type B: if the suggestion introduced is of type B, the prize range from €25 to €500. There are six categories; A. €25, B. €50, C. €100, D. €150, E. €300 and F. €500. The Team has to follow the rules established and the valuation guideline to decide the category of the prize.
- Type C: if the suggestion introduced is of type C, the prize range from €0 to €250 when it is no-quantifiable. There are five categories; A. €0, B. €25, C. €50, D. €100,

and E. €250. The Team has to decide the category of the prize following the rules established and the valuation guideline.

When the suggestion of Type C is quantifiable, the prize is calculated with the same method as the suggestion of Type A and multiplying the final result times 0.25.

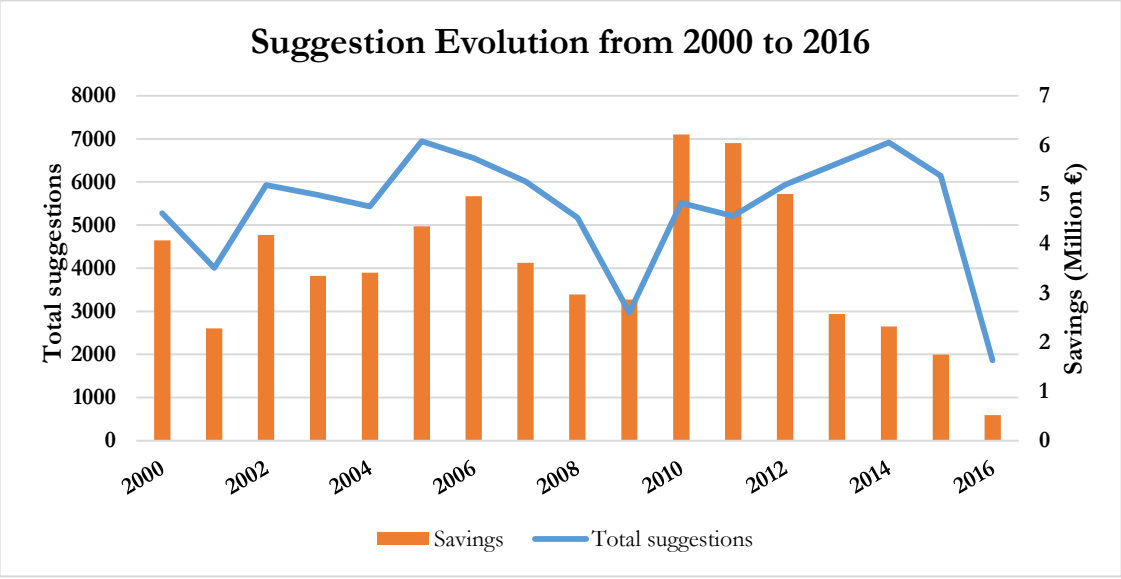
The maximum prize that a participant can receive for a suggestion of type A or C, when it is quantifiable, is 12.000€ or one VW Polo with the same economic value.

When I started in the Suggestion Office, the biggest problem they were facing was the subjectivism when deciding the category of the prize during the evaluation of the suggestions. This problem was addressed in the Suggestion Workshop and the solution proposed was to create a guideline to evaluate the suggestions. I will explain all of this in the following sections.

5.6. Suggestion System analysis

How important is the Suggestion System for Volkswagen Navarra? The plant needs to develop a specific department to manage the Suggestion System and involve the rest of the plant to participate on it, is that really worth it?

5.6.1. Savings



Graph 3. Suggestions evolution of savings and total suggestions presented from 2000 to Q12016.

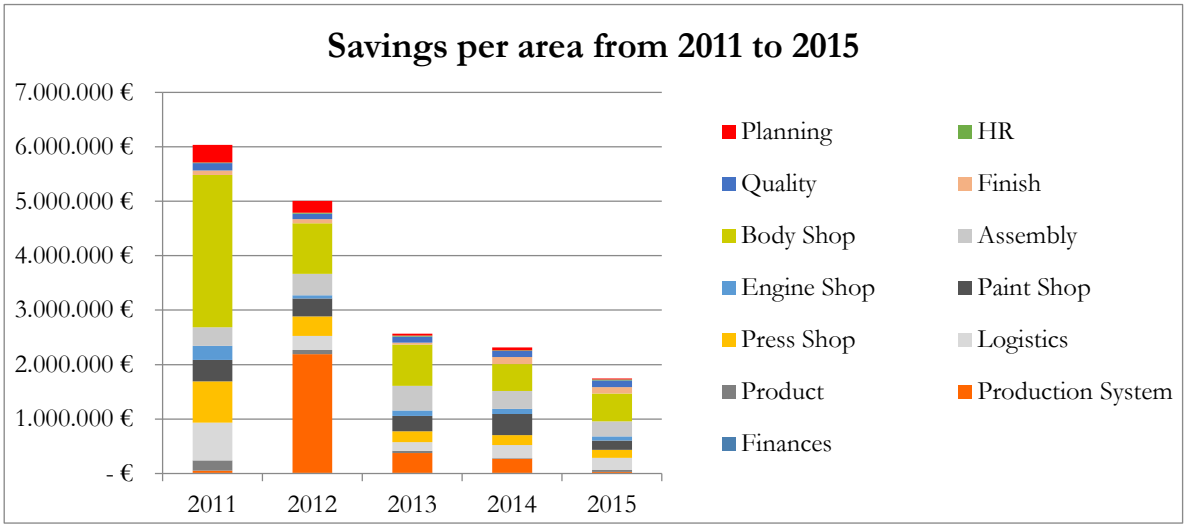
In order to see the value of the Suggestion System, it is important to analyze the savings' evolution of Volkswagen Navarra.

This graph shows the total savings generated through all the suggestions presented since 2000 until the first quarter of 2016. It shows that the number of suggestions presented and the total savings of one year are positively correlated to the launch of a new model. For example, the Polo A04 was launched in 2001 and the number of suggestions presented increased for the following four years until 2005, when the suggestions presented started to decrease.

In 2009, Volkswagen Navarra launched the Polo A05 and the same phenomenon was repeated again. Total savings decreased from €6.213 million in 2010 to €1.746 million in 2015. This is because, during the first years of the new model there are many new facilities and processes that start running and many possibilities to improve them. As time goes by and standards and improvements are introduced, people present less suggestions and most of them are no-quantifiable and generate less savings.

With this in mind, it is clear that the Suggestion System generates important savings for Volkswagen Navarra at the end of the year. As big investments are needed to produce the Polo, the Suggestion System helps to smooth out these economic investments.

There are areas in the plant which through the Suggestion System generate more savings than others. The next graph breaks down the total savings generated per area since 2011. The computer software of Volkswagen Navarra (SAP) started to save the data about the results of the suggestions per area in 2011. Until then, the computer software gave a global picture, it did not divide the results per areas.



Graph 4. Savings per area from 2011 to 2015.

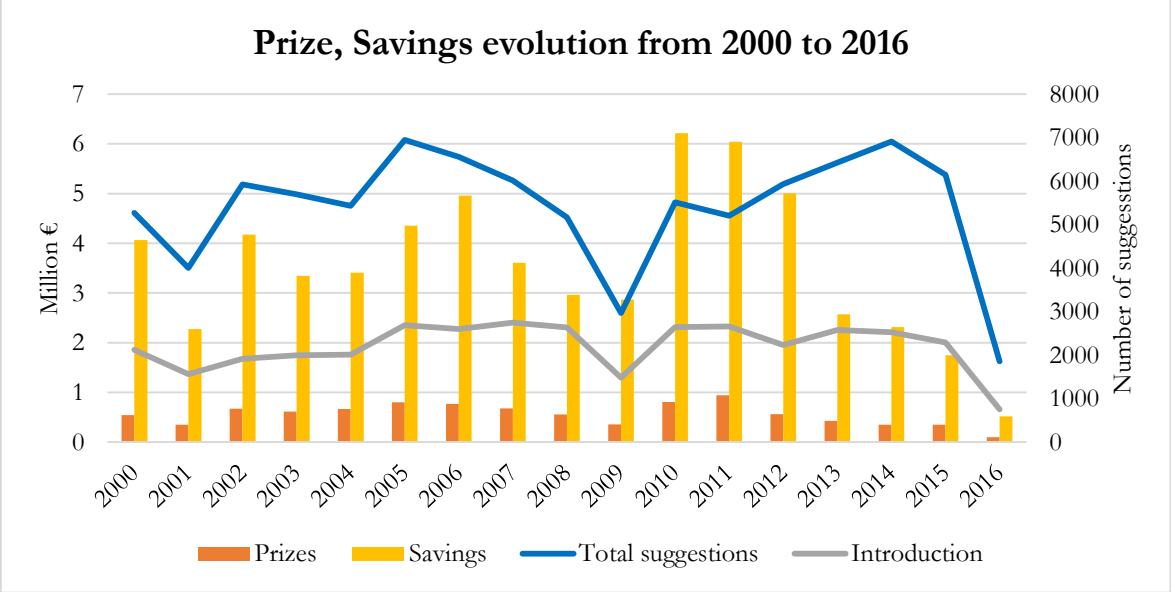
With all the data available, I calculated the average of the contribution to savings per area (Annex 5). The areas that contribute the most to savings are the ones which belong to

production; Body Shop, Paint Shop and Assembly. The biggest contributor is Body Shop, with an average of 29,05%. From the Auxiliary areas[4], the biggest contributor is Production System, with an average of 14,20%. However, its contribution is not constant because in 2011, this area contributed to savings 0,68% and the following year 43,55%.

In conclusion, production areas contribute more than auxiliary areas because all production areas together, contributed on average during these five years 63,7% of savings, while auxiliary areas contributed 36,3%.

5.6.2. Prizes

The prize given when a suggestion is introduced is an important tool that motivates the workforce to present more suggestions. The next graph shows the evolution of prizes given from 2000 to the first quarter of 2016. It also shows total savings and total presented and introduced suggestions per year.



Graph 5. Prize, Savings, Presented suggestions, Introduced suggestions evolution from 2000 to Q12016.

The Suggestion Office has calculated that the percentage of prizes given regarding to the savings generated is approximately 18%.

Analyzing the graph, years in which savings are higher the percentage of prizes given is lower. The reason behind this conclusion is that regardless of savings generated by a suggestion, the maximum prize was 10.000€, since 2016 is 12.000€. If for example one suggestion generates

[4] Auxiliary areas: Finances, Production System, Product, Logistics, Finish, Quality, HR and Planning.

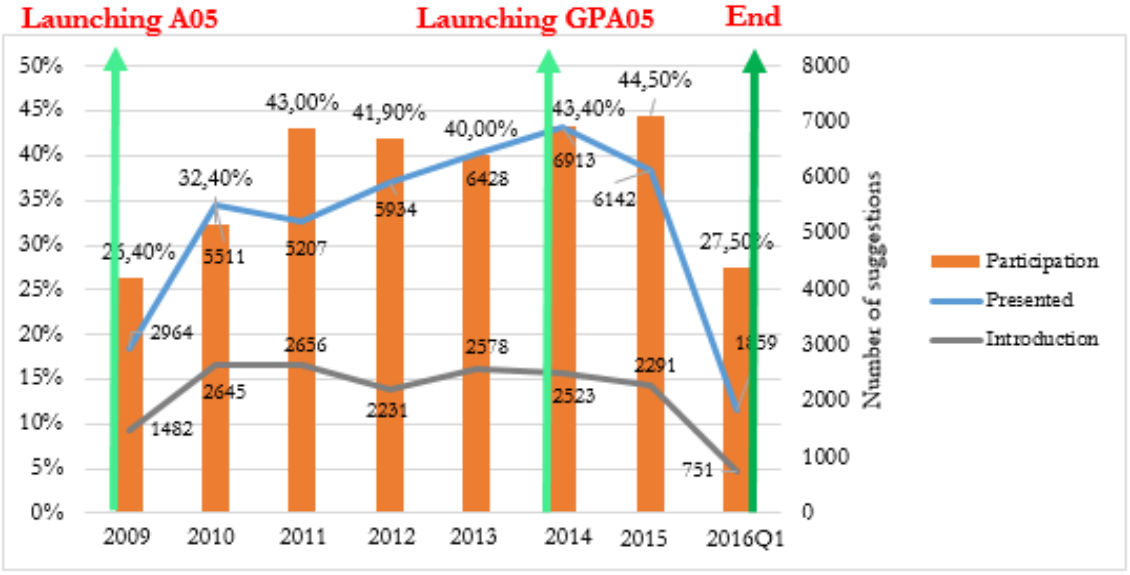
250.000€ of savings, the prize will be 12.000€ (if the suggestion is not directly related to the participant's responsibility), and if other suggestion generates 1.000.000€ of savings, the participant will receive the same prize. Until June of 2011 this percentage was lower because the maximum prize was 6.000€.

5.6.3. Participation, presentation and introduction of suggestions

What is this?

- Participation is the percentage of the workforce who presents suggestions.
- Presentation is the total of suggestions presented by the workforce.
- Introduction is the number of suggestions presented which are implemented.

This graph shows the participation rate, the number of suggestions presented and the number of suggestions introduced during the life of the Polo A05 and the Polo GPA05 that the plant is actually producing. As it was discussed previously, the number of suggestions presented and thus the participation and the introduction, in general terms, are positively correlated to the launch of a new model.



Graph 6. Evolution of Participation rate, Presented and Introduced from 2009 to Q12016.

Participation, presentation and introduction are positively correlated to the launching curve of the models A05 and GPA05. The Polo A05 was launched in 2009 that is the reason why, in general terms, the percentage of participation and the number of suggestions introduced started rising from that time on. As the graph shows, there was a first peak in 2011, when the participation rate increased to 43% almost doubling the rate in 2009 that was 26.4%. But after

2011, the participation rate fell. However, in 2014 the participation rate increased again (43.4%) and it reached the highest point in 2015 (44.5%). This second peak coincided in time with the launch of the Polo GPA05, which was in 2014.

The same pattern follows the total of suggestions introduced and presented. The graph shows that in 2011, Volkswagen Navarra introduced 1174 more suggestions and presented 2243 more suggestions than in 2009. And again there is a second peak of suggestions presented in 2014 (6913, 133.23% more than in 2009) when the Polo GPA05 was launched. However the number of suggestions introduced is lower because most of the processes and facilities are shared by the models A05 and GP05, so most of the installations are already standardize and less suggestions are accepted. The newer the model is, the higher is the number of suggestions introduced. As new processes and facilities are implemented, more suggestions to improve them are presented. In 2017 Volkswagen Navarra will launch the new Polo A07, so all the variables in 2016 will be lower than the previous years because it does not make sense to invest money remaining less than one year for the new launching.

For this reasons, the Suggestion Office prepares campaigns to motivate workers to participate. As we are at the end of the actual model's life, we prepared a campaign to keep the quality of the Polo until the end of production. Every introduced suggestion related to quality will receive a present and the best suggestion per month will receive a trip to visit Wolfsburg.

5.6.4. World League of Suggestions

The Suggestion System is a standard of Volkswagen Group. All the plants around the world have implemented it. The system has 41 years and although it is a standard, each plant has its own rules and processes when treating and evaluating the suggestions. Nowadays, the Group is developing a common software and they want to unify the evaluation system (same classification, same maximum prize, same rules…). The principal objective of Volkswagen Group is that plants could share between them their suggestions, between all its brands. That is why the company wants to develop a common software of suggestions to all the factories.

The World League of Suggestions, called "Koncern – Ideen – Liga", has common objectives even though the results in each plant are different. There are more than 45 index that each factory has to report to Wolfsburg (the headquarters of VW Group). The World League of Suggestions is one of them and it is presented as a unifying element in order to keep alive the

System. It is a ranking that presents the situation of each plant with respect to the operation of the Suggestion System. (Annex 6).

5.6.5. Objectives and evolution of suggestions

In order to be number one in the World League of Suggestions, Volkswagen Navarra establishes internally their own objectives. Every month the Suggestion Office of VW Navarra uploads to the electronic platform the overall situation and the situation per areas of the suggestions, to which only the supervisors and managers of the plant have access. The objective is to keep alive the system, if the areas see that they are not achieving their objectives, they will try harder the next month to reach them (Annex 7).

6. SUGGESTION WORKSHOP

When I got into Volkswagen Navarra, the first project in which I was involved was the Suggestion Workshop. It started in February 2015 so I did not participate since the beginning of it. It was compounded by a multidisciplinary work team in which all the areas of the plant were participating. Both the production areas (Paint Shop, Body Shop, Press Shop, Assembly shop and Engine assembly) and the auxiliary areas (Finances, Logistics, Quality, Planning, HR, Product and Production System).

As we are at the end of the Polo A05 life and soon will be the beginning of the Polo A07, the Office of Suggestions wanted to improve the efficiency of the system. The principal objectives of the Workshop were answering faster the suggestions, more precisely and objectively and increase the percentage of introduced suggestions to achieve the most important objective; increase workers' satisfaction. If workers' satisfaction increases, more suggestions will be presented; therefore, more suggestions will be introduced generating more improvements and savings for the plant.

6.1. Improvements

The Team prepared a list with the improvements they considered important to develop a better and more efficient Suggestion System, in order to achieve the principal objective. By the time I arrived, all the improvements except four were already implemented;

1	Multiannual Objectives	
	▪ # presented suggestions/worker → 1,5 ▪ Introduction Ratio → 40% ▪ Participation Ratio → 45%	▪ Savings/worker → 800€ ▪ Management time/Suggestion → 50 days

✓	2	**Flexibility to exclude a suggestion from the system**
		▪ The suggestions, firstly, will be accepted provisionally in the Suggestion Office. They only will be admitted if the Team decides to do so.
✓	3	**More consultants**
		▪ Each consultant will have a maximum of 10 suggestions, in case he has to receive one more, the area will be asked to assign it to a different consultant. ▪ Meeting with the consultant if he has a suggestion more than 30 days.
✗	4	**New validity date of the suggestions**
		▪ Over the product, since 30 working days from the S.O.P (Start of Production) ▪ Over new installations, since 30 working days from the pre-acceptance ▪ Over new computer Apps and processes, since 60 working days from its introduction. ▪ Over new installations not linked to new products launching, since it start running. ▪ Over the product, between the VFF[5] and 30 working days after the S.O.P, the suggestions will be classified as Type B (no-quantifiable).
✓	5	**Standardize Team's operation**
		▪ The suggestion Office will have weekly meetings with the Teams to check their suggestions situation.
✓	6	**General Management support**
		▪ Every three months the overall and per areas suggestions situation will be presented in the Management Meeting.
✗	7	**New Classification of Suggestions of Type C**
		▪ In case a Suggestion of type C is quantifiable, it will be valued as a Type A but the maximum prize will be 25% of it.
✓	8	**New Suggestions Type "DL"**
		▪ Direct labor suggestions will be controlled separately. ▪ The objective of this is to promote the presentation of suggestions by this group (75% of the workforce).
✗	9	**New tool for objective valuation**
		▪ Create a template to evaluate objectively the suggestions of each area. ▪ Each area will have its own template with its own requirements.
✗	10	**Prize increase**
		▪ Maximum prize: 12.000€ (equal to the average price of the manufactured product). ▪ No quantifiable suggestions: A.25€, B.50€, C.100€, D.150€, E.300€, F.500€ (with the approval of Controlling).
✓	11	**Adjustment of the collective suggestions**
		▪ When participating in a collective act, it will be taxed with the concept of payment in kind. ▪ The participation in this act will be reported in the payroll, even though it does not affect the salary. In order to cover the PIT, 25% of the budget of each department will be discounted.
✓	12	**Savings in Volkswagen Navarra, Savings in the Group**
		▪ In case the savings of a suggestion affect the product but not to the income statement of Volkswagen Navarra, the participant will receive the prize likewise. ▪ In case the suggestion generates savings in the Polo and other vehicles, the participant will receive exclusively the prize from the savings generated in the Polo.
✓	13	**Relation between suggestions and BOM18**
		▪ One BOM18 will never be a suggestion, but a suggestion can become BOM18. ▪ To that effect, a tool will be created to upload the best suggestions to the Maßnahmenweb. As a consequence, the introduced suggestions that are quantifiable will be classified differently, in order to assure their correct transfer to the Maßnahmenweb and their correct account in the plant.
✓	14	**High value suggestions**
		▪ The high value suggestions will be tracked specially.
✓	15	**Communication to the workforce**
		▪ There will be communications to the workforce about the Suggestion System, in order to motive them to participate and inform them about how to present a suggestion, write down it and other strategic issues. ▪ To that effect, different media will be used: Polo League, Polo Zoom, Week Idea, Suggestion of the month, Management Meeting y Panels of the different workshops. ▪ The Suggestion Office will establish means to know the workforce opinion about the Suggestion System.

Table 1. Workshop proposed improvements.

[5] VFF: Pre-series. The prototypes of series cars.

6.2. Implementation of Improvements

When Workshop meetings end up, the next step is to present the decisions to the Executive Board. However, in this case the presentation of the Workshop did not follow the normal method because implementing a new Suggestions System or modifying the previous one, is a sensible process as it affects to the entire plant. For this reason, it is important the support of the managers from all the areas. So, the Suggestion Office decided to organize meetings with all the managers, in order to go through the Workshop again, solving conflictive points and collecting new suggestions.

This is the time when I joined the Suggestion Office. All managers agreed with the new improvements except with three of them, which affected directly to the rules of the Suggestions System. The other was the valuation guideline for the suggestions, which was approved but was not developed yet.

6.2.1. Improvements affecting the rules

In order to solve the conflict of opinions about the modification of the rules, the Suggestion Office decided to benchmark the actual rules against the rules of other Suggestion Offices of Volkswagen Group.

- New validity date of the suggestions

In the Workshop, one of the improvements proposed was changing the validity date of the suggestions at the beginning of a new model. As graph 6 shows, the number of suggestions presented during the first year of a new model is lower than the following years. This is because the rules, before the workshop, stated several conditions for the suggestions to be accepted into the system;

- Over the product, since the commercial delivery of 100.000 cars.
- Over the process, since the commercial delivery of 25.000 cars.
- Over new facilities or computer Apps, since 2 months after the pre-acceptance

Taking into account this rules, suggestions related to a new model should wait at least 2 months (if it was about facilities or computer Apps, if not more time than 2 months considering that the first 25.000 cars are delivered 4 months after the S.O.P). Many good ideas about a new model were rejected because of that, for this reason, during the Workshop, the managers along with the Suggestion Office decided to change these rules to the ones

proposed in point 4 of the Workshop table. These new rules are based on the rules of Wolfsburg and Mexico Volkswagen plants.

- New classification of Suggestions of Type C

Before the Workshop, the suggestions of Type C were denominated complaints. The concept of complaint does not exist in any plant of the Group, however, having this classification has advantages and disadvantages for VW Navarra. The advantages are;

- The suggestions of Type C allow finding anomalous situations that for some reason have not been solved.
- During the 20 years of existence of complaints (now called suggestions of Type C), Volkswagen Navarra has saved several million euros.

The disadvantages are;

- There are no suggestions of Type C in any plant of the Group.
- Before the Workshop, there was almost no difference between complaints with no value added and complaints that save million euros, because there was no difference between quantifiable and no-quantifiable complaints (prizes ranged from 0€ to 250€).
- Does the word complaint sound attractive for Volkswagen Navarra?

Although no other plants have this suggestions classification, the participants of the Workshop decided to maintain it due to the positive results since its implementation; since it was created, more than 15,000 complaints were received saving million euros. However, they considered that the name sounded a little violent, so they changed it to Suggestions of Type C. Apart from this, during the Workshop it was approved the new classification of suggestions of Type C as quantifiable, so they can now be awarded as a Type A, but being the maximum prize 25% of it.

- Prize increase

The formula to calculate the prize of the quantifiable suggestions is clear and everyone agrees with it;

$$\text{Prize} = \text{Annual Savings} \times 0.3 \times \text{Responsibility Coefficient} \times \text{Recovery coefficient}$$

All the participants in the Workshop agreed that the advantages of the actual award system are;

- An easy and well-known system.
- It creates a positive discrimination to Direct Labor force.

However, the disadvantages are;

- In other plants, percentages are linked to savings sections, decreasing as savings increase, while in Volkswagen Navarra it is the same for all sections (Annex 8).

The next data was presented in the benchmarking;
Maximum prize;

Martorell: 24.000€	Mexico: 15.000€
Germany: 51.129€	Pamplona: 10.000€

Responsibility coefficient;

- Germany: Sections between 0.15 and 0.45, average 0.3
- Martorell: 0.3 x Function coefficient (0.25/0.5/0.75/1)
- Mexico: Sections between 0.7 and 0.15, average 0.12
- Navarra: 0.3 x Responsibility coefficient (between 0 and 1)

After the analysis, the recommendations are to increase the maximum prize to 12.000€ and leave the responsibility coefficient criteria as it was established.

6.2.2. Valuation guideline of the suggestions

The Suggestion Office encountered a problem when evaluating the suggestions. Approximately, 5% of suggestions are quantifiable and the other 95% no-quantifiable (Graph 2). The accounting standards to evaluate the quantifiable suggestions were clear and did not lead to subjectivism, however, the criteria to evaluate the no-quantifiable suggestions was not objective and this created doubts and distrust in the Suggestions System. Besides, there were many good ideas that could not be awarded properly just because they did not generate effective savings, but the production was more efficient and the employee could perform better in his working place.
In order to end up with this situation, the decision in the Workshop is creating a guideline to evaluate the suggestions objectively and which suits the priorities and criteria of Volkswagen.
The advantages are;

- The guide allows for orienting the suggestions towards the critical points of the plant.

- The guide rewards the suggestions that generate value added within the priorities of Volkswagen strategy.
- Standardize the process of evaluation paying everyone with the same criteria. Before, similar no-quantifiable ideas could be awarded differently depending on uncontrollable factors such as mood of the manager, manager-participant relation, personal situation…

The key point of the guideline is to improve the critical points of the plant. To develop it, the managers of the Suggestion Office and me organized meetings with the areas of the plant to establish the evaluation criteria.

Once the criteria were defined, I was asked to design it. Therefore, after the meetings, the managers of all the areas and the IT department helped me to prepare the guideline. I designed an Excel with thirteen sheets, each one representing a critical point or a priority for VW Navarra and collecting the evaluation criteria. I decided to use Excel because I consider that it is an easy tool to record the necessary information of a suggestion, to which every manager have access and know how to use it. Also, for the IT department it was the easiest format to attach to SAP. Once I created the different sheets, each effected area has to review and approve the tables. Actually, from the twelve sheets, only the first six are approved, the rest are in process of evaluation.

The next table describes twelve sheets;

	Sheet	Description/Criteria
✓	▪ Staff costs	Valuation of labor costs per worker and labor costs, hours/worker
✓	▪ Body Shop & Press Shop	Prizes are paid depending on the increased capacity of a critical installation.
✓	▪ Consumption	Valuation of consumption reduction of material, rejections and paper-photocopies.
✓	▪ Employment Security	Valuation of risk reductions
✓	▪ Environment	Valuation of the relevance to the environment and the environmental priorities for Volkswagen
✓	▪ Logistics	Valuation of real savings in Logistics
✗	▪ Quality	Valuation of reductions in auditing points
✗	▪ Planning	Valuation of a product modification.
✗	▪ Launching	Valuation of the suggestions during the launching period.
✗	▪ Unrealized Investments	Valuation of unrealized investments
✗	▪ Reworks	Valuation of reworks
✗	▪ Order and Cleanliness	Valuation according to the order and cleanliness audit.

Table 2. Description of the guideline's sheets.

1. The cover

The first sheet of the guideline serves as a cover; we can find the basic information about the suggestion and the final assessment. Besides, it includes an index to identify the concept of it. Now, I will explain the six sheets that are already approved, how they work and how I created them.

Figure 6. Example of the guideline's cover.

2. Staff costs

The second sheet of the guideline is used when the suggestion affects staff costs. Before this table was created, if the participant proposed an idea that decreased the workload of an employee, there was an evaluation problem. Direct and indirect labor workers were evaluated with the same criteria. Savings were calculated the same way no matter which position the worker had. For this reason, the Suggestion Office proposed new criteria that the rest of areas accepted and I reflected it in the next two tables.

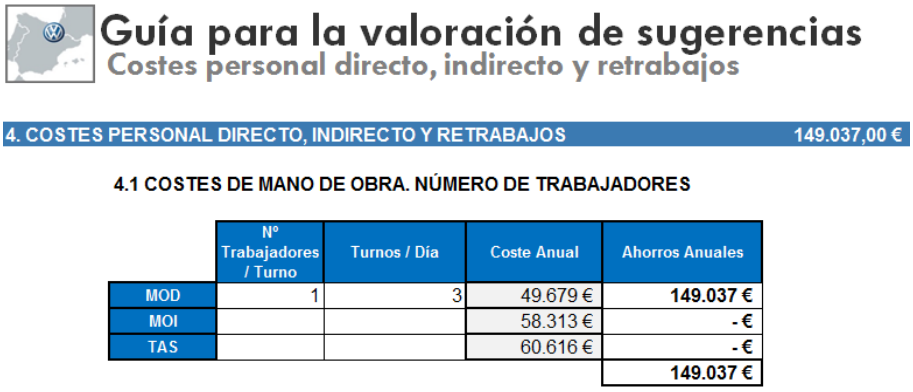


Figure 7. Staff Costs evaluation table 1.

4.2 COSTES DE MANO DE OBRA. HORAS/TRABAJADOR
Reducción de número de horas - El trabajador permanece

	Nº Horas	Coste/Hora	Coeficiente	Ahorros Anuales
MOD		29,43 €	25%	- €
MOI		34,55 €	25%	- €
TAS		35,91 €	25%	- €
				- €

Figure 8. Staff Costs evaluation table 2.

First, it is important to understand the differences between MOD (direct labor: operators in the production line), MOI (indirect labor: staff linked to production who do not work directly in the production line) and TAS (technician and administrative, also indirect labor) when decreasing the workload;

- Direct labor (MOD): decreasing workload means decreasing work cycle time[6] that he can use to do new works or other operations. It affects to the car manufacturing time.
- Indirect labor (MOI and TAS): their workload is not linked to the production line, thus, decreasing workload does not lead to decrease the car manufacturing time.

The first table calculates the annual savings if a worker is removed, depending on his annual cost for the plant. For example, if the participant proposes to automate a workplace, the worker would be replaced by a machine. Annual savings, in this case, would be considered as the annual cost of the worker. The cells of annual savings have the formulas incorporated (#workers x shifts/day x annual cost).

The second table calculates the annual savings when the suggestion decreases the workload. In this case, annual savings would be 25% of the cost per hour of the worker. As the suggestion does not eliminate a worker, the Suggestion Office decided to apply a 25% reduction coefficient, because the reduction of the workload may not generate immediate or long term savings. Once the annual savings are calculated, the suggestion will be awarded as a suggestion of Type A.

3. Body Shop and Press Shop

The third sheet is used when the suggestion affects to Body Shop or Press Shop. This is one of the most important sheets because as we have seen, Body Shop is the largest contributor to savings through the Suggestion System (graph 4). This area is the bottleneck of Volkswagen

[6] Cycle time: assigned time that an operator has to perform his work per car.

Navarra due to its limited capacity to produce bodyworks. For this reason, the suggestions that increase the capacity of this workshop are highly awarded. In Press Shop the situation is very similar.

Thanks to the introduction of suggestions in Body Shop and Press Shop, the capacity and efficiency of their installations has increased considerably. In this case, I created one table per workshop, one for Body Shop and a different one for Press Shop. I will start with Body Shop.

Before creating the table, suggestions were awarded based on the value of the installation. For example, if a suggestion improved the process of producing car roofs, as it is the most expensive installation, the prize was higher than if the suggestions improved the process of producing trunks, which has a cheaper installation. However, within Body Shop, trunk's installation is the bottleneck. Therefore, improving the trunk's installation will increase the capacity of the area. For this reason, in the Suggestion Workshop, the decision was to award the suggestions based on the capacity increase. In Press Shop the situation is similar.

Guía para la valoración de sugerencias
Eficiencia Instalaciones Chapistería y Prensas

5. EFICIENCIA EN CHAPISTERÍA Y PRENSAS									20.000 €
5.1 Eficiencia en las Instalaciones de Chapistería									
	€/PIEZA	€/PIEZA/AÑO	Nº PIEZAS	€/SEG (NCB)	Nº SEG. (NCB)	€/SEG (CB)	Nº SEG. (CB)	AHORROS	POR
PISO ANTERIOR	1,35 €	300 €		1.100 €		2.200 €		- €	2
PISO POSTERIOR	1,68 €	400 €		700 €		1.400 €		- €	2
PASORRUEDAS ANTERIOR DERECHO	1,48 €	300 €		600 €		1.200 €		- €	2
PASORRUEDAS ANTERIOR IZQUIERDO	1,53 €	300 €		600 €		1.200 €		- €	2
PUERTA TRASERA IZQUIERDA	0,83 €	200 €		700 €		1.400 €		- €	2
PUERTA TRASERA DERECHA	0,83 €	200 €		700 €		1.400 €		- €	2
PUERTA DELANTERA IZQUIERDA	0,77 €	200 €		1.300 €		2.600 €		- €	2
PUERTA DELANTERA DERECHA	0,77 €	200 €		1.300 €		2.600 €		- €	2
CAPÓ	0,82 €	200 €		1.400 €		2.800 €		- €	2
PORTÓN	0,75 €	200 €		1.300 €		2.600 €		- €	2
MASCARÓN III	4,29 €	1.000 €		1.800 €		9.000 €		- €	5
COMPLETACIÓN AUTOBASTIDOR I	2,79 €	600 €		1.200 €		6.000 €		- €	5
GEO I	2,79 €	600 €		1.200 €		6.000 €		- €	5
COMPLETACIÓN UTOBASTIDOR II	4,29 €	1.000 €		1.800 €		9.000 €		- €	5
GEO II	4,80 €	1.100 €		2.000 €		10.000 €		- €	5
FALDÓN	1,50 €	300 €		600 €		3.000 €		- €	5
MASCARÓN I	6,03 €	1.400 €		2.600 €		13.000 €		- €	5
MASCARÓN II	0,93 €	200 €		1.600 €		8.000 €		- €	5
ELEMENTOS MÓVILES	0,82 €	200 €		400 €		2.000 €		- €	5
SALPICADERO	1,83 €	400 €	50	800 €		6.400 €		20.000 €	8
LATERAL IZQUIERDO	2,99 €	700 €		1.300 €		10.400 €		- €	8
LATERAL DERECHO	2,98 €	700 €		1.300 €		10.400 €		- €	8
								20.000 €	

Figure 9. Body Shop evaluation table example.

This table calculates the savings derived from a suggestion that increase the capacity of Body Shop. There are two possibilities to increase capacity;

- The first one is by eliminating or reducing breakdowns in installations, avoiding loss of parts. In this case, the suggestion is evaluated based on the number of parts that the suggestion avoids losing (Columns 1, 2 and 3).
- The second is by reducing the cycle time of the installation. In this other case, the suggestion is evaluated based on the reduced time and if the installation is a bottleneck (columns 6 and 7) or if is not (columns 4 and 5). If the installation is a bottleneck, savings are twice of savings generated by an installation that is not a bottleneck.

Besides, the table is divided into three sections based on the capacity of the installations;

- Green: installations where the production capacity is bigger than the production necessities.
- Yellow: the production capacity of these installations is a little critical. If the line stops, the ability to react is low.
- Red: The installations are critical, this means that if one of them stops, the rest of the installations of the plant would progressively stop.

The second table calculates the savings generated by the increase capacity in Press Shop.

5.2 Eficiencia en las Instalaciones de Prensas

	MINUTOS/ DÍA	GOLPES/ MINUTO	INCREMENTO GOLPES/DIA	EUROS/ MINUTO	AHORRO
PRENSA ERFURT	1,00	4,52	4,52	600 €	2.712 €
PRENSAS GT1/GT2		9,52	0,00	300 €	- €
					2.712 €

Figure 10. Press Shop evaluation table example.

This table calculates the savings when a suggestion increases the press capacity. There are three presses in the plant. The Enfurt press is slower than the presses GT1 and GT2 (4.52 hits/min against 9.52 hits/min) because it makes bigger parts and the pressing process is different. For this reason, the suggestions that increase the capacity of the Enfurt press generate more savings than the others.

Once savings are calculated, the suggestion will be awarded as a suggestion of Type A.

4. Consumption

This sheet is used when the suggestion is about reducing the consumption of material, rejections or photocopies and paper. I did one table for each type of reduction.

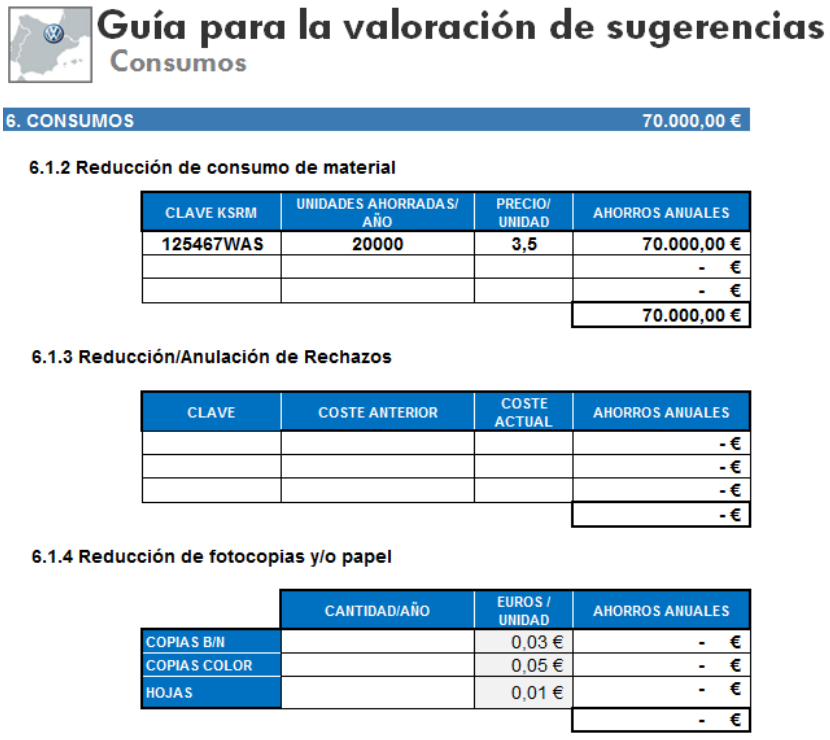
The first one calculates savings from the reduction of auxiliary material consumption. KSRM is a catalog shopping system, where the authorized employees of Volkswagen Navarra buy

auxiliary materials, such as; office supplies and accessories for workers (gloves, overalls, security shoes…). It works as a template, you fill in the KSRM code, the number of saved parts per year and the price and you will obtain the annual savings because the annual savings cell has the formula inserted in it (units saved x price = savings).

The second table calculates savings derived from reducing the rejections in installations within Volkswagen Navarra. Rejections are parts that the plant normally has to throw away because they have been broken during the production process. For example, parts or screws that are assembled wrong and the operator has to break. Savings are calculated comparing the costs before and after the suggestion.

The last table is used to evaluate savings generated from reducing paper or photocopies consumption. It works as the first table.

Once savings are calculated, the suggestion will be awarded as a suggestion of Type A.



Guía para la valoración de sugerencias
Consumos

6. CONSUMOS 70.000,00 €

6.1.2 Reducción de consumo de material

CLAVE KSRM	UNIDADES AHORRADAS/ AÑO	PRECIO/ UNIDAD	AHORROS ANUALES
125467WAS	20000	3,5	70.000,00 €
			- €
			- €
			70.000,00 €

6.1.3 Reducción/Anulación de Rechazos

CLAVE	COSTE ANTERIOR	COSTE ACTUAL	AHORROS ANUALES
			- €
			- €
			- €
			- €

6.1.4 Reducción de fotocopias y/o papel

	CANTIDAD/AÑO	EUROS / UNIDAD	AHORROS ANUALES
COPIAS B/N		0,03 €	- €
COPIAS COLOR		0,05 €	- €
HOJAS		0,01 €	- €
			- €

Figure 11. Consumption evaluation table example.

5. Employment Security

This table was created along with the employment security managers. Before creating the table, there was a problem when evaluating their suggestions. For example, if a participant

with his suggestion eliminated a serious risk of accident, the plant avoided a work leave but how could we evaluate this suggestions if there are not effective savings?

For this reason, we had a meeting with them and we decided to establish certain criteria to award objectively their suggestions based on the probability and severity of the risk. After the meeting, I created this table using macros. I built automatic buttons in VBA (Visual Basic for Applications), a programming Excel tool. When you click a button automatically the value of the prize appears in the upper bar.

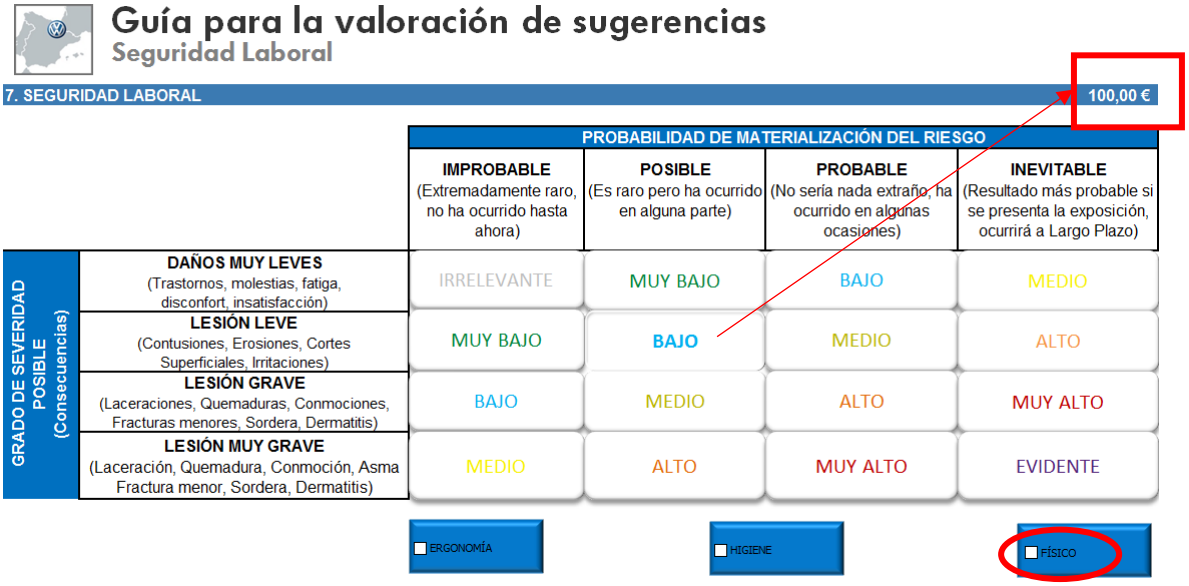


Figure 12. Risk employment evaluation table example.

The risk that a suggestion eliminates can be classified from irrelevant to evident, based on the probability and severity. Depending on the classification of the risk, the prize will be different; irrelevant = 25€, very low = 50€, low = 100€, medium = 150€, high = 300€, very high = 600€ or evident = 1.000€. The Suggestion Office decided to give these values comparing the risk evaluation system of Volkswagen Navarra with the system of other plants of the Group. This way, all the suggestions will be awarded objectively, following the same criteria. There is a second classification of the risks; they can affect to the worker's ergonomics, hygiene or to his physical condition. This does not affect to the prize, but it will be used as a sorter to classify the suggestions in SAP and facilitate the statistical reports at the end of the year.

The previous picture includes an example. The suggestion eliminates a possible slight injury that affects to the physical condition of the worker. Therefore, the risk is low and the prize for the participant is 100€.

6. Environment

Volkswagen Navarra has an ecofriendly strategy called Think Blue. The objective of this strategy is to reduce energy and water consumption, wastes, CO_2 and solvent emissions 25% from 2010 to 2018. All the suggestions affecting these five elements are quantifiable, so they are evaluated as Type A suggestions.

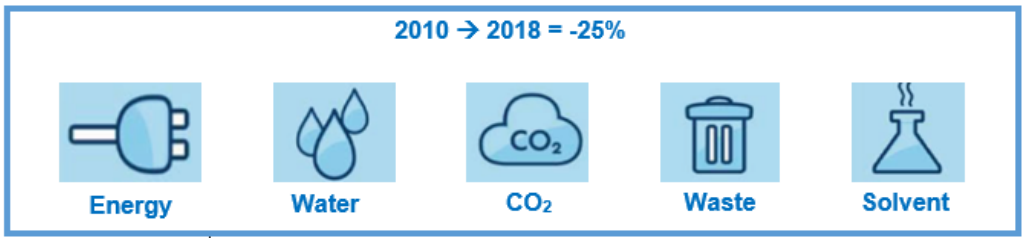


Figure 13. Think Blue objectives of Volkswagen Navarra in 2018.

However, there are other elements that are also important for Volkswagen Navarra environmental strategy, but they are no-quantifiable. Although the criteria to award suggestions of Type B is already established, the managers of the Suggestion Office considered that no-quantifiable environment suggestions should have an especial evaluation to increase the participation rate. Before the environment table was created, these suggestions were evaluated randomly and subjectively. For this reason, we had a meeting with the environment manager of the plant, to decide the criteria for these no-quantifiable suggestions.

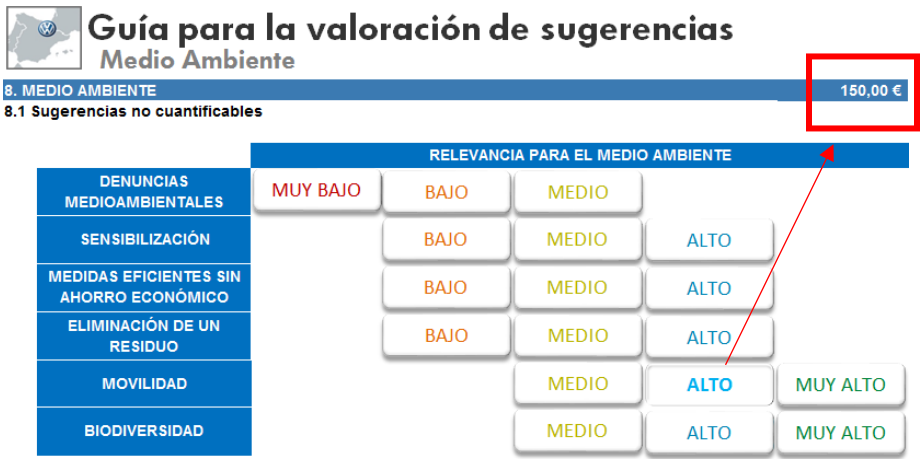


Figure 14. Environmental evaluation table example.

This table is organized from the least relevant to the most relevant environmental concept based on the plant strategy.

1. Environmental complaints: are suggestions which result from a logical environmental problem that the environmental rules of Volkswagen Navarra already contemplate.
2. Sensitivity: all the suggestions that make employees aware of the importance of conserving the environment.
3. Efficient measures without economic savings: e.g. a suggestion that proposes to put a specific container to collect the sprays (dangerous residue) in the changing rooms.
4. Removing a residue: all the suggestions regarding to the handling of recyclable wastes.
5. Mobility: Those suggestions that increase the transportation or mobility efficiency within the plant or in the way from home to work and vice versa.
6. Biodiversity: Suggestions that improve the situation of the green areas, vegetation and wildlife within the plant.

Depending on the relevance to the environment according to Volkswagen Navarra strategy the prizes will be different. They range from 25€ to 300€; very low = 25€, low = 50€, medium = 100€, high = 150€, very high = 300€. These prizes were given by the Suggestion Office making a comparison with the environmental strategies and the Suggestion System of other plants of the Group.

7. Logistics

The Logistics suggestions always propose changes like; changing one part by a similar one that is cheaper or has better quality, changing the supplier or the container of a part, and so on. To evaluate these suggestions, the Suggestion Office along with the Logistics manager decided to build a tool that compares the prices of the actual situation and the proposal to see if the new suggestion is more economic and feasible. I worked along with the Logistics manager and IT to make this sheet. It was the most difficult to develop because I had to learn a lot of new concepts of the Logistics department that I did not know. This sheet has six tables that I will explain with a real example;

This suggestion proposes optimizing the transportation of a part; instead of receiving 60 parts it is proposing to receive 90 parts in the same container. To see if it is feasible we use the different tables we built;

Denominación	OPTIMIZAR TRANSPORTE PIEZA 6R0802717B
Familia	TALLER DE MONTAJE VEHICULO
Clave	6R0802717B
Proveedor	NEEF MELEGHY GMBH & CO
Causante del estudio	SUGERENCIA Nº 4200-2016-00019902

Figure 15. Basic information. Logistics evaluation table 1.

The figure 15 is the first table that contains the basic information of the suggestion.

PREMISAS	Clave, denom. u otra información especifica del cálculo.	Taller	Producción	262610	
			Días lab./año	212	
			Piezas/ coche	Mix	Piezas/ año
A	6R0802717B	Otros	1	2,627	**6898,76**
B	6R0802717B	Otros	1	2,627	**6898,76**
C					**0**
D					**0**
E					**0**
F					**0**

Figure 16. Premises. Logistics evaluation table 2.

The second table contains in the first column the reference part code.

The second column classifies the workshop. There are two possible classifications; Engine assembly or others. This is because the parts delivered to Engine Assembly are different to the parts delivered to other workshops and so are the prices of them.

In the third column, production cell indicates the total annual production of vehicles (262.610). The cell below indicates the total annual working days (212). Below this cell, it is indicated the number of parts that are used per car (in this case 1 part per car).

In the next column, the Mix of production (percentage of total daily production that contains the part) is calculated as follows: number of daily parts/daily vehicle production.

The last column calculates the total annual parts used that is calculated as follows: parts/vehicle x mix x production (1 x 0,02627 x 262.610 = 6.898,76 parts per year).

These calculations are estimated because both Mix of production and yearly production can vary. The weekly production is known one month in advance according to dealer's orders, so both calculations depend on the amount of orders. Once Logistics has this information, the daily production is programmed and they organize the number of daily parts that are needed.

Before explaining the next table, it is important to understand some Logistics concepts of Volkswagen Navarra.

Volkswagen Navarra has contracts with different Logistics companies (Logiters and Grupo Sesé are the biggest ones) which are extern to the plant and that are responsible for receiving the parts inside the plant and carry the parts to the supermarket[7]. Volkswagen Navarra has to pay these companies a fixed cost for receiving the materials (unloading the truck, placing the parts on the shelves in the warehouse…) and a fixed cost to take them out (material movement) from the warehouse to the supermarkets of the different workshops. The strategy used to manage the lots that come into and go out of the warehouse is FIFO[8].

[7] Supermarket: Place where the materials from the supplier are arranged in sequence for the production line.
[8] FIFO: First in, first out.

The parts are delivered either in KLTs[9] or GLTs[10], depending on the size of the materials or the necessity of the parts. If for example, the part is widely used, it is better a GLT because it has more capacity, but if the part is fragile or it is less used it is better a KLT. Normally, one pallet supports between 15 and 20 KLTs or 1 GLT. The fixed cost of taking out the parts to the production line depends on the container;

- NO: When the complete pallet is taken out of the warehouse (a GLT or 15-20 KLTs)
- NX: When only one KLT is taken out.
- NP: When a small number of parts received in a KLT are transferred to a smaller KLT and then, it is taken out.

		Entrada	NO	NX	NP	Autos.
CC	Otros	7,084	2,965	1,311	1,94	-
	Motores	7,084	6,95	2,089	2,718	-
GdM		-	3,985	0,778	0,778	1,288

Figure 17.Entry and Exit. Logistics evaluation table 3.

The first column indicates the fixed price of receiving the container. The next three columns indicate the fixed price of taking out the parts from the warehouse depending on the container they are taken out. The bottom row of the table (GdM = Materials management) indicates the fixed price of taking the parts from the supermarket to the line, which depends on the type of container. The Autos cell indicates the fixed price of using the pallet truck. The materials management is done by intern workers of Volkswagen Navarra. This table is filled manually. The data is obtained from an Excel that contains all the fixed costs.

The next table contains information of both options.

DATOS ALTERNATIVAS

	Embalaje		Transporte							Suministro			Alquiler	
	contenedor	capacidad	cont. Llenos/ camión	cont. vacíos/ camión	Total Piezas/ camión	Origen		Destino		Lote Entr. (KLTs)	Tipo Salida	si NP cant./sum	Cont./ año	Alquiler
A	111940	60	104	182	6240	Alemania	1800	España	600	1	NO		114,979	0,11
B	111940	90	104	182	9360	Alemania	1800	España	600	1	NO		76,653	0,11
C			0	0	0		0		0				0	0
D			0	0	0		0		0				0	0
E			0	0	0		0		0				0	0
F			0	0	0		0		0				0	0

Figure 18. Alternative data. Logistics evaluation table 4.

The first column indicates the type of container. There are many types of KLTs and GLTs and each one has a reference code. In this case, the parts come in the GLT 111940.

[9] KLT: Small load container.
[10] GLT: Heavy load container.

The second column indicates the capacity of the container. In the actual situation the GLT carries 60 parts, but the suggestion proposes to carry 90 part on it.

The third column indicates the amount of full KLTs or GLTs that the truck carries. In the example, the truck carries 104 full GLTs.

The fourth column indicates the amount of empty KLTs or GLTs. Normally these containers are bendable, that is why in the example, the truck picks up 182 empty GLTs.

The total parts per truck is calculated as follows; Capacity x Full containers/truck.

The next two columns indicates the origin and destination of the truck (columns 6&7 and 8&9 respectively), the data is taken from an Excel that contains the information of the different origins and destinations.

Columns from 10 to 13 indicate how the parts are delivered to the supermarket. In this case, 1 complete GLT is taken out to the supermarket, that is why the exit is NO.

The last two columns refer to rent of containers. The containers are owned by Begalter Management, an extern Company. Volkswagen Navarra pays each month the rent of these containers. In the example, if the GLT carries 60 parts, more containers at the end of the year will be needed (114.979). But if the container carries 90 parts, less containers will be needed (76.653, a difference of 38.326 containers). The rental price per container is 0.11.

RESULTADOS ALTERNATIVAS

	Transporte				Handling								Alquiler	
	ida	retorno			C.C.				GdM					
	€/pz.	€/pz.	Total Transporte €/pz.	Total Transporte €/coche.	entrada €/pz.	salida.+ transp. línea €/pz.	Total CC €/pz.	Total CC €/coche	Total GdM €/pz.	Total GdM €/coche	Total Handling €/pz.	Total Handling €/coche	Total Alquiler €/pz.	Total Alquiler €/coche
A	0,288	0,055	0,343	0,009	0,118	0,049	0,167	0,004	0,066	0,002	0,234	0,006	0,022	0,001
B	0,192	0,037	0,229	0,006	0,079	0,033	0,112	0,003	0,044	0,001	0,156	0,004	0,015	0,000
C	0	0	0,000	0,000	0	0,000	0,000	0,000	0	0,000	0,000	0,000	0,000	0,000
D	0	0	0,000	0,000	0	0,000	0,000	0,000	0	0,000	0,000	0,000	0,000	0,000
E	0	0	0,000	0,000	0	0,000	0,000	0,000	0	0,000	0,000	0,000	0,000	0,000
F	0	0	0,000	0,000	0	0,000	0,000	0,000	0	0,000	0,000	0,000	0,000	0,000

Figure 19. Alternative results. Logistics evaluation table 5.

The table above is the calculator of every cost per alternative. To make it, the IT department helped me, because we had to link some formulas to other Excel sheets that work as data base including the information of all containers, all routes of transportation, rental prices…

The first two blue columns, calculate the total round trip cost per part and vehicle respectively.

The next four columns calculate the cost of taking the parts out to the supermarket (C.C.=external consolidation center) and to the line (GdM) respectively. After calculating this four columns, it calculates the total handling summing up C.C + GdM.

The last two columns calculate the total rental price per part and vehicle respectively.

I inserted the necessary formulas in the cells with the data of the previous tables, so the results appear automatically and the table works as a calculator.

TOTAL			
€/ pieza	€/ coche afectado	€/ coche	€/ año
0,599	0,599	0,016	4.135,131
0,400	0,400	0,010	2.756,754
0,000	0,000	0,000	0
0,000	0,000	0,000	0
0,000	0,000	0,000	0
0,000	0,000	0,000	0
	-0,200	-0,005	1378,377
	0,000	0,000	0,000

Figure 20. Savings calculator. Logistics evaluation table 6.

This is the last table, where the prices of the actual and proposed situations are compared. Each cell has its own formula inserted in order to operate as a calculator. The price per part is obtained summing up the costs obtained in the previous table (the total transportation, handling and rental costs per part), that are in the red squares. The cost per car affected is calculated as follows: cost per part x parts per car. The total annual cost (last column) is calculated as follows: cost per part x total annual parts used. In our example the annual cost of the actual situation is; 0,599 x 6.898,76 = 4.135,131€. The annual cost of the proposed situation is 2.756,754€. Thus, the proposed situation is 1.378,377€ cheaper. For this reason, the decision of Logistics is to introduce the suggestion and increase the number of parts carried in one GLT.

As this suggestion is quantifiable, it will be awarded as a Type A taking into account the 1.378,37€ of savings.

7. CONCLUSIONS

The objective of the project is to understand the Suggestion System of Volkswagen Navarra from the bottom to the top to create a standardized and objective guideline to evaluate the suggestions. Throughout the project these concepts have been described in the scope of the company. Afterwards, the weak points of the system addressed in the Suggestion Workshop have been explained in order to identify the solutions proposed to improve the quality of the evaluation system and the employees' satisfaction.

Through the introduction of the improvements proposed in the Workshop and the implementation of the guideline, the Suggestion Office expects to receive more suggestions that will be better administrated and will contribute to the development of the plant, improving productivity and increasing savings. Besides, the new guideline allows for orienting the suggestions to the critical points of the plant and the improvements that generate value added within the strategy of Volkswagen Navarra. It also helps to reward the widely amount of no-quantifiable suggestions with the same criteria. But, the standardization of the guideline not only pursuits increasing the suggestions presented, it also tries to answer faster, seeking a more personal treat with them and a higher rate of introduced suggestions.

With all this being said, I think that the Suggestion System creates a win-win situation; on the one hand it generates commitment, involvement and input for workers and on the other hand it generates savings and improved efficiency for the plant. I consider it as a basic element that every company should implement. During the period of time that I have been working in Volkswagen Navarra, I can say that the administration of suggestions is very efficient, every day, the managers of the office study the suggestions presented the previous day and during the day. However, the challenge nowadays is to achieve the pure objectivity when evaluating the suggestions. A future challenge would be to increase the number of quantifiable suggestions, find the way to quantify all or the maximum number of suggestions presented.

Regarding to the actual position of Volkswagen Group in the world, the introduction of the Lean Production model has allowed the company to make its way to the top of the automotive market, being number one in the first quarter of 2016. In my opinion, implementing a new Production model or using Continuous Improvement tools depends on the level of commitment of the General Management and the allocated resources to develop them. I think that the Lean Production model can be introduced in all kind of companies and sectors because it is based on seeking total quality and eliminating unnecessary actions.

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9. ANNEXES

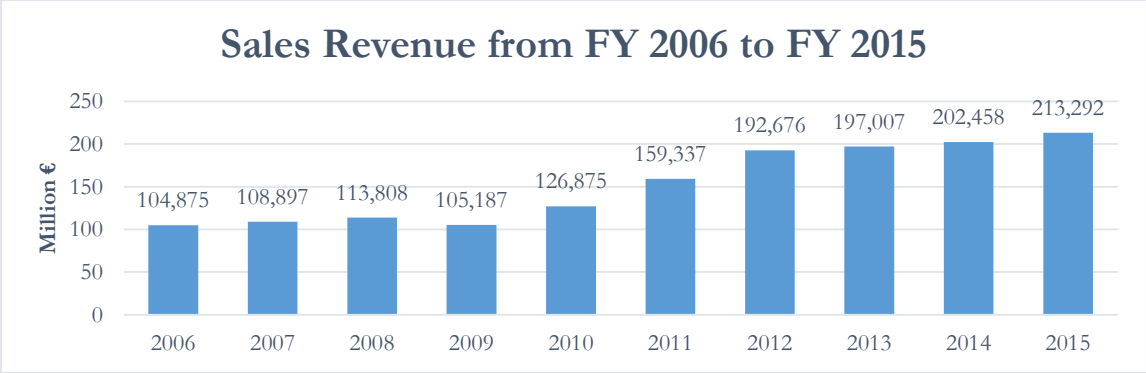
ANNEX 1

One of the most important objectives of Volkswagen Group was becoming the car manufacturer number one in the world. The strategies that the company has followed through these past years have pushed it to the top and in the first quarter of 2016, it has become number one in sales volume.

The next three graphs show some of the key figures that are taken from the Volkswagen GA's official annual reports from 2006 to 2015 (Statista, 2016).

1. Sales revenues of Volkswagen Group from FY 2006 to FY 2015 (million €).

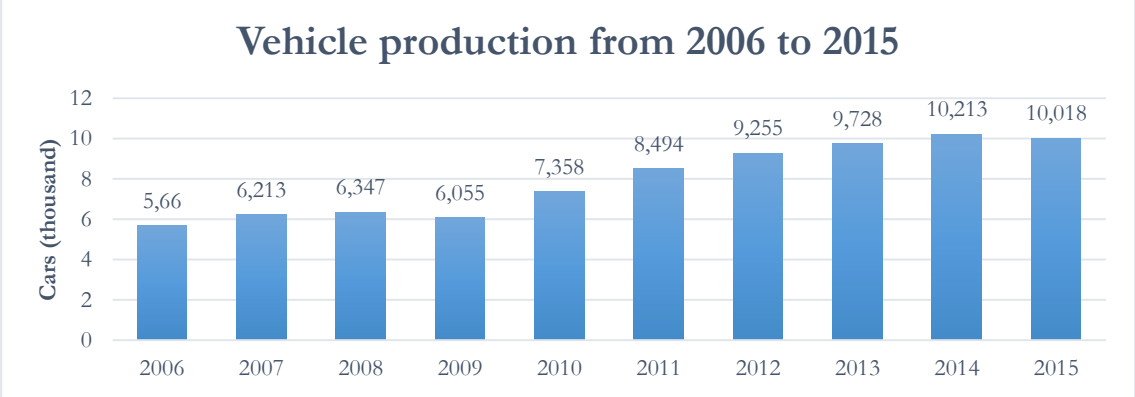
This graph shows that sales revenue in 2015 was 213,292 million €. Sales revenue are 5.08% higher than in 2014.



Graph 7. Volkswagen Group Sales Revenue from 2006 to 2015.

2. Vehicle production of Volkswagen Group from 2006 to 2015 (in thousand units)

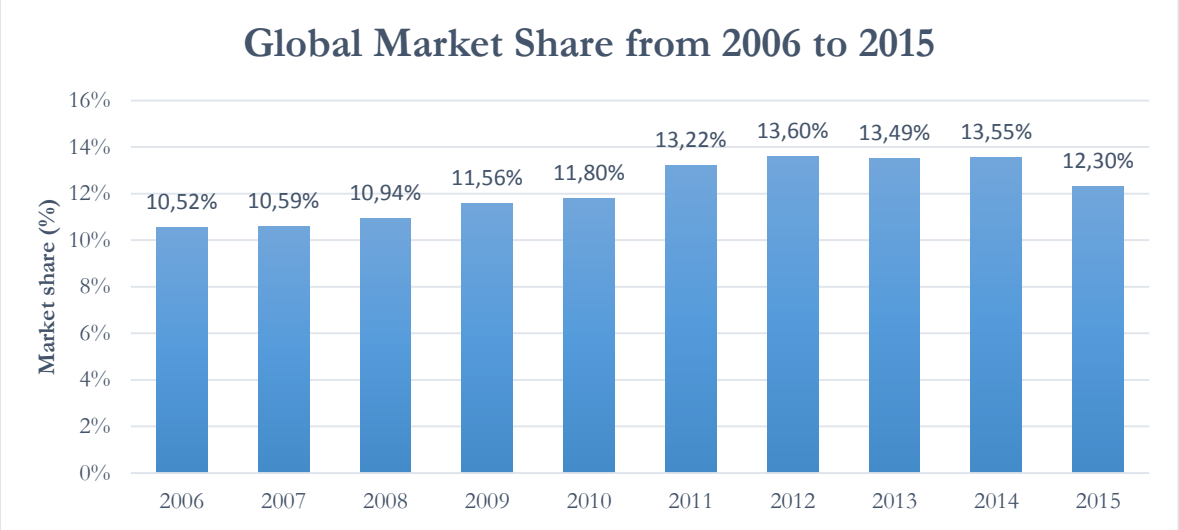
Volkswagen Group produced in 2015 10,017,191 cars according to its annual report.



Graph 8. Volkswagen Group Vehicle Production from 2006 to 2015

3. **Global market share of Volkswagen Group from 1999 to 2014, based on passenger car production volume.**

Volkswagen AG's market share reached 12.3% in 2015. However, it highest global market share has been 13.6% in 2012.



Graph 9. Volkswagen Group Global Market Share from 2006 to 2015.

This three graphs reflect that Volkswagen GA has been increasing its number of sales revenue and its production, however since 2012 the company has been losing its global market share. This is due to its strategy of colonization of new markets. Each market has its own consumer demands because not all buyers are looking for the same characteristics when the purchase a vehicle. Volkswagen Group has expanded worldwide, but now it needs to adapt its products to the different demands around the world.

Actually, Volkswagen Group is number one in the world after overtaking its biggest rival Toyota (the number one seller for four consecutive years). However, Toyota suffered a production stoppage during the last quarter due to the earthquakes in Japan and the company is recovering from all its damages. For these reason, Volkswagen Group needs a consistent strategy to maintain the first position.

ANNEX 2

This table and the picture below show how the diesel scandal of VW has directly affected to the volume of vehicle's deliveries.

Overview of deliveries by the Volkswagen Passenger Cars brand:

Deliveries to customers by markets	April 2016	April 2015	Change (%)	Jan.-April 2016	Jan.-April 2015	Change (%)
Europe	150,300	151,700	-0.9	579,500	582,000	-0.4
Western Europe	131,400	134,500	-2.3	511,000	516,200	-1.0
Germany	52,600	53,900	-2.4	191,300	198,100	-3.4
Central and Eastern Europe	18,900	17,200	+9.7	68,600	65,900	+4.1
Russia	5,900	6,200	-3.4	21,800	24,300	-10.2
North America	50,700	48,700	+4.0	178,300	185,100	-3.7
USA	27,100	30,000	-9.7	96,400	109,200	-11.7
South America	31,900	38,800	-17.8	120,300	167,400	-28.2
Brazil	21,400	28,100	-23.9	80,900	126,100	-35.8
Asia-Pacific	229,200	236,600	-3.1	999,900	972,000	+2.9
China	216,700	221,100	-2.0	939.400	899,400	+4.4
Worldwide	476,700	496,000	-3.9	1,936,200	1,975,500	-2.0

Table 3. Volkswagen Group cars deliveries in 2015 and 2016.
Source: Volkswagen AG annual report 2015.

This table reflects the number of cars that the different VW's plants sold to the dealers in April and the first quarter of 2015 and 2016. Worldwide, the results of 2016 first quarter show that deliveries have decreased 2% in comparison with 2015. In more detail, the results of April 2016 in North America are positive, because deliveries increased 4%. However, in the US it shows a 9.7% decrease in deliveries. This means that sales in Canada and Mexico increased more than 4% to compensate the decrease in the US. Moving to Europe, the results are also negative (-0.9%). Although deliveries in April 2016 have increased 9.7% in Central and Eastern Europe, in Western Europe, they have decreased 2.3% and it is known that the European market is the main consumer.

According to Alex Klain, from Autolist, one of the most important online services in the world that polls new and used car buyer and connects buyers to dealers to purchase vehicles, people are 28% less likely to buy a VW after the scandal. They got the results from a survey they recently ran on diesel-gate.

It is clear that consumer perception about Volkswagen has decreased, for this reason, the company has decided to be more decentralized in the future, with more independence for brands and regions. With this strategy the company seeks better sharing of responsibilities and encourage of entrepreneurial thinking and behavior.

It is obvious that the scandal has affected more to Volkswagen than other brands of Volkswagen Group. For example, in April 2016 Audi sales in the US have increased 5.8% while Volkswagen sales in that country have decreased 9.7%. The rise of other Volkswagen AG brands permits the Group being number one.

The next picture shows Volkswagen Group deliveries worldwide.

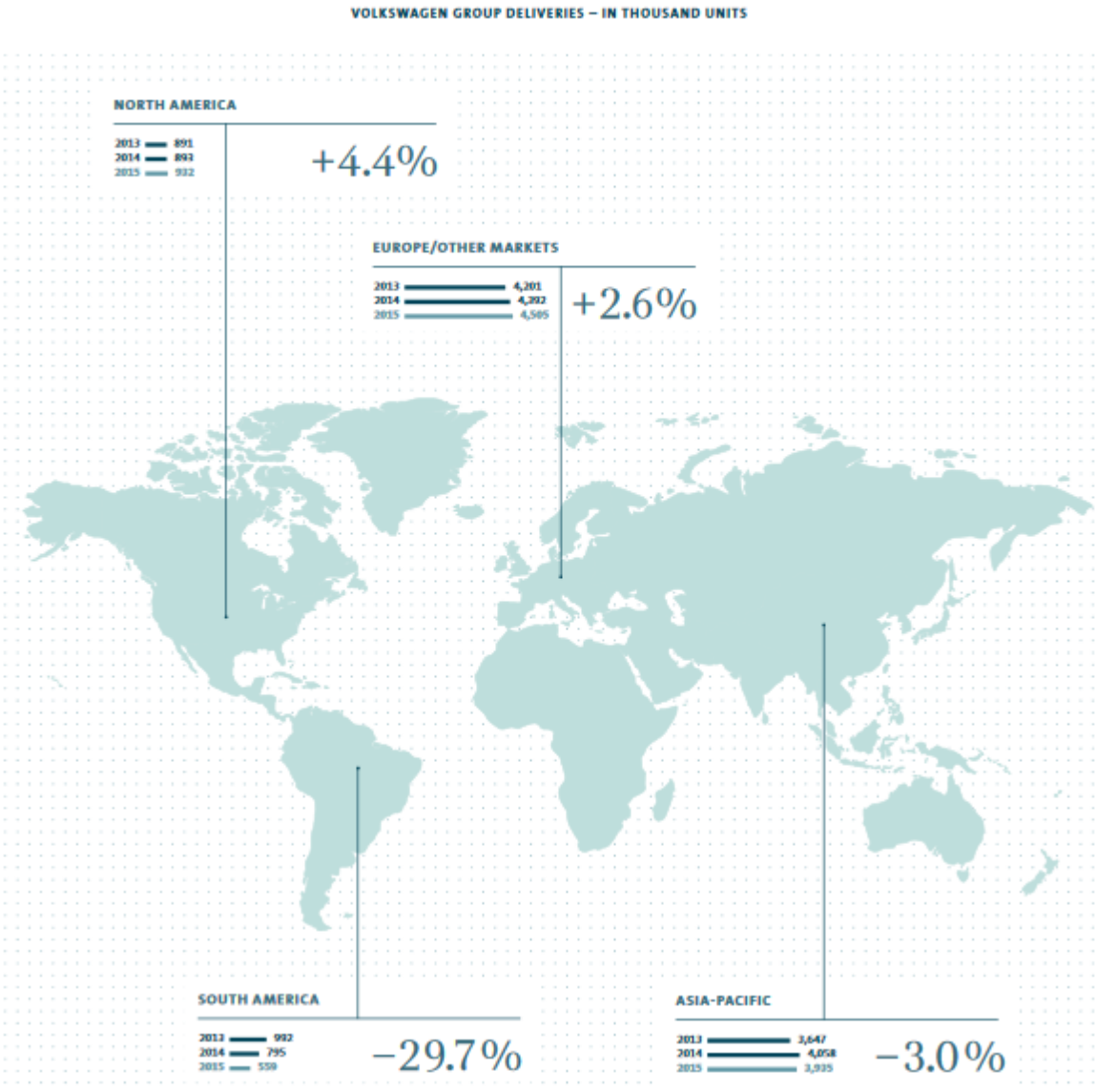


Figure 21. 2015 Volkswagen Group worldwide deliveries in thousand units.
Source: Volkswagen AG Annual report 2015.

ANNEX 3

The next picture shows the electronic platform of Volkswagen Navarra where any employee can present a suggestion.

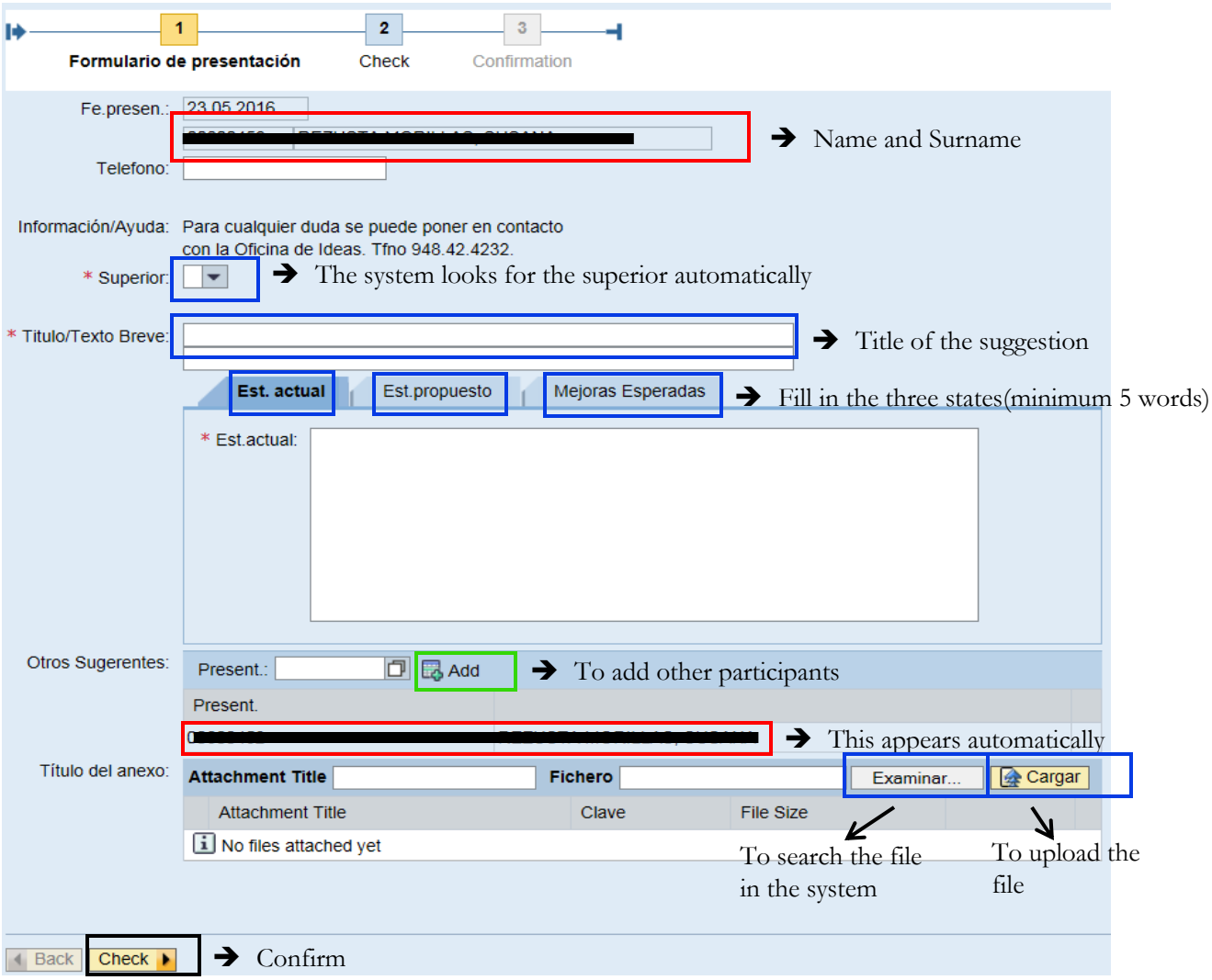
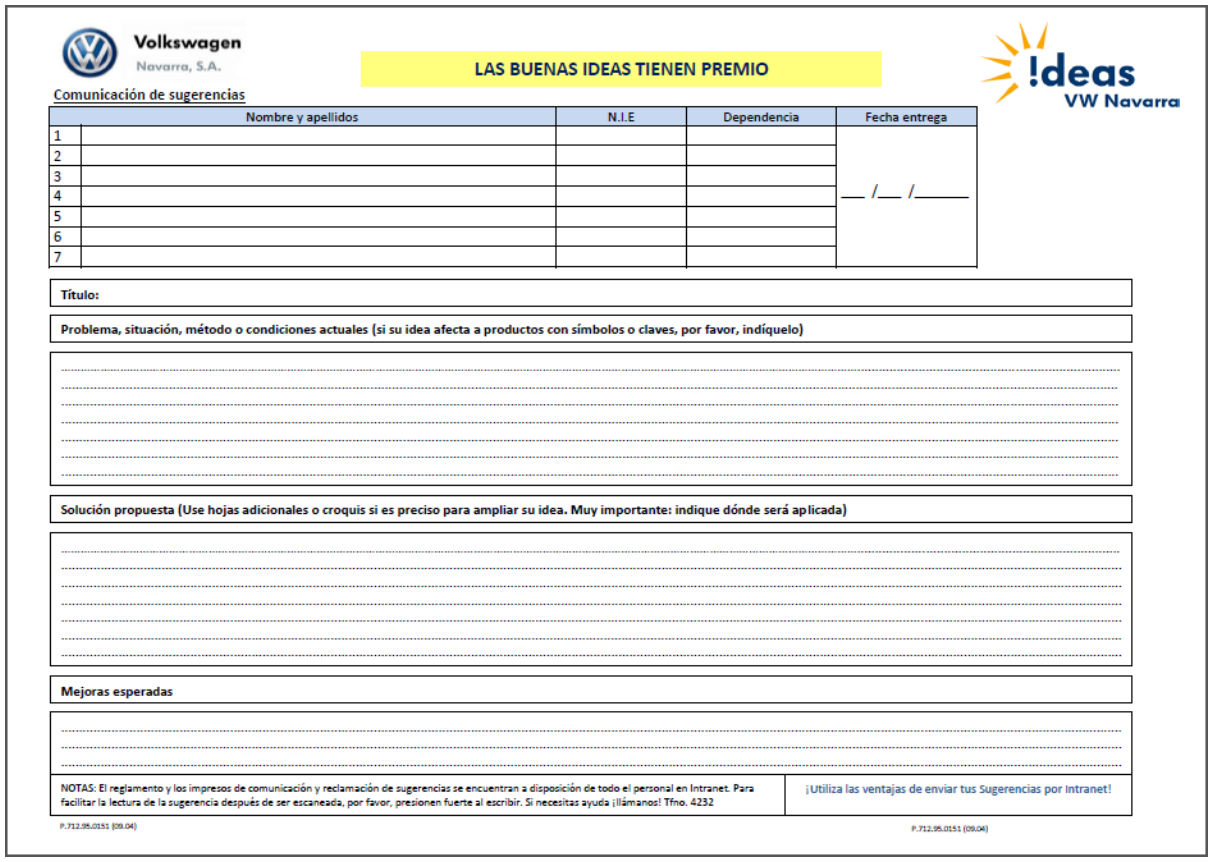


Figure 22. Electronic template to present a suggestion.
Source: Volkswagen Navarra Suggestion System.

There is another way to present a suggestion and it is explained in the next page.

The second way to present an idea is filling in the next template.



Volkswagen Navarra, S.A.

LAS BUENAS IDEAS TIENEN PREMIO

!deas VW Navarra

Comunicación de sugerencias

	Nombre y apellidos	N.I.E	Dependencia	Fecha entrega
1				
2				
3				
4				__ /__ /_____
5				
6				
7				

Título:

Problema, situación, método o condiciones actuales (si su idea afecta a productos con símbolos o claves, por favor, indíquelo)

Solución propuesta (Use hojas adicionales o croquis si es preciso para ampliar su idea. Muy importante: indique dónde será aplicada)

Mejoras esperadas

NOTAS: El reglamento y los impresos de comunicación y reclamación de sugerencias se encuentran a disposición de todo el personal en Intranet. Para facilitar la lectura de la sugerencia después de ser escaneada, por favor, presionen fuerte al escribir. Si necesitas ayuda ¡llámanos! Tfno. 4232

¡Utiliza las ventajas de enviar tus Sugerencias por Intranet!

P.712.95.0151 (09.04)

P.712.95.0151 (09.04)

Figure 23. Paper template to present a suggestion.
Source: Volkswagen Navarra Suggestion System.

The participants must fill in the template and hand it in to the manager of the suggestion office. This was the only method to present ideas during the first twenty years of the Suggestion System. When the computer software SAP that works as a database, was introduced in Volkswagen Navarra, the suggestion office created the electronic template, which is actually more preferred than the hard copy template.

ANNEX 4

The next diagram explains the first four steps of the flow of the suggestions, until the consultant decides whether the implementation of the suggestion is feasible or not.

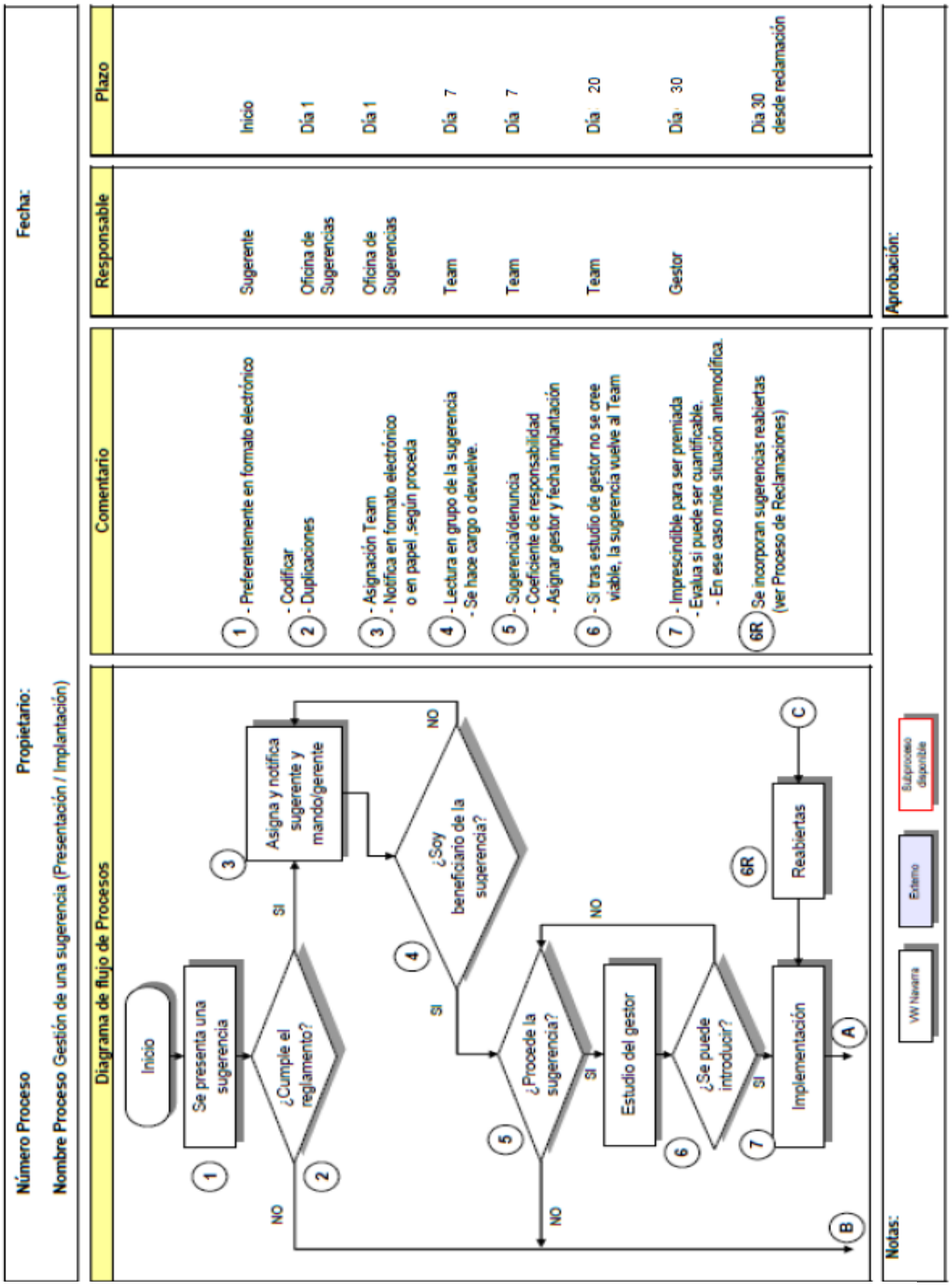


Figure 24. Chart flow 1 of the Suggestion System.
Source: Volkswagen Navarra Suggestion System.

This other diagram shows the final steps to implement or reject a suggestion.

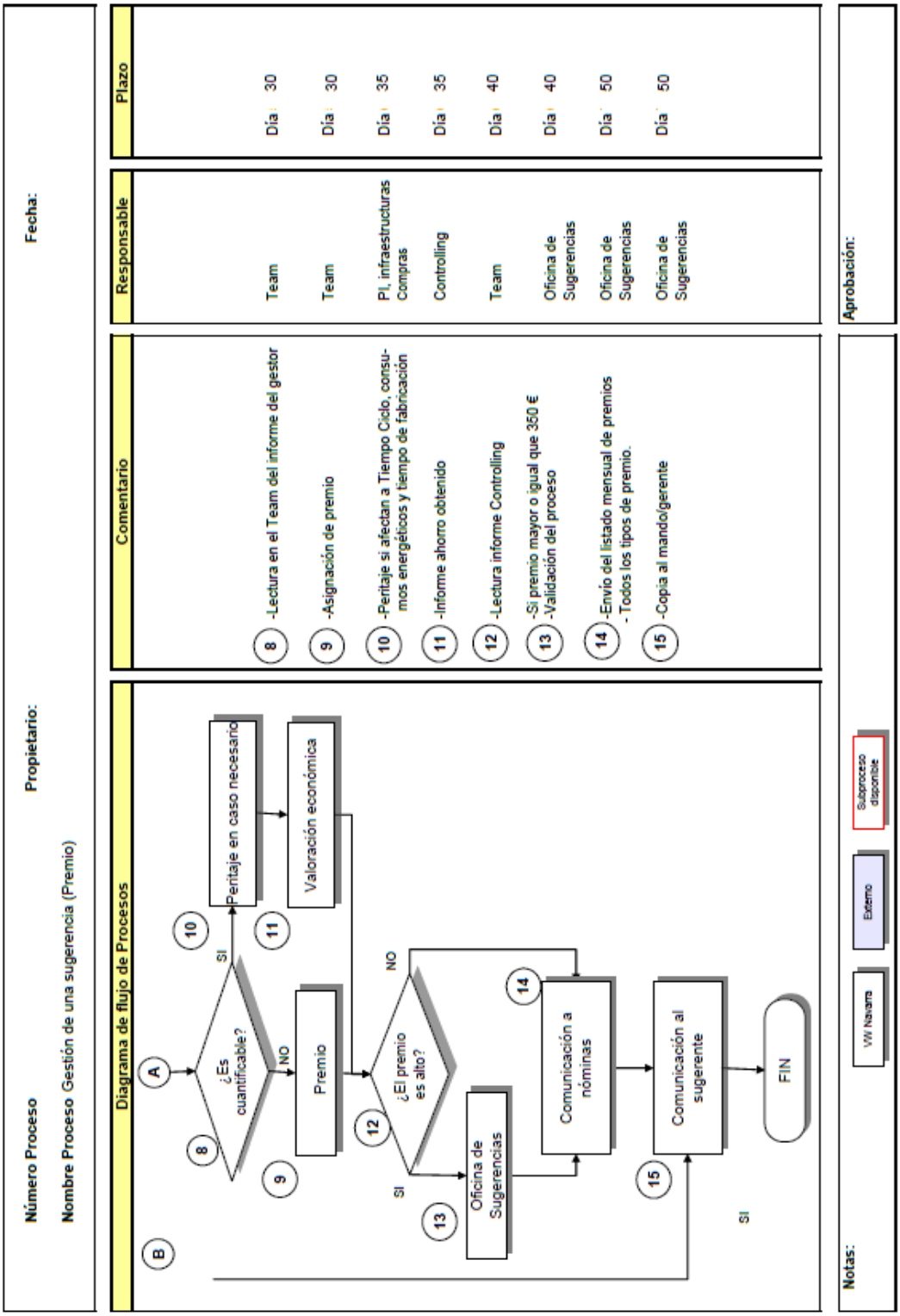


Figure 25. Chart flow 2 of the Suggestion System.
Source: Volkswagen Navarra Suggestion System.

ANNEX 5

This table contains all the savings and the average savings generated through the Suggestion System from 2011 to 2015, in the thirteen areas of the plant.

	Finances	Production System	Product	Logistics	Press Shop	Paint Shop	Engine Shop	Assembly	Body Shop	Finish	Quality	HR	Planning
2011	0,15%	0,68%	3,13%	11,46%	12,63%	6,46%	4,35%	5,58%	46,42%	1,32%	2,22%	0,20%	5,41%
2012	0,24%	43,55%	1,47%	5,17%	7,21%	6,59%	1,18%	7,78%	18,65%	1,47%	2,05%	0,31%	4,33%
2013	0,29%	14,24%	1,54%	6,38%	7,79%	10,84%	3,97%	17,63%	29,53%	1,39%	4,40%	0,62%	1,39%
2014	0,31%	11,35%	0,50%	10,35%	7,91%	16,81%	3,90%	14,37%	21,25%	5,59%	4,75%	0,53%	2,38%
2015	0,42%	1,20%	1,93%	12,96%	8,42%	9,64%	4,22%	15,97%	29,42%	6,55%	7,12%	0,92%	1,23%
Average	0,28%	14,20%	1,71%	9,26%	8,79%	10,07%	3,52%	12,27%	29,05%	3,26%	4,11%	0,52%	2,95%

Table 4. Savings generated per area through the Suggestion System.
Source: Volkswagen Navarra Suggestion System.

ANNEX 6

Every four months, the Suggestion Office of all the plants of Volkswagen Group must report to Wolfsburg the situation of the suggestions in the plant. After receiving all the reports from all the plants in the world, the headquarters in Germany sends to each plant the World League of Suggestions.

The next figure shows a ranking of presented suggestions in 2015 and a comparison between 2014 and 2015. The table on the left hand shows the data of 2015; in the first column the plant, in the second the total of suggestions presented and in the third the workforce. The graph shows the average of suggestions presented per worker in 2014 and 2015. The red line is the objective established by Volkswagen Group, the objective for 2015 was 1,643 presented suggestions per worker. Only the first twenty two plants are included in both of them.

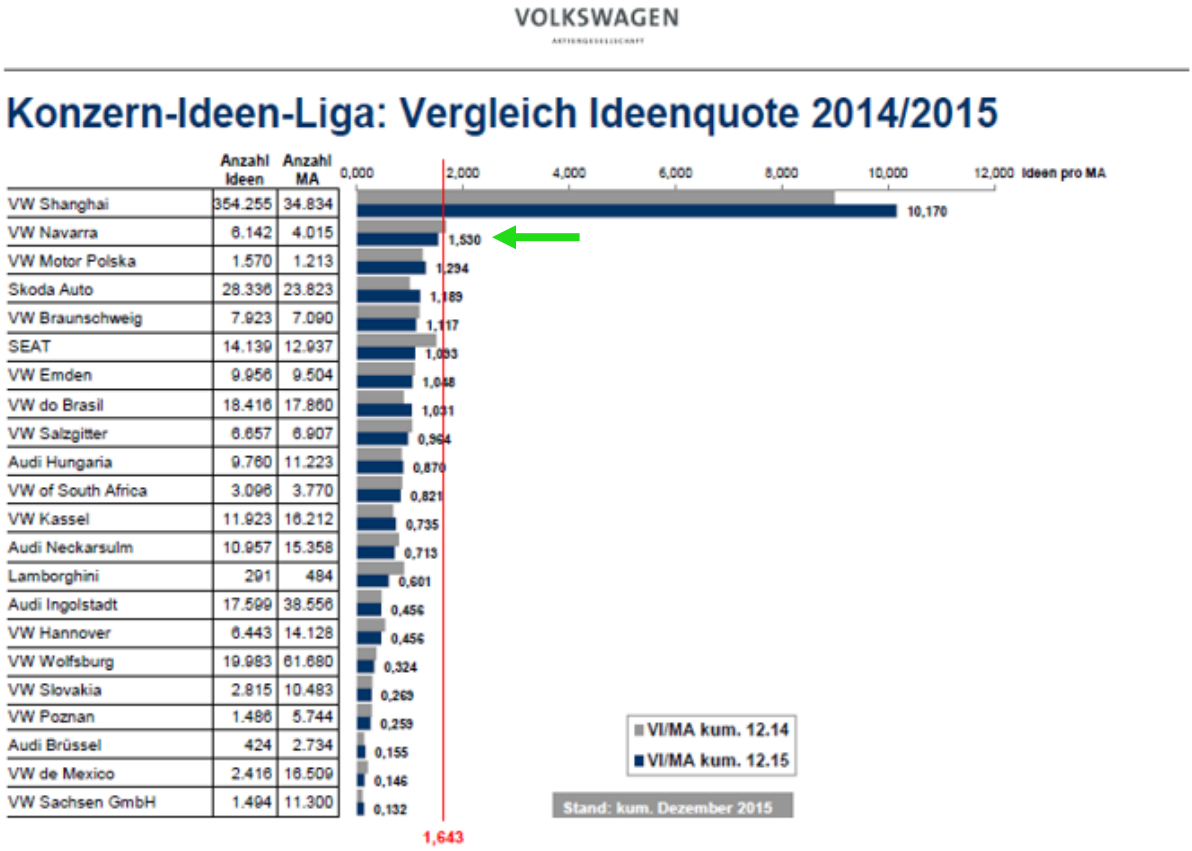


Figure 26. World League of Suggestions. Ranking of Presented Suggestions 2015.
Source: VW Navarra

This raking shows the data of 2015; in the first column the plant, in the second the total of suggestions presented and in the third the workforce. The graph shows the average of suggestions presented per worker in 2014 and 2015. The red line is the objective established

by Volkswagen Group, the objective for 2015 was 1,643 presented suggestions per worker. Only the first twenty two plants are included in both of them. Volkswagen Navarra is in the second place with 6142 presented ideas after Shanghai that presented 354255. Although Shanghai has a bigger workforce, is the only plant that exceeds the objective, the average of presented suggestions per worker is 10,170. In VW Navarra the average per worker is 1,530 and it is a little below the objective.

The next figure shows the realization quote of 2015. The ranking shows in the first column the plant, in the second the total of managed suggestions[11], in the third the total of introduced suggestions and in the fourth the workforce. The graph shows the percentage of introduced suggestion (introduced suggestions/managed suggestions x 100). The red line represents the objective established by Volkswagen Group, in 2015 the objective was introducing 79,1% of the suggestions managed. Volkswagen Navarra has introduced only 37,3% of managed suggestions. It is far from achieving the objective that is why the Suggestion Office must change the management strategy in order to improve their situation and realize more suggestions. Shanghai is in the first position, introducing 99,4% of managed suggestions.

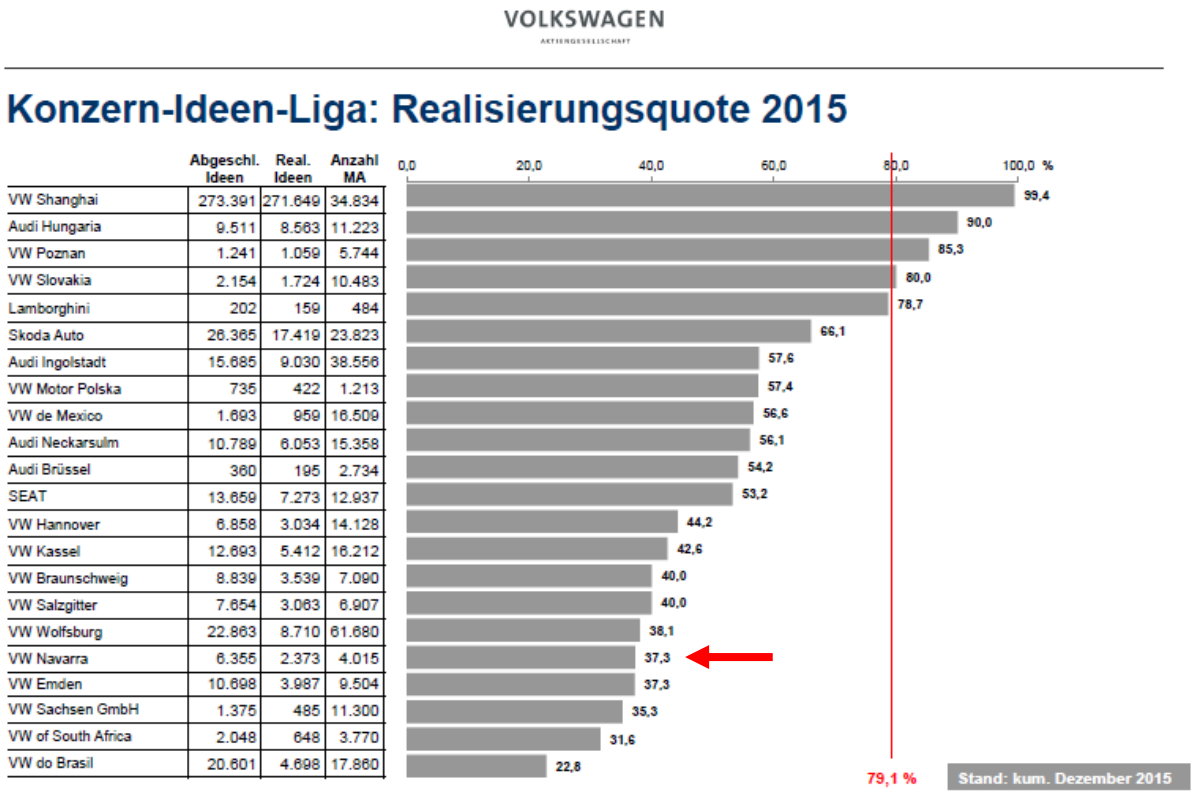


Figure 27. World League of Suggestions. Ranking of Introduced Suggestions 2015. Source: VW Navarra.

[11] Managed suggestions: are the total of new suggestions presented one year plus the suggestions reopened from previous years in that year.

ANNEX 7

- Objective

The first thing that the office presents is the overall objectives of the year and the completion of them. The latest information we have is from April 2016. The objective column does not change but the completed column contains the results of April 2016 plus the results of previous moths.

	OBJECTIVE	COMPLETED
Presentation (# suggestions/worker/year)	0,6	0,47
Total number of suggestions / year	2360	1859
Participation	18%	27,47%
Introduction	40%	40,43%
Savings / year	800.000 €	519.276 €
Average time management of a suggestion	50	56
Suggestions in circulation below	750	910

Table 5. Table of Suggestion System objective.

- Evolution

After the objectives, the office presents the outstanding management suggestions, the average time managing suggestions and total managed suggestions per area, with the same format. Each area has different objectives because it would not be fair that for example, Body Shop and Finances had the same objective of outstanding management suggestions or introduced suggestions, when Body Shop manages much more suggestions than Finances.

The next graph represents the outstanding management suggestions of April 2016;

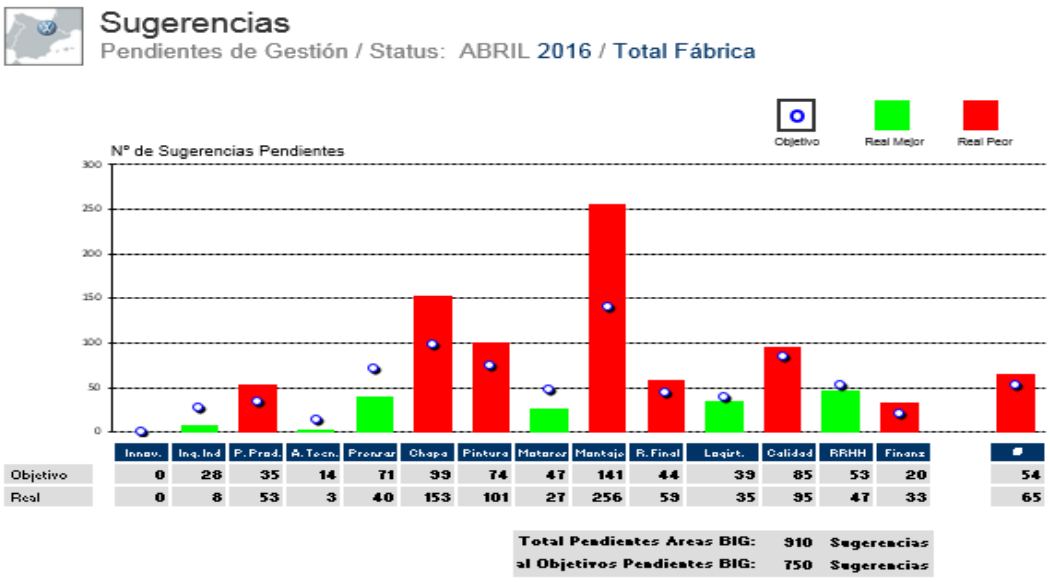
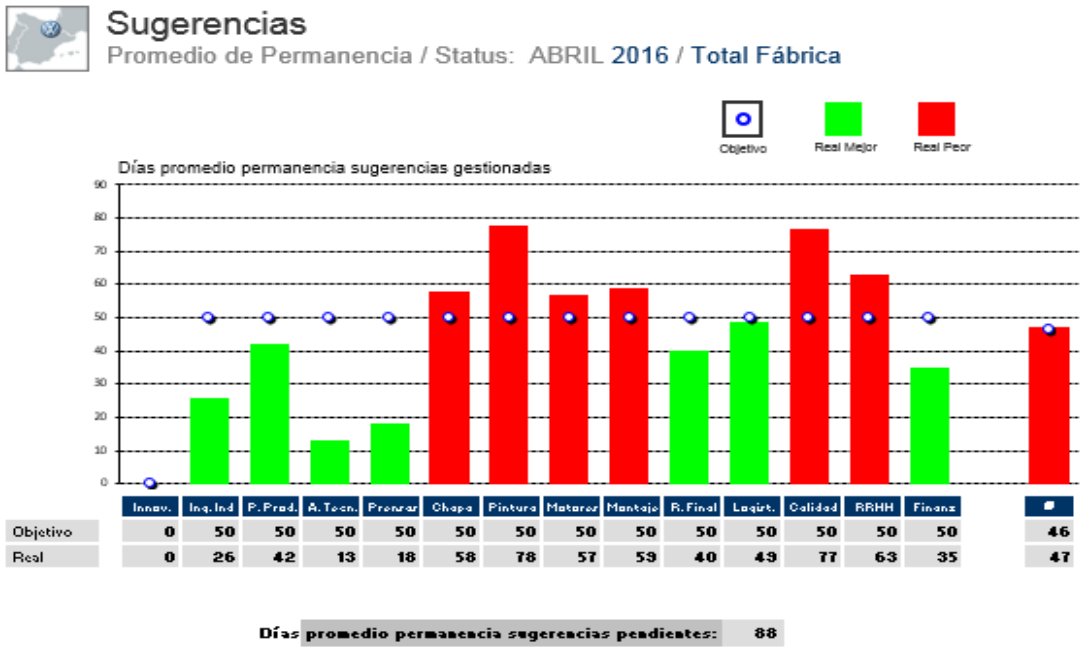


Figure 28. Graph 1 of the Suggestion System objective. **Source: VW Navarra**

The blue point represents the objective. If the number of outstanding management suggestions is above the objective, then the area is in red if not in green. The last column represents the overall situation per month. The area with more outstanding suggestions in April 2016 is Assembly, the biggest are of the plant.

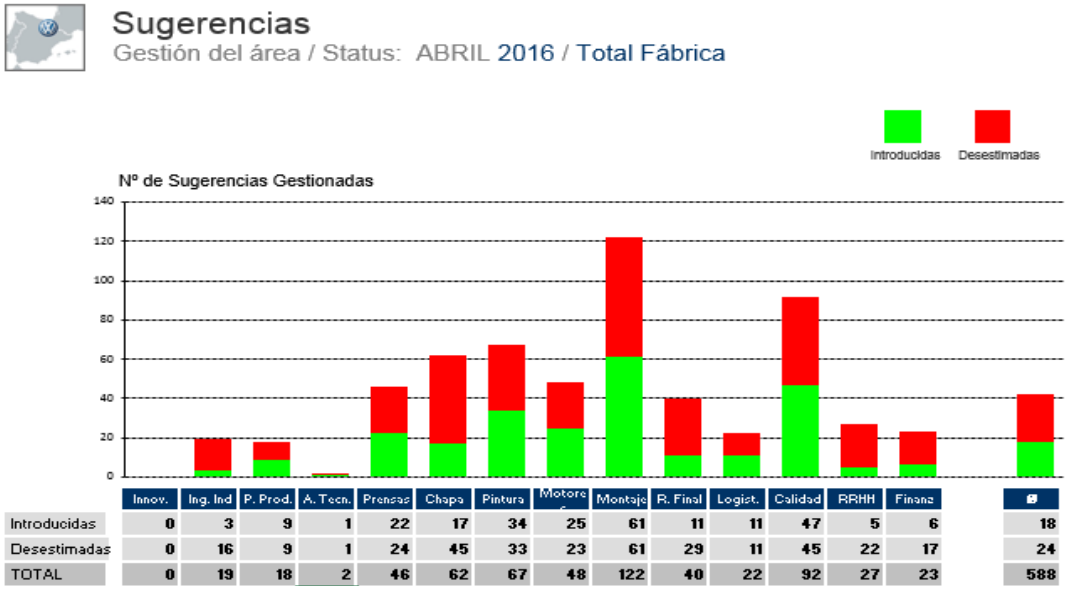
The next graph represents the average time managing a suggestion.



	Innov.	Ing. Ind	P. Prod.	A. Tecn.	Prensas	Chapa	Pintura	Motores	Montaje	R. Final	Logist.	Calidad	RRHH	Finanz	
Objetivo	0	50	50	50	50	50	50	50	50	50	50	50	50	50	46
Real	0	26	42	13	18	58	78	57	59	40	49	77	63	35	47

Figure 29. Graph 2 of the Suggestion System objective. **Source: VW Navarra**

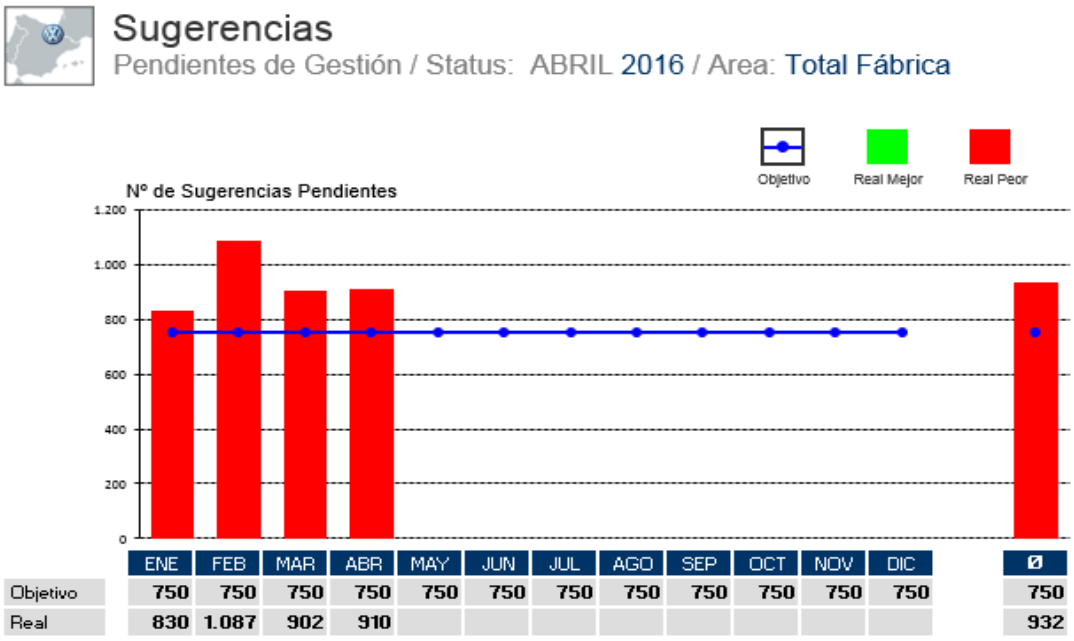
And the last graph represents the managed suggestions, introduced suggestions are green and rejected suggestions are red;



	Innov.	Ing. Ind	P. Prod.	A. Tecn.	Prensas	Chapa	Pintura	Motores	Montaje	R. Final	Logist.	Calidad	RRHH	Finanz	
Introducidas	0	3	9	1	22	17	34	25	61	11	11	47	5	6	18
Desestimadas	0	16	9	1	24	45	33	23	61	29	11	45	22	17	24
TOTAL	0	19	18	2	46	62	67	48	122	40	22	92	27	23	588

Figure 30. Graph 3 of the Suggestion System objective. **Source: VW Navarra**

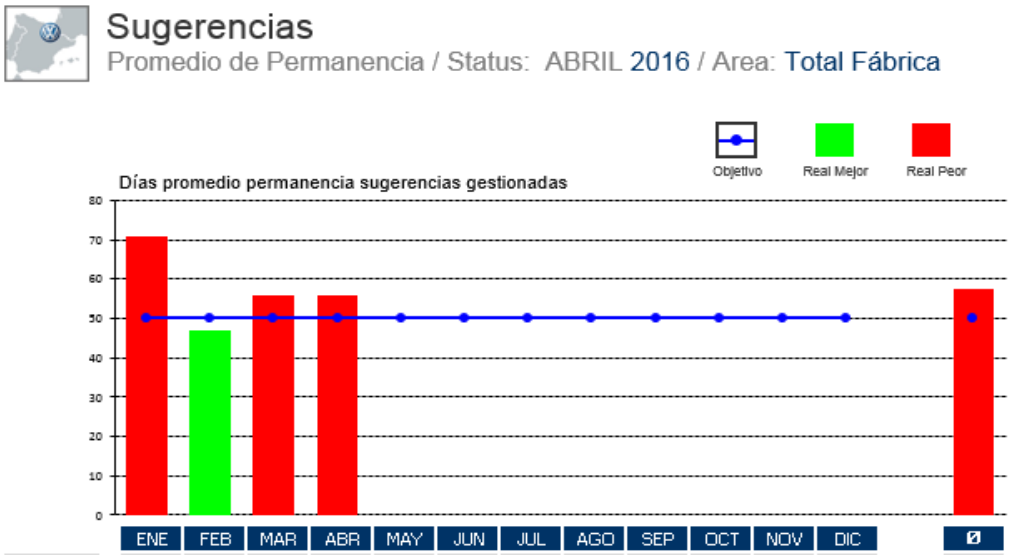
Apart from these, the office also reports the overall situation per month of outstanding management suggestions, average time managing suggestions and total managed suggestions. The next graph represents the outstanding management suggestions until April 2016 per month. Results from the sum of all areas of the plant;



	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	Ø
Objetivo	750	750	750	750	750	750	750	750	750	750	750	750	750
Real	830	1.087	902	910									932

Figure 31. Graph 4 of the Suggestion System objective. **Source: VW Navarra**

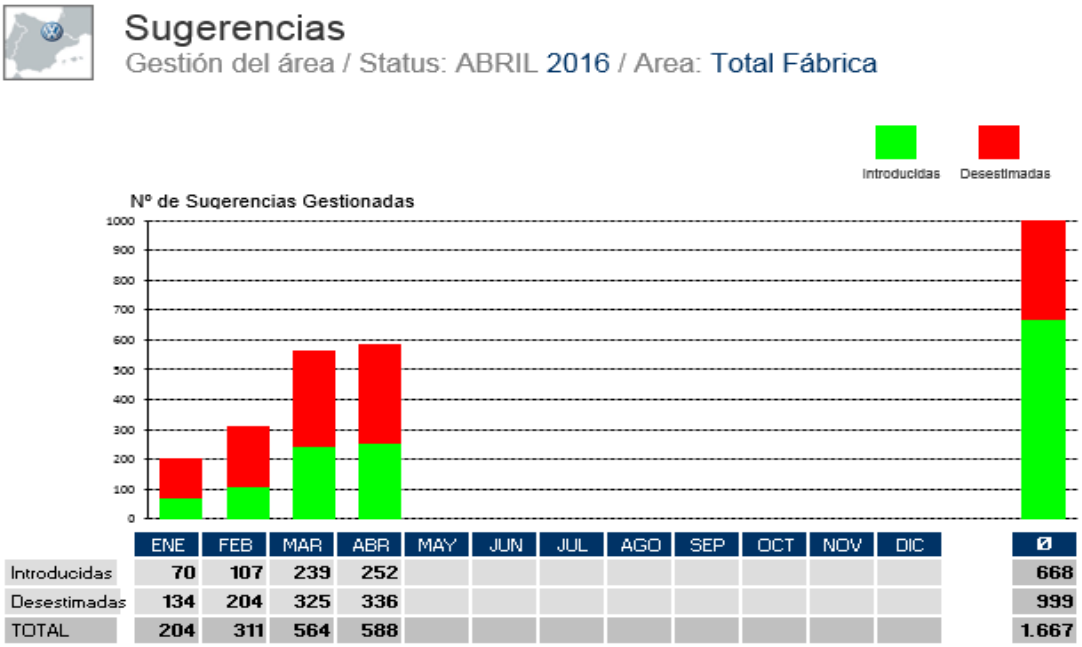
The next graph represents the average time managing a suggestion per month;



	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	Ø
Objetivo	50	50	50	50	50	50	50	50	50	50	50	50	50
Real	71	47	56	56									58

Figure 32. Graph 5 of the Suggestion System objective. **Source: VW Navarra**

This graph represents the managed suggestions per month;



	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	Ø
Introducidas	70	107	239	252									668
Desestimadas	134	204	325	336									999
TOTAL	204	311	564	588									1.667

Figure 33. Graph 6 of the Suggestion System objective. **Source: VW Navarra**

ANNEX 8

In Mexico the prize system is established by sections with a prize percentage that decreases as savings generated through the suggestions increase. The maximum prize is 250.000MXP (15.000€ approximately). Besides, prizes for direct labor workers and indirect labor workers are the same.

SAVINGS		PRIZE PERCENTAGE	MINIMUM PRIZE
FROM	TO		
$ 8.000,00	$ 20.000,00	15	No min.
$ 20.001,00	$ 125.000,00	15	$ 3.000,00
$ 125.001,00	$ 300.000,00	12	$ 18.750,00
$ 300.001,00	$ 450.000,00	10	$ 36.000,00
$ 450.001,00	$ 900.000,00	8	$ 45.000,00
$ 900.001,00		7	$ 72.000,00

Table 6. Prize system of the Suggestion System in VW Mexico.

In Wolfsburg the prize system is also established by sections with a prize percentage that decreases as savings generated through the suggestion increase. The Maximum prize in this case is 51.129€. In this case, prizes for direct labor workers and indirect labor workers are also the same.

FROM	TO				
512,00 €	1.534,00 €	=	45%	+	25,50 €
1.534,50 €	3.068,00 €	=	40%	+	102,50 €
3.068,50 €	4.601,50 €	=	35%	+	255,50 €
5.602,00 €	7.669,50 €	=	30%	+	485,50 €
7.670,00 €	15.339,00 €	=	25%	+	869,00 €
15.339,50 €	25.564,50 €	=	20%	+	1.636,00 €
25.565,00 €	51.129,00 €	=	15%	+	2.914,50 €
Above 51129€		=	10%	+	5.471,00 €

Table 7. Prize system of the Suggestion System in VW Wolfsburg.

In Martorell, the maximum prize is 24.000€ and as in Volkswagen Navarra, the prize is 30% the savings generated through the suggestion. It is also applied a function coefficient that can be 0.25, 0.5, 0.75 or 1.