

POLITECNICO DI TORINO

Master degree in Mechanical Engineering

**Warranty Process and Service Quality in
PSA After Sales**



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Introduction

This elaborate is consequence of an internship held in the Warranty Office in Italian headquarter of PSA Groupe. Even if in Italy is present an industrial production plant, headquarter located in Milan have only commercial purpose.

This lead to an internship where, from engineering point of view, design or production aspects have been put aside in favour of an analysis on the after-sale life of the product. This will complete the knowledge of product quality that, instead of regarding the quality of a single component, is elevated to the study of an entire package: the vehicle, his reliability and his after sales services.

Warranty office has an important role in after sales environment, for technical and for customer reasons, both of them will be analysed in this elaborate. For which concern technical aspect the office has first of all to manage warranty repair done by the repairer network. Due to the nearness to product defects, when necessary the office has the role to ask to repairers detailed report of problems found and, thanks to the large data source available, it is possible to do data analysis of expenses in repairer network with the aim to increase the efficiency of budget distribution or to define a contribute for vehicles out of warranty. Parallely will be analysed which are services in after sales that directly influence the customer experience. Example are road assistance, spare parts availability, quick and correct repair. Role of the brand is to guarantee all these components, if this is done a discomfort can be alleviated. The objective is to build lasting customer relationship based on creating value

Chapter 1

Marketing and Services

Starting from objectives of the actual business program of PSA Groupe, this chapter will introduce which are Services considered fundamental to reach these objectives: it will be analysed which are the characteristics of a Service and the importance of interaction between the company, customers and employees. After that, will be done a focus of kinds of After Sales Services in a company, with deeper analyse in the automotive area. It will purpose how many potential customers are circulating and how the After-Sales is an expense but how it could also become business with profitability.

1.1 Push to Pass

In a company Marketing and Services are strictly lied.

In 2016 PSA as launched a new strategic plan “Push to Pass”, aims of this program are various and predictable (profitable growth, change of traditional car manufacturer business model) but is important to note that one of core points to reach these objectives strictly related to the customer satisfaction and in specific are:

- optimise customer contact points and sell more products and services;
- evolve services by satisfying new customer-mobility requirements.

As Patrick Labilloy¹ said, “*customers satisfaction is actually the best way to protect the business in the medium term and long term. The ambition is to be in the TOP 3 in terms of quality of its products and services in the regions where it has a significant presence*” (Labilloy, 2017). The further aim of the Push to Pass program is to reach the first position of the category in 2021 (Colomba, 2017).

In general quality is defined through four elements, two concerning the product and two concerning the service.

For which concern product of an automotive company, the quality is influenced from two main factors: reliability and performance. Reliability consist to have a car without

¹ Patrick Labilloy: from 2016 he has the role of PSA Quality Manager.

problems like breakdowns or abnormal operation during the life of the car. Once the product is without defect, the next step is to sell a product that correspond to wishes of the costumers: dimension, facility to be used, engine performance.

For which concern services, firstly we have the selling aspect: how the costumer is welcomed at the dealership, explanation of characteristic and others selling aspect. The service that is related to quality improvement is the After Sale: if the costumer need to repair his car or need to do maintenance it necessary that he will feel welcome and to be well taken care. He will need quick and efficient work and if necessary he need to have available assistance's service.

On next paragraphs will follow definition and characteristics of a Service.

1.2 What is a Service

A Service is an immaterial good in form of activity or benefit that one subject offer to another. In a relationship within costumer and company, services consist in all activities rules by the company for his costumer. The services are intangible and are often offered in a moment of difficult for the costumer. A company must take in account of 4 main services characteristics.

Intangibility

A service is always intangible: it cannot put on view before it acquisitions, for a buyer it's difficult to evaluate a service before consumption. When a costumer bought a car he can try it, touch it and analyse its components but he is not able to evaluate the quality of the after-sales service before that these services are performed.

Inseparability

Services cannot be divided from the company. On the other hand, the costumer is also present when the service is produced and provided to him. Note that service, differently from physical goods, are first sold and then produced. A physical good first is produced and then sold and still later consumed.

A service's problem is to perform service when the demand rises, this is due to the fact that services are concurrently produced and consumed.

Variability

The quality of a service is object affected from who provide it. A call center dedicated to the road assistance has quality that is subjected also to the operator that answer to the phone call. An important aspect is that, to get a good service, the front-line employees should be authorized to take actions and do what is necessary to guarantee the services.

Perishability

It signifies that a service cannot be stored for a following use or sale. This could be a problem only for some kind of services, a typical example is the rush-our demand for public transport.

1.2.1 The Service-Profit Chain

A successful company put attention to the concept of service-profit chain: this is the connection between company service from one side, and employee and customer satisfaction from the other side. This chain could be resumed in following 5 key points:

- 1st Internal service quality: employee selection and training, work environment;
- 2nd Loyal and productive employees;
- 3rd Greater service value;
- 4th Satisfied and loyal customer;
- 5th Healthy service profits and growth superior service.

This denote that a company must offer more than just traditional external marketing but also:

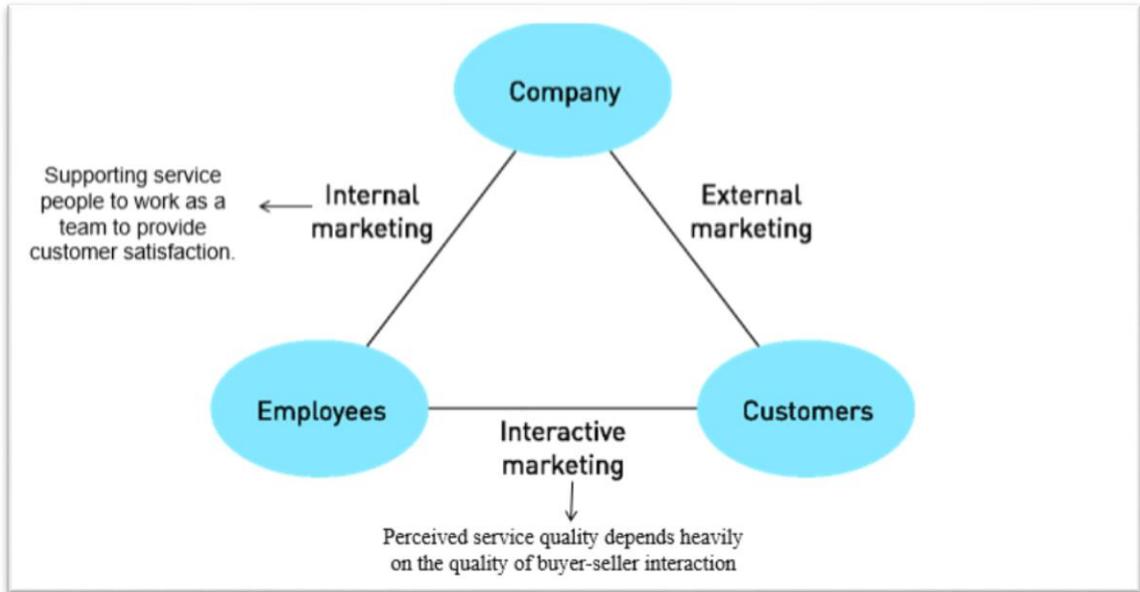


Figure 1 The Service-Profit Chain (Ferrero, 2018).

A popular example for employees in an automotive group, is the possibility obtain dedicated offer for car long-term renting. Another example, object of the internship in PSA, is the execution of course to employees of IMA Assistance² where new vehicles and new components are presented.

1.3 After-Sales – Services Marketing

The after-sales service is strictly lied to the typologies of product realized and sold and has more importance for company which produce durable goods. The company activity doesn't end with the sale of a product, it continues with different interaction with the sold product and consequently with the customer.

This often correspond to a cost for the company, the law implied some standard of technical assistance and warranty that are mandatory. In general, main activity are:

- Selling of spare part and wear part
- Repairs under warranty coverage

² IMA Assistance manage all road Assistance for PSA Italia, it is an external supplier of the group.

- Technical assistance
- Maintenance
- Product disposal

Is evident not all these activities represent a cost for the company, for this reason companies could start to invest in after-sales elevating it to a money profit source, in fact in many cases the after-sales area could generate a profit and can become an independent business unit.

Another important factor to must be taken in account is that after-sales service are less influenced from economical changes, they represent an almost constant business area.

1.4 After-Sales & Services - Automotive Area

1.4.1 Car Market

Before to analyse what are After-Sales & Services in the automotive area we shall put in evidence which is the volume of potential customers and service demand by analysing the number of sold.

Car market represent a very big economy in constant evolution thanks to development of new technologies, new pollution normative that require to be respected, new form of marketing (ex. car sharing).

For which concern world market last data available regards the 2016's market. In this year car market has been pushed from the matriculation of more than 94 billion of car, Europe contribute to this market for the 21% with 20 billions of vehicles (ANFIA, 2017a). Is important to note that respect 2015 the European market is increased in all countries for an average global increase of 6.5%³.

³ Riferito a UE 15. Dati ANFIA

Matriculation in Italy had the following trend:

Table 1 Cars and LCV matriculation in Italy (ANFIA, 2017b)

Years	Cars	LCV	Total
2007	2.494.115	242.826	2.736.941
2008	2.161.359	221.830	2.383.189
2009	2.159.924	175.849	2.335.773
2010	1.962.042	180.686	2.142.728
2011	1.749.469	170.638	1.920.107
2012	1.403.263	113.267	1.516.530
2013	1.304.842	99.904	1.404.746
2014	1.360.777	117.720	1.478.497
2015	1.575.954	132.769	1.708.723
2016	1.826.050	200.252	2.026.302
2017	1.970.497	193.812	2.164.309

Keeping in account of all actuals cars matriculated in Italy the result is the following one⁴:

- number of car with an active matriculation in Italy: 37.876.138 units;
- number of car with less than 10 years age: 17.668.098 units (46.65%).

Car market, in the statistical analysis published by ISTAT each year, is included in the category of expense called “Transport” that is average the 3rd cause of expense in an Italian family with 11% of total expenses (at 1st position there is home purchase, at 2nd foods). This elevate at higher level the importance of a durable good as a vehicle that have for sure a protagonist role in this category: fuel consumption will be important as insurance cost, but also maintenance and reliability has importance. A brand in automotive area must manage the after-sales of a good that is durable and expensive for the owner.

1.4.2 Automotive After-Sales Sectors

After-sales services offered from the brand change with the aging of the vehicle, this depends also from the customer that, if in first year choose to stay in the authorized repairers network, passing years customers tend to leave.

After-Sales for an automotive company are composed of the following are:

⁴ Data are referred to 2016 (ANFIA, 2017b).

- Distribution
- Channel Development
- Marketing
- Customer Satisfaction
- Cost Management
- Price and Volume Planning
- Strategy & Processes
- Service & Warranty
- Parts Logistics Management
- Regional Aftersales Management

Sectors that directly influence the customer satisfaction are:

The regional aftersales environment that guarantees a territorial coverage of authorized repairer and spare parts diffusion.

The Parts and logistics management that guarantees a sufficient storage and quick delivery of spare parts.

The customers Satisfaction office that could act on complicated and situation.

The Service & Warranty to provide to costumer adequate assistance and analysis of inconvenience.

For which concern the after-sales market of spare parts there are two aspects to be take in account, once related to customer satisfaction and the other to business profitability.

First simply regards the availability of spare parts, it could be anticipated that in PSA is case of missing spare parts the brand will provide a courtesy car for the customer, but this happen only if the car is in warranty. In addition to that, in case of missing spare parts, an important aspect to be considered is to have a correct prevision of when the part will become available, in many cases the prevision could influence the carried-out repair.

Second important aspect for an automotive brand is the after-sales market of spare parts: in Italy its business represent has a value of 12 billion € and has an higher operating margin respect car market (La Posta, 2016).

1.4.3 Prospects for the future of automotive after-sales

For which concern business area of After Sales sector, brands have always the ambition to keep customers inside their repairer network with the aim to sell OEM products to customer and, thanks to that, get profitability.

The news, for a brand like PSA, is the attempt to become protagonist also in the Independent Aftermarket sector. This is done by the bought of an important e-commerce (Mister-auto.com) and through the creation of a new repairer network. This new repairer network has the name Eurorepar⁵ and has the purpose to repair and maintain vehicles of all brands by using the spare parts distributors of PSA Groupe. The aim for the future is to get profitability from these new projects. It must be taken in account that new vehicles have longer maintenance frequency period and, in the future, hybrid technologies and electric vehicles have an expectation of very higher reliability respect actuals vehicles.

For which concern customers after sales services, the diffusion of vehicles that are more and more technological will led to the creation of new after sales services.

Repairers will need constant upgrading courses and guided repair manual for each possible technical issue that could be find on the vehicle. Another important aspect will be the possibility for repairer to ask for help to a central platform from which, by remote, technical experts could intervene for car repair.

In addition, once main interface to commands and function of the vehicle will be digital, this interface will have the possibility to be upgraded in the after sales life of the vehicle. A customer with renewed interface and software could be grateful to his brand. Other examples are in the road assistance, thanks to news technological components it is already easier to know which car require assistance, but in the future with the bigger expansion of electric vehicle, there will be a special rescue service for them. Other aspects that could be improved concern the cause of issue, by remote for a technician it will become possible predict the time that the issue will require to be solved. Thanks to this information the car could be sent to the more convenient authorized repairer for customer: it will be chosen

⁵ Eurorepar is Groupe PSA's multibrand parts and accessories range for repair and maintenance of vehicles 3 years old and over.

for technical requirement for repair, for the time that it will require and from the distance from customer residence. Also for repairers they will know the kind a problem before arrival to the garage, it will be an advantage for the work organisation.

In conclusion future vehicles distribution will give the possibility for the brands to increase the quality products also thanks to the contribute of the aftermarket area. After services, with the aim to increase the customer care, have to possibility to exploit the technologies that will be present of new vehicles to offer an adequate and more efficient service.

Chapter 2

The PSA Groupe

The second chapter will be focused on the story of the Groupe and of brands that compose it. This is one of the key elements because it permits to better understand which are base motivations that have pushed to the formation of the group and of the economical choices that have been inaugurated in last years. In addition to that it will be illustrated the organizational structure of the company.

2.1 History of the Groupe

PSA Groupe is a society that has his core business in the production of car vehicles in brands Peugeot, Citroen, DS and, starting from 2017, also Opel and Vauxhall⁶. The Groupe is also the principal and controlling shareholder of Faurecia, one of bigger producer of car components.



Figure 2 Logo of the Groupe PSA.

The history of the Groupe PSA starts with the acquisition of brand Citroen in December of 1974 by Peugeot SA (Peugeot Société Anonyme). Thanks to this operation there is the born of one of bigger production group in the automotive sector), this was a period of great economic crisis for Citroen and this operation allowed save of the brand from bankruptcy.

The fusion between these two brands allowed the group to reach an elevate importance in the automotive sector exploiting the know-how and different peculiarity of different brands that were part of this new society.

⁶ Subsidiary of the brand Opel exclusively for British territory.

In addition to that, PSA has realized different joint ventures with other car companies. Some important cases are here described.

In the Italian territory PSA maintain an important cooperation with the Groupe FCA, with Fiat S.p.A., in the production of Sevel. This joint venture allowed the creation of an important production centre: Sevel Sud in Val di Sangro. This collaboration has given important results up to reach a stable and long-term cooperation. The agreement is referred to the production of vehicles dedicated to a professional use, this category is called MPV.

In addition to that, the Groupe PSA has stipulated joint venture also with Toyota, this has generated the TCPA (Toyota Citroen Peugeot Automobiles). With the born of this society has been constructed a new production plant in the Czech Republic with the aim to produce the models C1, Aygo and 108. Furthermore, thanks to this agreement, is born also a joint venture to produce some light commercial vans and passenger minivans for different models like Peugeot Traveller, Fiat Scudo and Toyota ProAce Verso.

The actual shareholding structure is the following one:

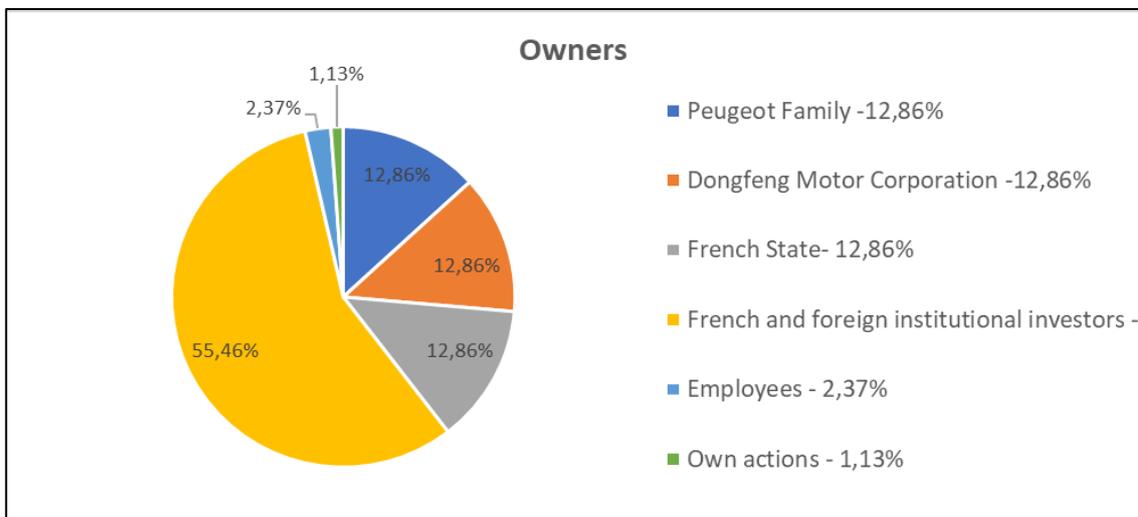


Figure 3 PSA Shareholding chart.

This composition is consequence of the economic crisis that has involved the group. In the 2008 Groupe PSA has been obliged to sell some of his property in between GEFCO, the society of logistic services and transport services made by PSA. This liquidity gain has not been sufficient for PSA money boxes, so that PSA has sold other packages of shares of the companies to the French state and French institutions. This economic crisis

that have induced the Groupe to look for new business in emerging countries, mostly in China and Brazil. Parallel to that many partnerships born during this period failed: the alliance with BMW for the production of hybrid vehicles ended in 2012 cause the enter of GM in the group; the alliance with GM that has bought the 7% of PSA end in 2013 cause the enter of Dongfeng Motor Corporation in the shareholding.

The enter in the 2014 of the Dongfeng Motor Corporation has not been casual: in the 1992 there is been a joint venture to produce Citroën ZX and a new joint venture born in 2002 for production of Peugeot and Citroen models. This agreement allowed PSA to further increase his sell potential in Chinese market where PSA was already present.

In later years follow an expansion of the Groupe, in 2014 DS become officially an independent brand, the 3rd automotive brand of the group.

In 2016 is launched the new business plan “Push to Pass” which includes the Free2Move launch for car sharing or long-term renting, the entry in ecommerce for multi-brand spare parts and the creation of a multi brand repairer network called Eurorepar.

In March 2017 there is the entry of Opel and Vauxhall: the 4th and the 5th automotive brands of the Groupe.

2.2 World locations of PSA factories

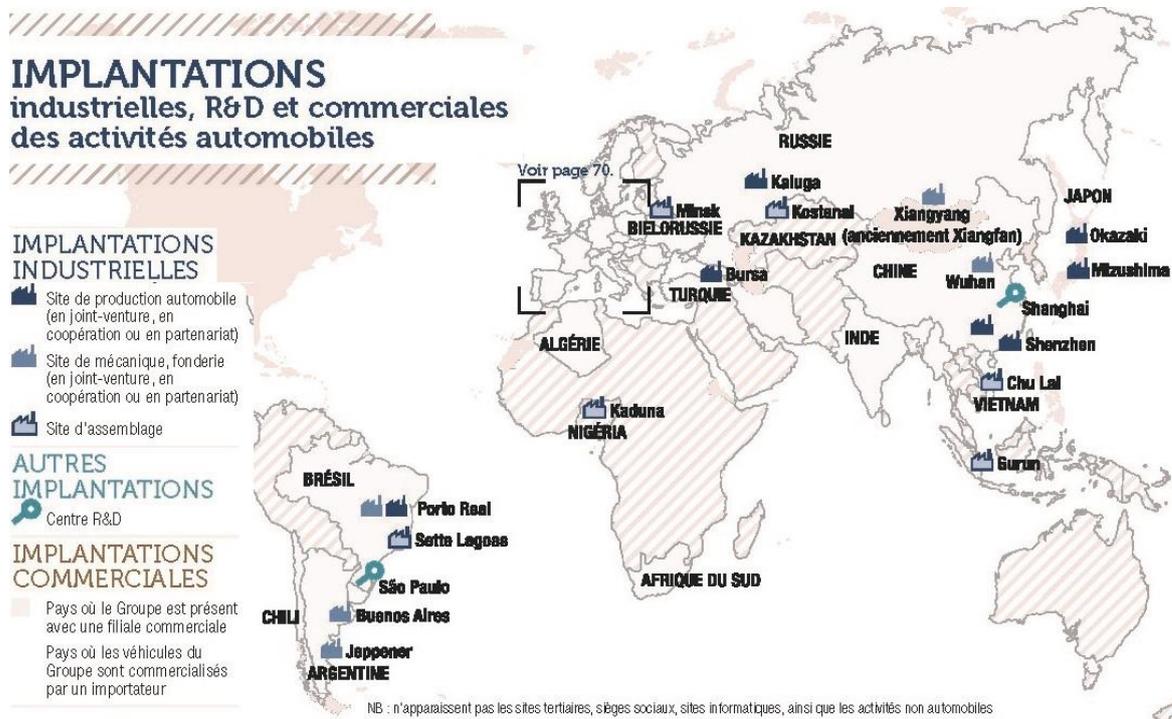


Figure 4 World locations of PSA factories. Source: Portail PSA.

PSA production in South America started in 2000's, in Brazil and Argentina apart production site and powertrain site is also present a R&D centre dedicate to research in application of local biofuel.

In 2000's is also started the production in Russian territory, today there is the production (autonomous to 50%) of models C4 and 408 and in addition to this in 2018 will parallelly start the production of light commercial vans. This production it stands out from European one because models are characterized of reinforced suspension, protection to engine carter, remote engine preheating and expanded battery capacity.

About China, as written before, there is been a first partnership in 1992 with carmaker Dongfeng Motor Group. After the bought of 14,1% of PSA in 2014 the support to PSA is obviously increased. Today the vehicle output capacity is of 1,3 million vehicles and in the China and South-East Asia there are six production centres.

In Europe there are 17 production centres in 9 different countries (considering also the two sites in cooperation). The production is located mainly in France, despite the world

industrial expansion PSA has the certificated “Guaranteed French Origin”⁷ for 15 Peugeot, Citroën and DS vehicles.

Is interesting to analyse the new plan (PSA Press Release, 2018), to face up to the increase in SUV demands.

Table 2 Multi-site strategy of SUV production.

Brand	Model	Europe	Asia	Other
Peugeot	2008	Mulhouse (France)	Wuhan (China)	Porto Real (Brazil)
Peugeot	3008	Sochaux (France)	Chulai (Vietnam) Gurun (Malaysia)	Walvis Bay (Namibia)
Peugeot	4008		Chengdu (China)	
Peugeot	5008	Rennes and Sochaux (France)	Chulai (Vietnam) Chengdu (China)	
Citroen	C3 Aircross	Zaragosa (Spain)		
Citroen	C4 Aircross		Wuhan (China)	
Citroen	C5 Aircross	Rennes (France)	Chengdu (China)	
DS	7 Crossback	Mulhouse (France)	Shenzhen (China)	
Opel / Vauxhall	Grandland X	Sochaux (France) Eisenach (Germany)	Walvis Bay (Namibia)	
Opel / Vauxhall	Crossland X	Zaragosa (Spain)		
Opel / Vauxhall	Mokka X	Zaragosa (Spain)	Bupyeong (Korea)	

⁷ Certification that attests the French origin of a product by the Pro France association.

2.3 History of the Peugeot Brand

Peugeot started his history in the automotive world in the 1889, when Armand Peugeot learned the potential that the automotive sector had.

In the years started the production of four tricycles with vapour engine that were exposed in the universal exposition in Paris.

The brand Peugeot has immediately participated in motorsport events: in the 1894 joined to the 500 miles of Indianapolis becoming the first non-US car producer to win the competition thanks to creation of the Peugeot “Bebè”, in collaboration with Bugatti.

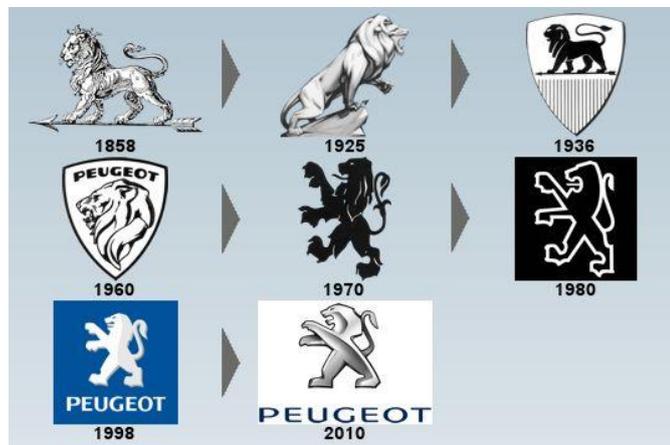


Figure 1 Evolution of the Peugeot's mark.

Into 1906 started the real production of series cars with the production of 201 equipped with diesel engine (built in cooperation with Ford) with a power of 6 hp.

During years of the war, like a multitude of others enterprises, Peugeot had to change his business into weapon production.

At the end of the conflict Peugeot started again the production of vehicles through the sale of new models and, in the 1953, there is the born also of the first scooter Peugeot.

Thanks to the motorsport sector the brand gained a big visibility: from '60 years up to today Peugeot has participated to many events, but in particular to rally events or endurance races like 24 hours of Le Mans with also some competition in Formula 1.

2.4 History of the Citroen brand

The history of the brand Citroen started in the 1900 when André Citroen has bought the brother-in law's company. This company was specialized in the build of a gearing with V teeth that has always inspired the mark of the brand composed by the double "chevron".



Figure 2 Evolution of the Peugeot's mark.

André Citroen, by studying business results of Peugeot "Bebè" selling, in the 1918 decides to transform his business in the production of automotive vehicles. This production started with the build of the model Type A, first vehicle of the brand with diesel engine.

Also the brand Citroen, during the period of II world war, stopped the production of vehicle to give priority to the production of guns and other war equipment in cooperation with Renault.

After this period, in '50 years, the brand restarts the vehicles production with the model 2CV.

Like for Peugeot, also Citroen has increase his brand importance thanks to motorsport participation. In particular the best result of the brand were in rally competition in which it has demonstrate good reliability and efficiency of her vehicles.

But in next years, due to economic problems caused by non-sustainable action plans, the society was obliged to accept to be sold to Peugeot. In was 1974 the born of the actual PSA Groupe.

2.5 History of the DS brand

The brand DS starts his history with the production of Citroen DS that was officially presented in 1955 during the Paris car show. The aim of this car was distinguishing from others vehicles philosophy with a production of a model with nonconformist appearance and important engineering innovations. This allowed the Citroen brand to take a share of the premium car market. Main actors of this differentiation of the brand is the partnership with designers André Lefèbvre and Flaminio Bertoni; they started to collaborate in 1938 in the design of 2CV and DS prototypes.

After 20 years and 1,330⁸ million of vehicles, in 1975 the production of model DS ended. In 2009 Citroen progressively started a new production of model named DS3, DS4 and DS5. These models were built to be part of premium vehicle market, they were based on same platform of Citroen vehicle but with premium interior and a sophisticated aspect, rich of possible customizations.

In the 2014 there is the official formation of a 3rd automotive brand of the Groupe PSA: the brand “DS”. One of key points is to make DS an autonomous brand.

In China, where the DS market was more popular, it has been easier create a car dealer network completely independent from the Citroen one. In Italy, will be reached the selling of DS vehicle only in new DS Store, independent from the Citroen network, during the year 2018.

⁸ Data from Citroen official site.



Figure 5 From model Citroen DS4 to model DS 4: differences in the front logo.

To push in the increase of the brand in the European market there has been the presentation of a new model, the DS7. It has been presented in 2017 and the selling is started in 2018. In addition to that, in next future the production of all previous models will be interrupted, at the end of the 2018 the production of DS vehicle's will be composed only from 2 models: DS 7 and New DS 3.

2.6 History of the Opel and Vauxhall brands

Even if these two brands today are strictly lied, they have different history.

Both of them born in XIX century, like Citroen and Peugeot.

Vauxhall was located in English territory, firstly London and after in Luton. It was a mechanical industry that decided to entry in the car market in 1895. First year was dedicated to luxury and sportive segment but in 1925 GM⁹ bought this brand and convert him to lower price cars.

Opel start cars production in 1899, before this it was a producer of sewing machines and bicycles. In 1928 become the bigger German car producer and in 1931 was bought by GM for 33 million dollars, a record value. After the II world war the restart of the production has been slow, but in 1972 become again the largest German automobile manufacturer.

In 1970 GM started his project of globalization for Vauxhall and Opel model, during this project GM gave more priority to Opel models. Today Vauxhall consist in the re-branding of Opel vehicle for the British Market.

⁹ General Motors Corporation.

In 2017 after many years under the property of GM, Opel and Vauxhall was sold to the PSA Groupe.

2.7 Economic Results of 2017¹⁰

The 2017 has been the 4th year in a row of growth under many aspects:

- Growth of sales: 3.63 million of vehicle, +15.4% respect 2017;
- Increase of operating margins;
- Increase of total revenues.

In detail total revenue of the PSA Groupe amounts to 65.210 million € with an increase of 20,7 % respect the result of 2016. These total revenues reach an amount of 40.735 million € and refer to Automobile PCD¹¹ division (+9.9% respect 2016).

Regarding the operating margin the Automotive PCD division (that not includes Opel) reach the record of 7,3%, an increase in the cost for raw materials has been compensated from an amelioration in the mix products offer and from a general cost reduction-plan.

Automotive division OV (Opel Vauxhall), had 179 million € losses¹².

PSA Finance Bank report a result of 632 million € that correspond to a +10,7% respect 2016.

The net financial position of industrial and commercial activity at the 31 December 2017 amount to 6194 million € in contrast to 2016 result of 6813 million €.

Goals to achieve for 2018 are to maintain a stable European automotive market, growth of 4% in Latin America, of the 10% in Russia and 2% in China. In parallel to that, the challenge will be to make Opel net revenue profitability.

¹⁰ (PSA Financial, 2018).

¹¹ PCD: Peugeot Citroen DS.

¹² Opel Vauxhall is consolidated since August, 1st 2017.

As regards the Italian market, in 2017 the automotive market has reached 1 970 962 matriculations (+7.9% respect 2016) subdivided as it follows:

	2017	%	2016	%	variazioni		% a/a
FIAT - CHRYSLER Group	560.770	28,5	530.761	29,1	5,7	30.009	5,7
PSA Group ¹	284.020	14,4	253.401	13,9	12,1	30.619	12,1
VW Group	258.163	13,1	243.465	13,3	6,0	14.698	6,0
RENAULT Group	191.647	9,7	166.282	9,1	15,3	25.365	15,3
FORD	134.073	6,8	124.328	6,8	7,8	9.745	7,8
DAIMLER Group	92.520	4,7	92.769	5,1	-0,3	-249	-0,3
TOYOTA Group	89.149	4,5	76.085	4,2	17,2	13.064	17,2
BMW Group	85.593	4,3	84.284	4,6	1,6	1.309	1,6
NISSAN	62.708	3,2	55.222	3,0	13,6	7.486	13,6
HYUNDAI	58.917	3,0	56.379	3,1	4,5	2.538	4,5
KIA	47.935	2,4	45.154	2,5	6,2	2.781	6,2
SUZUKI	31.088	1,6	22.631	1,2	37,4	8.457	37,4

Figure 6 Ranking for Automotive Group with variation from 2016 (ANFIA, 2018c)

About PSA Groupe the last year has increased his Italian market share:

- 9.2% market share in 2015;
- 8.9% market share in 2016;
- 9.9% market share in 2017¹³ with: Peugeot 5.29%,
Citroen 3.97%,
DS 0,13%.
(without considering Opel)

Here below follows a table which reports different brands where are specified details of PSA Groupe and highlights model vehicles sold respect the total quantity of vehicles of the group.

¹³ (UNRAE,2018).

Table 3 Internal vehicles market share

Citroen Model	Quantity of Matriculation	% of Citroen Vehicle	% of PSA Vehicle
NUOVA C3	40882	52,28%	22,09%
N C1	7751	9,91%	4,19%
C4 CACTU	7116	9,10%	3,85%
JUMPER V	6932	8,86%	3,75%
C3 PICASS	5733	7,33%	3,10%

Peugeot Model	Quantity of Matriculation	% of Peugeot Vehicle	% of PSA Vehicle
208	38088	36,55%	20,58%
2008	23553	22,60%	12,73%
3008	18061	17,33%	9,76%
308 Berlina	8085	7,76%	4,37%
308 SW	7851	7,53%	4,24%

DS Model	Quantity of Matriculation	% of DS Vehicle	% of PSA Vehicle
DS3	1213	45,76%	0,66%
DS4	725	27,35%	0,39%
DS5	399	15,05%	0,22%
DS4 CROSS	230	8,68%	0,12%
DS3 CABRI	70	2,64%	0,04%

Table highlights the importance of model C3 in the success of Citroen, parallely for Peugeot brand there is a more linear distribution of popular vehicles: 208, 2008, 3008 and 308.

Chapter 3

Warranty Office

This chapter will enter in the Italian after sales department of PSA Groupe, up to July 2018 Opel was not present in this department but it expected that before the end of 2018 all after sales will be reunified in the PSA headquarter in Milan. So, this chapter will be related only to After Sales department of brands Peugeot, Citroen and DS.

It will be introduced which are main components of After Sales Service, and will be put in evidence also the purpose of each office. Some of them are oriented to business with profitability aspects (ex. Spare Parts), some other will be oriented in product quality and customers assistance services. It will be exposed how an issue on a vehicle requires separated work of different offices to analyse it, to report it (if necessary) and restore the vehicle by warranty coverage. In particular this chapter will analyse the Warranty Office where the internship was held, it will be showed how it work and which has been the role of the intern.

3.1 PSA Italian Business Headquarters

The Italian headquarters of PSA are in Milan, here are located all departments of Italian PSA Groupe and the after sales department. So, even if Peugeot and Citroen are different brands, they are located in the same headquarter but they maintain distinct and autonomous division inside the structure, each brand has his specific staff for which concern distinctive character of a brand: Marketing and Sales managements. Differently, for which concern the after sales department, the distinction between different brand decreases, offices must work in a wider prospective independently for the brand. In other word there is a unique office for all recalls campaigns, for homologation, for warranty and for spare parts and accessories.

Here is reported the organization chart of the Milan branch of PSA:

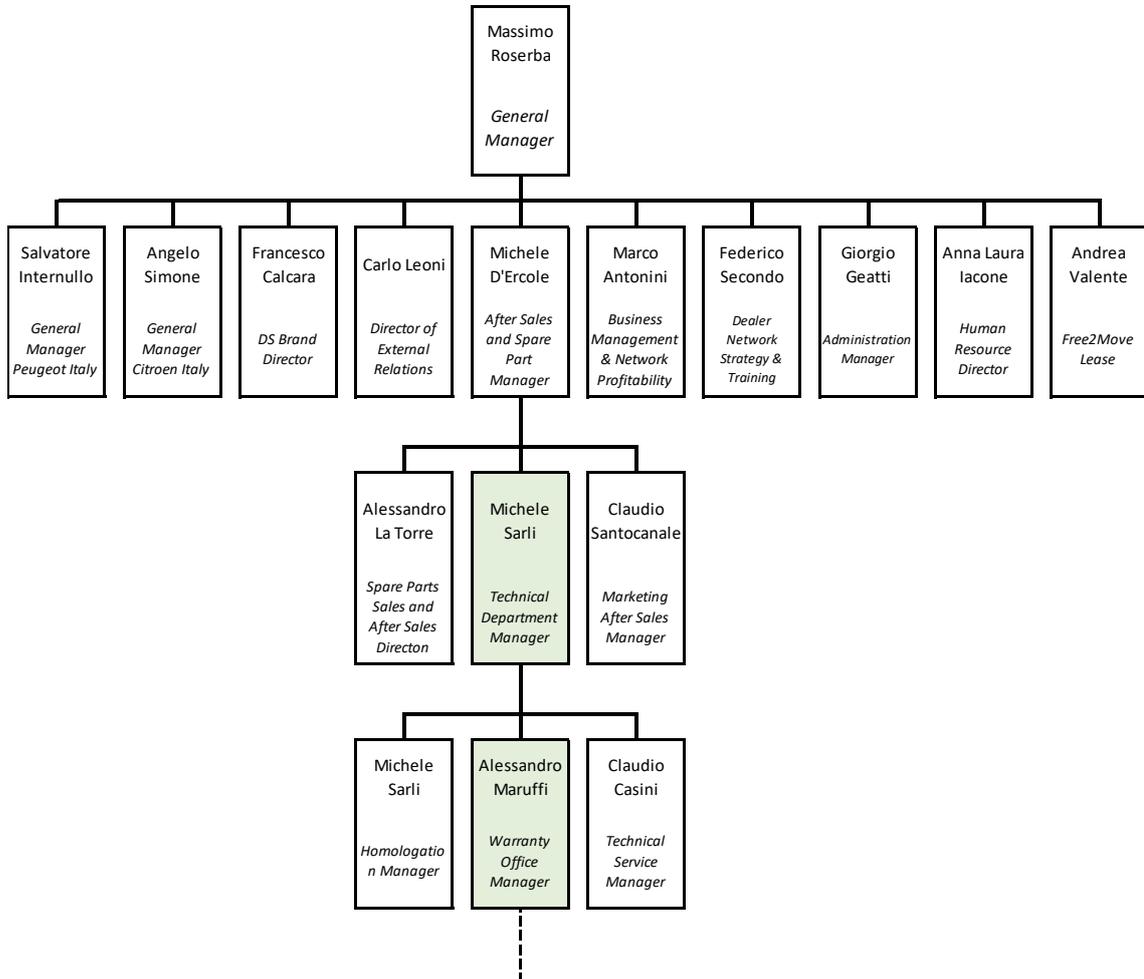


Figure 7 Organization Chart, from the General manager to the Warranty office.

Zooming in the Spare parts and After sales services, it's possible to note which are the different sectors that are included in the After Sales area.

Briefly here there is a more commercial area focused on the spare parts marketing: pricing, selling and distribution. The bought of the site mister-auto.com¹⁴ and the development of Eurorepar shows that PSA Italia is really pushing to becoming a protagonist in spare parts selling and after sales servicing also for vehicle of other brands and including also non-authorized repairer. It is sufficient to visit the Eurorepar site, here

¹⁴ Mister-auto.it is an e-commerce leader into independent aftermarket spare parts market. It has been part of the Groupe PSA since 2015.

is possible to do estimates for car maintenance or repair like in many other site, the news is that this is managed by a car producer and not from external companies.

Focusing in a more technical sector, in the after sales departments we found following offices:

- Technical service
- Homologation
- Warranty

3.2 Internship

My internship was held in the warranty office, prior role of this office is obviously to guarantee the warranty for vehicles. The office manages the network of authorized repairer and this management act by establishing an appropriate regulation, prior approval, coaching and audit program.

Other role is to guarantee assistance to costumers for which concern road assistance, courtesy car and other services. This is done through an external service supplier, IMA Servizi.

In addition to that the office is has the role to manage:

- Service Contract
- Spare parts warranty
- Programming software SAGAI

Guide lines for the correct dynamics of the office are:

- Specific KPI for each service (time for prior authorization, courtesy car coverage)
- Economical budget
- Constant exchange of information & instructions with the European warranty chief.

The office is composed by a staff of 7 people located in Italy and 3 other persons located in the European Platform. The role of this office consists of technical aspects (warranty preventive authorizations), management aspect (to manage of the authorized repairer rete), an informatic aspect (manage of the portal used by the repairer), indirectly customers service and relationship (by offering new services and assistance). Into the

warranty office each employee has a specific role based also to their previous experience, here is the actual organization chart:



Apart from staff of the warranty office there are other important actors that are involved in the dynamic of the office:

- Area manager after sales: 20 in the Italian territory
- European Platform
- External supplier (MSX, IMA Servizi)
- Authorized repairers: there are more than 800 authorized repairers in Italian territory, almost half are Peugeot and other half are Citroen & DS¹⁵. The brand DS is keeping always more autonomy and differentiation, in fact from the next upgrade in contract for Citroen Authorized Repairer, to do work on DS's vehicle it will be necessary to sign a new dedicated contract ad DS Authorized Repairer. This is a news because, before the born of DS "autonomous" brand, the network of authorized repairer of DS was inserted in the Citroen network.

3.3 Warranty office instruments

To get a good analysis how the warranty office panorama is mandatory to introduce three main instruments. The first one described is Service Box, it is an only portal shared with all the after-sales network and colleagues. Next it will be described Pamir, a portal where could be managed request on the authorized repairers network. The third instrument is SAGAI: specific software managed by the POA¹⁶ of warranty office that allows the modify and the access of vehicles.

¹⁵ At the end of 2018 will be completed the creation of a new DS Autonomous Network.

¹⁶ POA: "Pilote Opérationnel d'Application".

3.3.1 Service Box

It is the main portal used by all people that work in the after sales department (this includes also authorized repair). It is a must have for authorized repairers that periodically must pay a subscription.

His function is very simple: it contains all instruments to identify the vehicle, get information and simulate a payment.

This is how it appears, here below an analysis of main menus.



a. Reception

It shows main car information, recall campaigns, the warranty expiring date and warranty extension. In addition to that is possible to see all interventions that has been done on the vehicle (if they are done by the authorized repair).

b. Documentation

It regards all documentation of accessories, spare parts market and above all technical documentation of the car.

For each component are reported references necessary for a new order, billing index, diagnosis guide and eventually also the brand contribute to repair the component (if it is out of warranty).

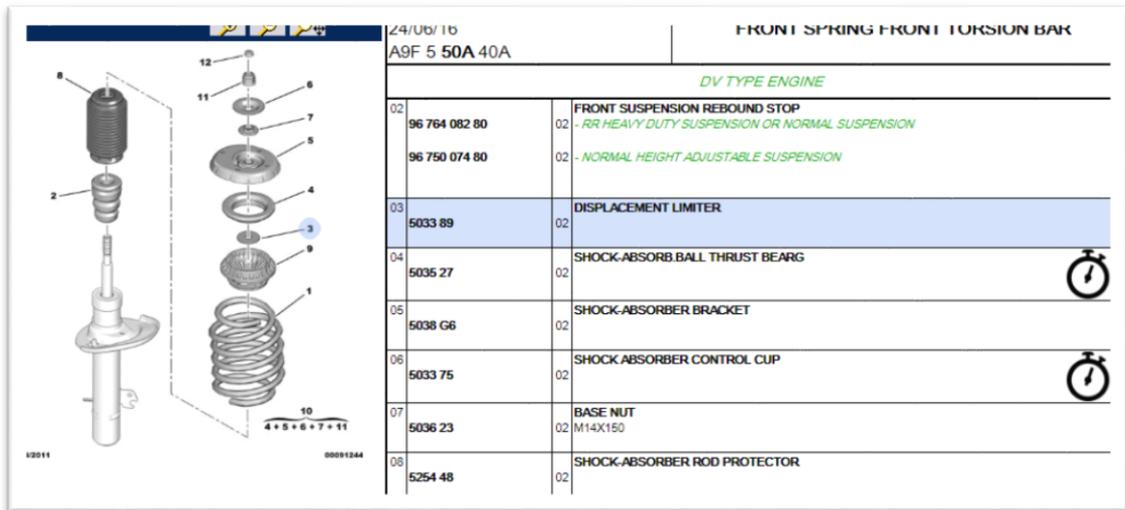
Here is an example:



For this component are available:



Parts detail:



Apart these general descriptions very important menu are the Diagnosis and the Repair Procedures.

A big network of cars and authorized repairs is a resource and a source of information that a brand must exploit to increase quality services. Thanks to that is possible to create detailed diagnosis guides called TSB: “Technical Service Bulletin”.

The aim is to get a guide for specific common problems of vehicle that permit to authorized repairers to be more quicker and optimize repair: for example, instead to change an entire kit of components from Diagnosis the repairer could discover that in previous cases the solution has been founded by only replacing a single component.

c. Incidents and Assistance

Menu with the aim to make a DID: Dealer Issue Detection.

d. Warranty – Service Contracts

Menu dedicated to keep documentation and practical information about procedure to follow.

e. Help & Contact

From this menu is possible for the repairer to open tickets in all kind off menu: from the technical documentation to warranty procedures. This is the main channel for repairers to contact the warranty office.

3.3.2 Pamir

Pamir is an online internal portal able to received tickets opened in “Help & Contact”. This is the main way for a repairer to take contact with the warranty office. Also, this menu has:

- Contact the Diagnostic Assistance to get help with the diagnosis
- Redact a DID-i
- Technical documentation
- Informatic assistance for the repair shop
- Insert information related to a “Preventive Authorization”
- Contact for warranty office (courtesy car, procedures problems, all general information and data).

The intern work consists in the manage mostly these last two tasks. There are two different KPIs that judge Pamir activities, they are based on response time to repairers. The time limit is 2 hours for preventive authorization and it is of 4 hours for the rest, the KPI is considered positive in case 90% of answers are in the time limit.

Mainly the warranty office receives 30 tickets/day.

3.3.3 SAGAI

As told in the introduction, SAGAI is a software provided by the French central office, but it is managed by the POA that is internal to the Italian warranty office. The work done by this software is simpler: SAGAI is the database of information and the instrument used to manage them.

There are different software that could interact with SAGAI, external software have the advantage to have a simpler and more automatic interaction, for example a repairer could

insert credit demand of the brand in SAGAI and at the same time he can issue the invoice to the customer.

The warranty office works directly on the basic interface here below represented.



Figure 8 Italian's SAGAI interface.

The data flow internal to SAGAI could be resumed as follow: people external to the warranty office can insert or visualize just some kind of information. Mainly use is to insert owner and vehicle information for a new vehicle (name, address, matriculation plate), insert preventive authorization¹⁷ or insert credit application for a work which the brand will pay¹⁸.

Furthermore, it is used not only from authorized repairers but also from external agency like MSX, GEFCO or IMA.

GEFCO has the role to manage the car transport and the storage on the park, issue during this period are possible but, GEFCO, are the possibility to repay for these damages all the authorized repairers network through SAGAI.

Personal of warranty office has access also for modification and validation of data: main uses are validation of preventive authorization or credit demand but also data extraction.

¹⁷ Preventive authorization will be presented in next paragraphs.

¹⁸ Main example are: warranty restore or recall campaigns.

More useful data are obviously related to credit demand: for them SAGAI output create a spreadsheet with the details of each credit demand. Details are various, more important are:

- spare parts that have been used: reference, quantity, cost
- labour time and kind of labour
- kind of problematic
- imputation
- all vehicle information (mileage, age...)
- main national cost for this kind of repair
- others.

This allowed the intern to do many kinds of research on the repairer network in the way to analyse drift expenses and directly intervene and indagate what were the causes (ex. suspensions).

POA role is to do most important data extraction, manage the access of all users and keep upgrade SAGAI with new kind of credit demand.

An example could be done with a recall campaign: if a repairer inserts a credit demand for a new recall campaign, codes that must be used for the work must be recognized from SAGAI in order to avoid anomalies, this work is done from the POA.

3.4 The contractual warranty

Laws determine the contractual guarantee which has the purpose to protect the costumer from hidden defects and not conformity of the car.

The standard warranty coverage has dome limit, it does not include:

- maintenance required to guarantee the correct functioning of the car;
- the replacement of parts subject to normal wear caused by the use of the vehicle, by the mileage, by the geographical and climatic environment, if such substitution is not a consequence of a manufacturing defect;
- adjustments or tuning (convergence, wheel balancing, front axle, doors, etc.), over 3 months or 3000 km;
- the vibrations and noises caused by normal vehicle operation;

- deterioration, such as fading, alteration or deformation of the pieces, due to normal aging;
- negligence to comply with the requirements indicated in the maintenance and warranty booklet and in the on-board documentation;
- damage caused by the customer: insertion of foreign bodies, attempts to dismantle, abnormal use (such as: overload, even passenger, use for competitions ...);
- damages caused by the use of fluids, parts or accessories, unsuitable or poor-quality consumables or fuel, and the use of additives not recommended by the Brand;
- damages resulting from natural phenomena, hail, floods, lightning or other atmospheric phenomena, such as those resulting from accidents, fire, theft or external phenomena (rodents, pets, ...);
- the consequences of repairs, transformations or modifications made by companies not authorized;
- damaged vehicles without the manufacturer being involved or modified to such an extent that they no longer comply with the Brand's manufacturing standards.

Previous list is an extended list that be take in account of all exceptional cases but for all day use it is necessary to know that the wear parts have the following warranty coverage limited period:

Table 4Wear parts warranty limits.

Wear Part	Limits (first that is reached)
Braking paddles	6 months / 10000 km
Braking disk	6 months / 10000 km
wiper blades	6 months / 10000 km
Lamos (not Xeno or LED)	6 months / 10000 km
Clutch kit	60 000km
Shocks absorbers	60 000km

In addition to these parts, also parts that are included in car maintenance are not covered by the warranty (see first point in the list of previous page), these parts could be indirectly founded from the car maintenance plan.

3.4.1 Maintenance plan

Parts that require maintenance are mainly commanded by a limit of time and a mileage limit. Here an example of maintenance plan:

		SERVICE SCHEDULE	
Dear customer			
Thank you for choosing a vehicle of our brand.			
The information presented below specifies the operations to be carried out in the servicing of your vehicle and correspond to the driving conditions you have foreseen. It allows you to plan the servicing of your vehicle.			
The service interval depends on time and mileage. The service is due when the first of the two terms is reached.			
The on-board diagnostics may indicate the need to have one of these operations carried out early, by means of a warning lamp.			
SERVICING	Normal conditions of use	Arduous* conditions of use	
SYSTEMATIC OPERATIONS			
Services: systematic operations	Every 25000 Km / 1 year(s)	Every 15000 Km / 1 year(s)	
ADDITIONAL OPERATIONS			
Replacement of the timing belt	100000 Km / 6 year(s) Then every 200000 Km / 12 year(s)	105000 Km / 6 year(s) Then every 210000 Km / 12 year(s)	
Replacement of the timing kit	200000 Km / 12 year(s) Then every 200000 Km	210000 Km / 12 year(s) Then every 210000 Km	
Check of the PH of the coolant	125000 Km / 4 year(s) Then every 25000 Km / 1 year(s)	120000 Km / 4 year(s) Then every 15000 Km / 1 year(s)	
Replacement of the spark plugs	Every 50000 Km / 4 year(s)	Every 45000 Km / 4 year(s)	
Replacement of the ancillary drive belt kit	200000 Km / 12 year(s) Then every 200000 Km	210000 Km / 12 year(s) Then every 210000 Km	
Replacement of the ancillary drive belt	100000 Km / 6 year(s) Then every 200000 Km / 12 year(s)	105000 Km / 6 year(s) Then every 210000 Km / 12 year(s)	
Replacement of the air filter	Every 50000 Km / 4 year(s)	Every 45000 Km / 4 year(s)	
Replacement of the brake fluid	Every 2 year(s)	Every 2 year(s)	
Replacement of the passenger compartment filter	Every 50000 Km / 2 year(s)	Every 15000 Km / 1 year(s)	
AUTHORISED ENGINE OILS			
00W30 B71 2312 (C1C2) - EM:05W30 B71 2290 - 05W30 B71 2290 (C2) - EM:05W40 B71 2296 - 05W40 B71 2296 (A3B4)			

The analysis of maintenance plan will be important for two main reasons:

- it puts in evidence which are wear parts that will not be included in warranty coverage;
- will contain details for work maintenance to do out of “authorized repair network”.

To keep warranty active the owner must respect normal condition of use.

Arduous condition of use is referred to the following cases:

- permanent door to door use;
- urban use (such as taxi, ambulance, average speed below 12 mph, driving school);

- repeated short journeys (less than 6 miles) with a cold engine (following a stop of more than 1 hour).

3.4.2 Maintenance out from authorized repairer network

As seen before a car has warranty coverage period covers any mileage. During this period the warranty covers all parts that are not related to mechanical wear (see wear parts list). In general, to keep the warranty active, the owner must respect maintenance plan expected for a normal use of the vehicle. Until the year 2002, owners had to do maintenance exclusively at authorized repair. Obviously the missing of a concurrence for the brand could generate disproportionate cost respect the real value of the work that is carried out. In 2002 has been introduced a new European regulation that allows the owner of the car to have free choice where from make maintenance: only request is call on a qualified repairer that respect the European regulation 1400/02. It means that the repairer is also able to produce a certified receipt containing all details of the intervention carried out. With European Regulation it has become mandatory for the Brand to share maintenance plan of produced vehicle with attached the list of detail components. Products must have a declared quality that is pair or major respect these required in maintenance plan.

This regulation has been confirmed in 2010 as regulation 461/2010.

From the brand point of view this has caused a decrease in incomes in after sales business, as written in 461/2000¹⁹ regulation's paragraph 11 "*The costs borne on average by consumers in the Union for motor vehicle repair and maintenance services represent a very high proportion of total consumer expenditure on motor vehicle*".

What is changed from the warranty office point of view?

The aim of the warranty office is the same, there is a major difficulty in historical evaluation of maintenance for warranty problems that concerns mechanical parts. If there is a suspect about problematics due to worst maintenance or also to error during the mechanic work, if this happens in an authorized repairer the owner is always covered from the brand. Differently the brand could not cover issue produced from non-authorized repairer.

¹⁹ COMMISSION REGULATION (EU) No 461/2010 of 27 May 2010.

3.5 Office technical area

Two technicians, with a high technical knowledge of car repair, have the role to check and approve repair estimates for work carried out with an economical coverage from the brand (ex. Repair in warranty). This is both quality and economical check:

- quality because during approval is checked if diagnosis is coherent and if correct repair procedure is applied;
- economical: before the restore of the car, the estimate of the repairer is checked, if for example estimate labour will be too high it will be corrected.

3.5.1 Preventive authorization in warranty coverage

When a problem is founded in a vehicle under warranty coverage, the repairer, after the diagnosis, must evaluate if the damage is covered by the warranty. In this case each repairer has an expense threshold limit (for each intervention) fixed by the warranty office. If the estimated cost is below the threshold limit the repairer could proceed in repairing the vehicle in autonomy. In this case the repairer will order parts, he will repair the vehicle and will ask to the brand the payment for the work. This payment is checked by the European platform and if the analyse of the work will result positive the repairer will be paid.

Differently if the cost is over the threshold limit, it will be necessary to issue a prior authorization: after the diagnosis the repairer will compile the demand to restore the vehicle in warranty coverage with the diagnosis, he will attach the historic of maintenance, the list of spare parts that will be necessary. The demand will be received by the warranty office where a technician will analyse it and if necessary will ask more information. This procedure has a “bidirectional” convenience: from one side the brand could check and manually approve the major expenses, from other side the repairer will have the confirm and the authorization to proceed in work. For works carried out without prior approval is major risk to have a rejected credit demand.

Is important to note that technician work in a wide range of problematics: from a spot on a chromed plastic to an oval tyre to a big quantity of condense on the lighting apparatus.

3.5.2 Preventive Authorization ABACO

Generally standard warranty ends at the 24th month, this is the normal procedure for most of brands (Fiat, Volkswagen..) and also for PSA vehicles. Are famous and popular some particular warranty offers of some other brands like Kia or Hyundai which offer 5, or in some case 7, years of warranty (into a mileage limit).

A car owner of a vehicle with “only” 24th months of warranty can choose to extend his contractual warranty with personalized Service Contract.

Anyway, the brand for vehicle without warranty extension could decide to contribute to repair, this contribute is called ABACO. For the brand, and for the repairer, is not a constrain to apply this contribute, must be the repairer to judge it, in general it is a valid instrument for the loyalty of costumers, but the fact to have done all the maintenance in an authorized repair will be judged as a “plus” to get this contribute. An authorized repairer could apply this contribute by itself, it will be posteriorly controlled by the European platform. In the case in which the costumer asks for more contribute respect the ABACO, the repair could ask for it to the warranty office, these are special cases that require good justifications.

Here is an example of ABACO’s contribute to a C3 with petrol engine. Car has 49435 kilometres and an age of 31 months. The car, cause to a mechanical failure, requires a new engine. Even if out of warranty, one the maintenance is checked, the brand had propose a contribute for the repair of 60%.

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SAS72CI * S.A.G.A.I. * AUTORIZZAZIONI PREVENTIVE * S22C
10/07/18 * INTERROGAZIONE AUTORIZZAZIONI PREVENTIVE * SCHERMO 1 U533291

NUM. AUTORIZZ. : 511368 N. SAGAI : YEFWJBR01
CODICE PDV : 287917Y 01
IMPUTAZIONE : 61A SOUTIEN DELEGUE RA ABAQUE AUTO
CAUSA : 1608512380 MOTORE BENZINA
DIFETTO : 501 VIBRAZIONI/SBALZI
D.D.R. : 05 / 02 / 2018
V.I.N : VF7 SCZM26 FW [REDACTED] DDG : 24 / 06 / 2015 KM : 49435
STAT. AUTORIZZ. : 2 LA DOMANDA DI ACCREDITO CORRISPONDE ALL AUTORIZZAZIONE
RESPONSABILE : RITORNO PR : 0
DATA : RICHIESTA: 09/02/2018 CONVALIDA : 09/02/2018 SCADENZA : 11/03/2018
COM 1 BATTITO DAL MOTORE TSB NON APPLICABILE PISTONI USURATI SOSTITUZIONE MOTOR
E ALLEGO GIUSTIFICATIVI PARTI RICAMBI NON ENTRANO IN AUTORIZZAZIONE
COM 4 ACCORDATA 60% NO PR USURA

MTT DEMANDE : 2496,17 % ACCORDE : 59,47 ALTRO COMMENTO N/P :
CONNESSIONE DIRETTA: ALTRE RICHI. D'AUTORIZZ. PER QUESTA CHIAVE: (N/P)
PF1: HELP PF2: MENU SAGAI PF3: FINE LAVORO PF4: ABBANDONO
UTM0040 PF8 => PAGINA SUCCESSIVA
```

Figure 9 Preventive authorization for a brand contribute for repation of a car out of warranty.

3.5.3 PTC

It means “Guided support”, it’s a contribute of the brand for the repair even if the car is out of warranty. This contribute regards parts not lied to strong mechanical failure or security problem, and regards defects that are not present on each vehicle, but if there is a PTC there is a concrete possibility (not random) to occur. It could be also related to wear parts that for example present early wear and the necessity to be changed before expectation. The contribute given by the brand could cover the full cost of the work or it could be only a partial coverage.

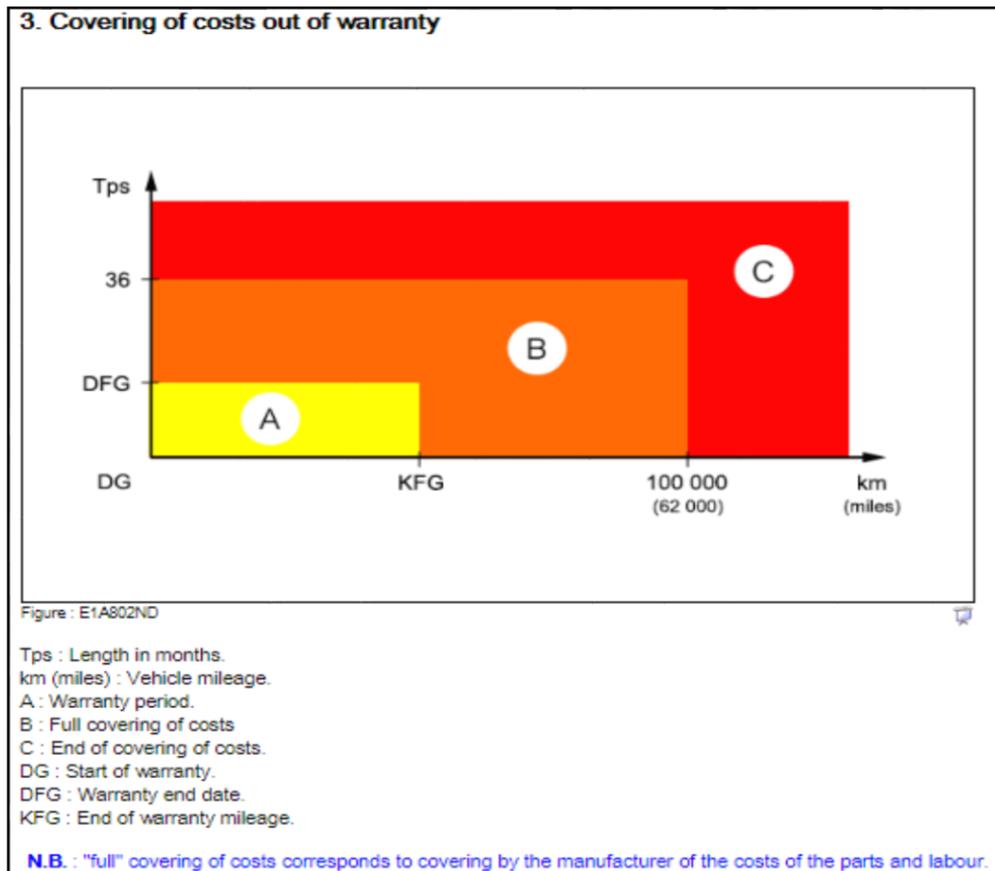


Figure 10 Example of Guided support.

3.6 Contract Service

The commercial offer of the brand includes contract services: they consist in services that include warranty extension and maintenance that the owner can bought. There is a wide

choice of contract that the customer could decide to sign based on three different level of services contracts with lots of mileage and age limit combinations. All three levels are an instrument of loyalty of the costumer that, above all in case of contract of 2nd and 3rd levels²⁰, will ask the maintenance in authorized repairer network and the repairer has the possibility to fidelities him also for future when the service contract will expired.

Repairers are autonomous to propose service contracts to customers; in case of request of contract extension become necessary the role of warranty office to modify existing contract.

Table here below reports the list of possible mileage and age combination for a C1 vehicle for Essentialdrive contract (Level 1). In general all service contract have a maximum of 96 months and 200000 kilometres.

Table 5 Example of pricing in contract service

		essentialdrive gruppo B1					
		KM/MESI	36	48	60	72	84
C1	20.000	€ 222	€ 247	€ 267	€ 358	€ 388	€ 434
	30.000	€ 252	€ 267	€ 277	€ 368	€ 398	€ 444
	40.000	€ 257	€ 277	€ 292	€ 393	€ 423	€ 474
	50.000	€ 267	€ 282	€ 313	€ 418	€ 454	€ 509
	60.000	€ 272	€ 292	€ 328	€ 444	€ 479	€ 534
	70.000	€ 282	€ 313	€ 343	€ 459	€ 494	€ 555
	80.000	€ 292	€ 328	€ 353	€ 479	€ 519	€ 580
	90.000	€ 308	€ 343	€ 393	€ 524	€ 565	€ 630
	100.000	€ 338	€ 378	€ 479	€ 640	€ 691	€ 771
	110.000	€ 348	€ 388	€ 494	€ 665	€ 716	€ 802
	120.000	€ 353	€ 393	€ 509	€ 686	€ 741	€ 832
	130.000	€ 403	€ 454	€ 580	€ 781	€ 842	€ 943
	140.000	€ 444	€ 494	€ 630	€ 847	€ 912	€ 1.023
	150.000	€ 494	€ 555	€ 696	€ 938	€ 1.013	€ 1.134
	160.000	€ 519	€ 580	€ 726	€ 973	€ 1.049	€ 1.175
	170.000	€ 544	€ 610	€ 761	€ 1.023	€ 1.104	€ 1.235
	180.000	€ 570	€ 640	€ 802	€ 1.079	€ 1.165	€ 1.306
190.000	€ 595	€ 665	€ 832	€ 1.119	€ 1.210	€ 1.356	
200.000	€ 655	€ 736	€ 918	€ 1.235	€ 1.336	€ 1.497	

The coverage levels, that are the same for all the brands, could be classified as follow:

- Level 1: it permits the stipulation of a service contract with a warranty extension, including troubleshooting coverage for mechanical and electrical issues (parts and labour cost are both included);

²⁰ At these levels the contracts includes maintenance.

- Level 2: it includes the Level 1 plus the ordinary maintenance. At this level the customer has the possibility to subscribe additional options like for example wheels change, courtesy car also in case of accident or theft.
- Level 3: it includes Levels 1 and 2, but in addition to them it includes also extraordinary maintenance like friction or braking disk.

	Failure	Ordinary Maintenance	Extraordinary Maintenance
LEVEL 1			
LEVEL 2			
LEVEL 3			

Figure 3 Summary of services by level.

3.7 Customer Relationship Office

Customer relationship office has many functions. This paragraph will report which are his functions related to the warranty office work.

As explained before, warranty office act in warranty coverage, if out of this coverage may the vehicle has a service contract, if it hasn't it could be used ABACO or guided support. Exceptionally the repairer could ask for a contribute Extra-ABACO, in these cases often also the repairer offer a contribute (ex. free labour time). In many cases if they are unsatisfied of previous contribution and decide to contact Customer Relationship Office. About the Warranty office, Customer Relationship office could be considered as a service that allows to manage a range of customers that requires a contribute that warranty office cannot give, judging not only the technical aspect but also customer experience because in this case is directly the customer that interact with the office.

Cause to the fact that Customer relationship office employees haven't specific technical knowledge, from the end of 2017, their decision pass through the warranty office where technicians receives preventive authorization from repairer where the vehicle is located. Technician, after having checked that the contribute requested from the customer relationship office, will check that the work that the repairer will carried out respects method: as always labour and spare parts requested will be checked.

3.8 Assistance

At the same time during car repairs, the car owner can ask for many additional services offered by the repairer. This sector usually acts in a difficult moment for the car owner, this is important for the brand to exploit this condition to prove a real care for the brand costumers. Inside PSA, Citroen and Peugeot offer the same assistance service, differently the brand DS has a richer offer that has been just renewed. To DS Assistance, that has been one of my first tasks, will be subsequently dedicated a specific paragraph.

Assistance could be divided in two main sectors: road assistance and after services. All these services are managed in cooperation with an external service provider: IMA Servizi. IMA Servizi is informed of all news regarding the authorized repairer network and has a database in constant updating of PSA's vehicle that of the Italian network. One of roles of the intern is to be a point of reference for IMA service about these information (network of repairer) and, in addition to that, the intern must manage exceptional and analyse problematic that could emerge during this service.

3.8.1 Road Assistance - Car in contractual warranty

A car covered by warranty can always ask for free road assistance. The brand has all the interest to assist the customer:

- In case of mechanical defect → to remediate to a possible defect o production;
- In case of missing replacement spare parts;
- In case of accident → to give assistance and also earn money to a possible repair.

Here follows a particular example that could help to understand the philosophy of the brand.

A car under contractual warranty that had an accident in a highway. For safety reasons police have managed the assistance and the vehicle has been transported to an authorized repairer. The car owner had to pay the road assistance not done by IMA (cause the road assistance has been called by the police). The brand in these case refund to the costumer for the road assistance.

3.8.2 Car out of contractual warranty - road assistance

If the car not covered by contractual warranty, the costumer could join to the Peugeot/Citroen 10 years' service: a free road assistance for 10 years in which only conditions are:

- Mechanical defect not caused by the battery
- Restore of the vehicles in an authorized repairer.

Numbers of road assistance for car out of warranty are below the brands objectives, there is a big part of customers that ask for road assistance to other providers (ex. road assistance included in car's insurance).

For this reason it has been started a market survey to verify how improve the advertising for green number of IMA Servizi, actually the costumer is keep informed about the number to call to ask assistance in different ways.

The car that need road assistance is a source for different reasons:

- Economical reason: the customer will spend money and buy spare parts to restore the vehicle.
- Loyalty reason: the customer that is assisted could appreciate the fact that the brand will pay the assistance (even on an old vehicle) and it could be also an occasion for a customer to come back in an authorized repairer.

Note that this service for the brand could be a source but also a cost. In modern vehicle there are many issues that from one side cause the need of road assistance but from the other side are very economical to be restored. During 6 months of my internship it has been calculated the average expense for the costumer to restore the 75% of vehicles it has been under 180€, final cost to the customer including labour and spare parts.

3.8.3 Others assistance services

They are related in most of case to vehicles that are under contractual warranty coverage. These services are often unknown, is IMA role to inform costumers during the request for assistance. During contractual warranty owner has the right to ask for a courtesy car, but not only: train, airplane, taxi, tickets to come back to retire the vehicle when is repaired.

All these services are managed always by IMA Servizi, the warranty office and the intern have the role to keep informed IMA determine regulation, monitoring the work of IMA and improve the quality of the assistance.

3.9 Premium Services

In the year these has been the launch of a new premium service for DS brand and for Peugeot 508. The services act in elevate the feeling of quality perceived from the brand, they are managed from the Warranty Office for different reasons: often payments pass through SAGAI, the office manage IMA and have also a direct contact with the repairer network and area after sales managers. Marketing office hasn't these possibilities.

The commercialization of Peugeot 508 will start in October 2018, for the moment for first 116 vehicles that will be sold as "First Edition" will be available free service Pick-up and Delivery (Inforete, 2018): when the vehicle requires maintenance, the repair run go directly to the customer to retire the vehicle, will proceed with maintenance and then will take back the car from the customer.

After the experimentation on these 116 first edition vehicles, will be judged to expand it also to all Italian 508. This service has been required from marketing division, but it will be managed from the warranty office: payment for extra labour time to repairer, monitored issue and problems of new created procedures.

A similar service is present for DS vehicles, with also the possibility to receive the new DS 7 model directly at home without retire it in the dealership, this service is called DS Delivery Valet²¹.

For which concern DS, between Citroen Peugeot Opel, is positioned in an higher premium segment. For this reason on January as been renewed the service DS Assistance with some modifications, it has been a job of warranty office to renewed it.

3.9.1 DS Assistance – Only You

With the launch of new DS 7 model that represent start of a new era for DS Brand, with a renew the service DS Assistance, it has been one of first task of the internship. This is a service that act in case of mechanical issue, accident or general road assistance requests. There is a premium coverture for all DS vehicles with less of 8 years starting from matriculation date.

This service is included in the vehicle, does not require to be bought from the customer. It could be subdivided in 3 main cases for which offered service changes. These three cases are:

- A. Simple issue: flat tire, error in choose of combustibile, key losses
- B. Accident
- C. Mechanical issue

For all these categories road assistance is the first step, the only way to get is to go in an authorized repairer. But apart this, Only You provides to the Customer extra service for:

²¹ This service has a very limited usage but has been required from DS French brand.

	A General issue	B Accident	C Mechanical issue
Courtesy Car	yes if labour > 2h	yes if labour > 2h	yes
Overnight stay in hotel (number)	1	1	4
First class train, or economy class airplane to come back home	no	no	yes
Retire repaired vehicle: First class train, or economy class airplane	no	no	yes
Repatriation of the vehicle if labour time request exceeds 8 hours	no	no	yes

The launch of this service has involved many aspects that allowed me to better understand necessary steps to promote a new service:

- Define the service offer: budget limit, service for each case
- Upgrade of vehicle contract with the layer
- Meeting and training with IMA Assistance of new service
- Creation of new green number to be called²²
- Official publication of the brand with Circular to repairer network with the diffusion of flyer to be stuck in all DS vehicles.

3.10 Warranty Process Improvement (WPI)

The brands provide to authorized repairers some indicators that allow to judge the work done by the repairer about his warranty work. If indicators evidence some issues WPI will start.

Main indicators that are available for the repairer are:

- Customers satisfaction coefficient
- DCVR: delta between cost repair for each vehicle and the national average

²² This allows IMA to give priority to DS vehicles.

- Average cost for specific part
- Number of vehicles that have require a repair in warranty
- Credit demand delay (from the date of repair)
- Labor quantity respect the total number of vehicle

The WPI programme is split into 3 phases

- STEP 1 - Coaching Review
- STEP 2 - Follow-up Review
- STEP 3 - AUDIT

The target is to provide to the network guidance to accept, process, and submit warranty repairs in accordance to the PSA Global Warranty Policy.

In Step 1 and Step 2, the analysis highlights which are areas where corrective actions are necessary and consequently direct the repairer in the execution of these actions. The MSX consultant will give advice to the repairer to avoid the Audit Risk. The actions will consequently reduce warranty inappropriate costs. The program for Step 1 and Step 2 is based on the same kind of analysis: it has been studied 50 credit demands (that correspond to 50 repair works done in warranty or for cars with service contract). For each one verified if all Global Warranty Policy has been followed. In particular:

- verify that the repair cost is legitimate;
- verify that the repair has been asked from the customer (not for recall campaigns);
- verify that the repair has been really done;
- check if Technical Service Bulletin has been correctly applied;
- check that the invoice cost hasn't any kind of increase.

Even if the program procedure is the same, Step 1 and Step 2 have a different debit proposal to the repairer. In case of Step 1 no debit is proposed apart in case of heavy anomalies (the repairer is informed about them). In case of Step 2 all credit demand with evident anomalies will be charged to the repairer.

Step 2 is not mandatory, it will be done followed only when indicators will not denote an improvement after Step 1. Even if they cause a different debit to the repairer is always presented in the final relation the Audit risk: what would have been the charge of debit if the visit was an Audit.

As regards Audit mission, it not requires previous Step 1 and Step 2 visits, but usually is done after them in case of apparent not improvement of indicators.

Audit follows a different procedure: it will be analysed all credits demands done during a limited period, all anomalies will be charged to the repairer and specific kind of them will be proposed an extrapolation on previous 12 months, it will have assumed that these errors have been done not only in the analyzed period but also in previous 12 months. At the end of the mission is organized a final meeting where consultant inform the workshop manager about reason of debit, what to do for products quality improvement and which acts in critical area are necessary to eliminate anomalies.

Despite all economical aspects is important to remember the coaching aim, for the brand these debits aren't an economical source, doesn't represent a profit for the brand. Objective is to get an amelioration in the repairer analysis. In 2018 there has been always a net improvement in all missions done: in fact the number of Claims in anomaly from Step 1 to Audit has reduced of the 76% for Peugeot and 81% for Citroen networks²³. Furthermore, even if the percentage of repairer that after a Step 1 are selected for a Step 2 is of about 70% only the 17% receive an Audit mission²⁴.

Role of the intern is to support MSX consultant, interact with area manager to organize missions and analyse reports once are received.

3.11 Extra tasks

Repair network cannot contact by phone the Warranty Office but could utilize Pamir (Help & Contact), there is a menu for "generals requests" that can be managed from the office. Usually in the 2018 the average quantity of tickets to be managed is of 900/month. Area Manager After Sales have a direct phone to the office, this could be used for general information and problems or also for urgent cases. The role of the intern is to help them in their problems.

Another prior role of the intern is to support the chief of the Italian warranty office in the monthly meeting with the European supervisor. Here is carried out a wide analysis of

²³ Up to 2018 DS repairers result fulfilled in Citroen network.

²⁴ Average data for both PSA brand's in Italy.

KPIs, budgets, new services launch of new services, analysis of drift expenses and action plan to contain them. For which action plane are fundamental two instruments, once is SAGAI with his data extraction. The other one is Analytics, a on-line database provided by MSX. These data source allow to do data national data analysis, to intercept repairer that have drift in some kind o expenses, to statics know which the mileage/age of parts changed in warranty.

3.12 Particular Examples

Here are reported some particular examples.

3.12.1 Peugeot Boxer with very high mileage

This vehicle has a matriculation date of 29/12/2015 so therefore it is covered by warranty up to 29/12/2017.

This is a particular case because it's rare to see vehicle that have done more that 720.000 kilometres in less than 24 months. In this case the vehicle had problems that have required the substitution of the entire gearbox with an expense of 4968,05 € for the warranty.

Here are reported the SAGAI screens, D.D.R stay for Date of repair, D.I.G is the date of start warranty, VIN is the chassis number.

SAA63FI		* S.A.G.A.I. *		BASE INCONVENIENTI *		S53F			
05/06/18		* STORICO INCONVENIENTI PER VIN *				U533291			
V.I.N. :		WMI	VDS	VIS		D.I.G. : 29/12/2015			
		VF3	YDUMFC	12A29					
D.D.R.	PDV	RIP.	N°	O.L.	CODICE CAUSA	DESCRIZIONE	IMP	KM	S
20122017	1234	01	04081429	00002231K8		SCAT CAMBIO CP(13X	000	722410	-
06102017	1234	01	04079078	9674958880		SCATOLA	000	664296	-
29082017	1234	01	04077994	9800570780		SCMBIAT ACQUA	000	635040	-
29082017	1234	01	04077994	9802446680		TURBO NE	000	635040	-

Figure 4 Resume of inconvenient had by this vehicle.

		WMI VDS		VIS		
N. SAGAI:	3CWN1	PDV/OL:	1234 01 / 04081429	VIN:	VF3 YDUMFC 12A29	
DATA INSERIMENTO:	23/01/2018	CRONOL:	3680			
D.I.G :	29/12/2015	D.D.R :	20/12/2017	DATA AGG:	KM: 722410	
CAUSA :	00002231K8	SCAT CAMBIO CP(13X68		AUTORIZ:	223169 IMP. : 000	
COD.LOC.:	1C2329	DIFETTO:	393 INEFFICACE	ORIGINE :	PANNE : 0	
		DEC/MES	OP. M.O.	ORE	DESCRIZIONE	DEC/MES
IMPORTI INCONVENIENTE		1	0022001A	710	STACCO E RIATTACCO C	
H. M.O. :	710	2				
SOMMA MO:		3				
SOMMA PR:		4				
		5				
		6				
MO :	243,67	GESTIONE :	181,71	N° ACC:	101721	DATA : 23/01/2018
PR :	4542,67	APPROVV. :		VALUTA:	EUR	TASSO: 1,000000
TPP:		TOT. INC.:	4968,05	STATUTO :	C	TIPO VAL. : CC
DATI ORIGINALI :						
CONNESSIONE DIRETTA :						
PF8	SCHERMO-2	PF10	INC. PREC.	PF11	INC. SUCC.	
UTM0022 PF8 => PAGINA SUCCESS.						

Figure 5 Detail of the gearbox change

Even if it may seem a big loss for the brand, this vehicle has done 19 maintenance operations during these 24 months (each one 45/50 thousands kilometres). 18 of these maintenance operations have been done by an authorized repairer, an economical source for the brand network. Indeed it make a profitable customer.

3.12.2 Peugeot 208 without gearbox oil

In this case the vehicle, already in warranty period, is arrives to the authorized repair without oil in the gearbox. Thanks to inconvenient history of this VIN it results that one month before the semi-axis has been repaired from an other authorized repairer (operation that require to void of oil the gearbox).

The repairer was asked to do a report to find the causes, looking for the hole or cracking, measuring the oil quantity in the gearbox.

Lingua della	25/01/2018
chiamata	Buongiorno,
	vi ringraziamo per la relazione fornita.
	Vista l'entità del danno procedere facendo Autorizzazione Preventiva, riportando le base informazioni necessarie (il tecnico è già stato avvisato).
	23/01/2018
	Vi chiediamo di fare una relazione dettagliata sui motivi della mancanza d'olio, cercando di capire se la causa può essere stata dovuta ad una perdita/fessurazione.

Some reasons for the report doesn't point out any cause for oil losses. Some reasons caused by the losses oil are unknow, but it was decided to cover the problem in warranty without any doubt (also thanks to the fact the semi-axis was been repaired in the authorized network).

25/05/18	* <u>STORICO INCONVENIENTI PER VIN</u> *							U533291
V.I.N. :	WMI VDS	VIS		D.I.G. : 30/03/2017				
	VF3 CCHMP6	HW0 [REDACTED]						
D.D.R.	PDV RIP.	N° O.L.	CODICE CAUSA	DESCRIZIONE	IMP	KM	S	
23012018	1200203 01	7000	9803846280	SCAT CAMBIO CP	(13 000	21938	-	
22012018	1197503 01	18015637	00000000008999	SUBFORNITORE - COS	24E	21938	-	
22012018	1197503 01	18030247	00000000008950	TRAINO VEICOLO	24E	21938	-	
13122017	1220403 01	358	9803959580	TRASMISSIONE NE S	000	19525	-	

This situation represents the advantage to have done a repair from an authorized repairer. In a similar case, but with restored semi-axis from an external repairer, the warranty probably refuses the repair because the damage is not caused by product defect but caused from wrong repair.

3.13 DID - Dealer Issue Detection (DID)

A Dealer Issue Detection is an important instrument for the brand, fundamental to improve the quality of the brand. Thanks to DID the repairer can report problems that he found on the vehicle up to main Italy office, and if necessary, up to the quality/ R&D / Manufacturing department in France.

There are 3 mainly kind of DID that act for 3 different reason:

- Assistance problem;
- Accident problem;
- Security problem.

Let's better understand how a ticket is open. After the acceptance of the car into the repairer, the technician collects information about problem from the owner later the same repairer redact by using also photo, audio or others digital files redacts a document Costumer Incident Form (CIF)²⁵ using the appropriate coding. After that if it is necessary the repairer can decide to open a ticket for a DID.

The procedure could be activated directly from DiagBox, an instrument connected to the vehicle and, through net connection, can directly ask for a DID by reporting automatically all fundamentals information's of the vehicle.

²⁵ CIF: document that is redact in fase of acceptance of the vehicle.



They correspond to the three different kinds of DID previously introduced.

3.13.1 DID-a , Assistance.

The repairer has do a DID-a when he is not able to solve the car problem and when:

- the time at disposal to make the diagnosis is finished;
- he has used all the technical documentation available: Customer Incident Card (SIC) / Bulletin Technical Service (TSB) / Assisted Diagnosis;
- when there is a recurrence (anomaly reported by the client or by the same piece due to the anomaly within 3 months from the last intervention);
- when no solution for the problem has not been found within labour time of 1.5h.

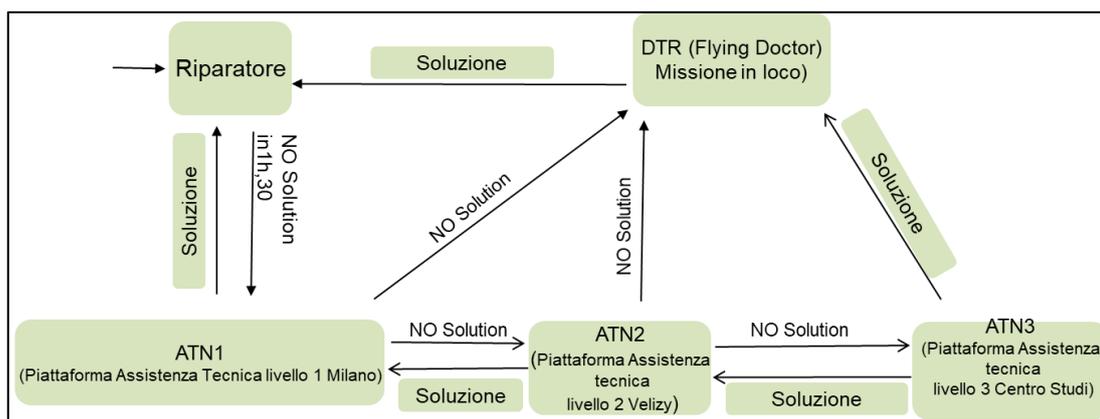


Figure 6 PAD functioning flowchart

The DID is directed to the PAD, Platform Assistance Diagnostic, that has a target to answer to the repairer in less than 4 hours. One of the big advantages to have, when necessary, a technician available into the PAD, is that tickets are divided depending of the arguments and they will be directly send to the technical expert. The Italian PAD is subdivided in some different sectors:

- Telematic;
- Automatic gear/ manual gear;
- Mechanical aspects;
- Engine aspects;

- BSI.

Every authorized repair is forced to subscribe a DiagBox renting, this instrument is fundamental to have a quick and precise communication. The PAD's technician by remote can directly access to Troubleshooting newspaper, analyse it and try to repair problems.

If the technical expert from the PAD has difficulties to solve the accident there are two possibilities for him: he can ask for a mission of a DTR in loco and/or he can forward the ticket to next levels.

“Level 2” is a sort of international PAD which receive tickets after a kind of filtering made by the “national” PAD.

In addition, there is also a “Level 3” directly located in the study centre.

3.13.2 The DID – i, Incident

The DID –i (incident) should be created in the following cases:

- any accident not covered by a TSB²⁶
- any relapse after the application of a TSB
- if there is a TSB that solves the accident, but it is for another vehicle
- for any incident related to new software
- for each claim Customer on a vehicle conforming to the definition or a reduction in vehicle performance.

It must be done after the vehicle has been repaired. In addition, to previous condition the brand has to pay attention for new models, in fact the DID-i must be redact for any accident not covered by a TSB during the first 6 months of marketing a vehicle.

An important task is taking replaced parts available for the return of the piece for analysis, the parts can be asked for a return in CRG²⁷ Italia or directly in France.

The warranty office often asks to the repairer to produce a DID-i , there are many strange accident that could involve vehicle that are already under warranty coverage. In order to

²⁶ Technical service bulletin: guide for a specific repair.

²⁷ CRG: centre in which are send parts to be checked.

avoid superficial warranty restoration of the vehicle, a DID-i is requested after the put in compliance of the vehicle.

3.13.3 The DID-s, Security

DID-s contains the description of a problem but involves Security and is related to a vehicle or an accessory. The aim is sending a quick diffusion to the after-sales services.

The repairer should redact a DID-s when:

- there are physical damages on car's driver or passengers;
- serious overheat of a component;
- oil or fuel losses;
- other problems without the lightening of anomaly indicator.

The repairer is in possession the specific list of problems related to the last point, some examples could be the following ones:

- Broken engine, loss of power;
- Liquid losses (on the ground or over a component);
- Problem to keep the trajectory during driving;
- Absence of losing tyre pressure alarm;
- Too much strong or smooth of brake pedal;
- Flash fogging of the windscreen;
- Loss of an object during driving;
- Doors closing/lock.

A DID-s follows a rigorous procedure that impose the prohibition to work on the vehicle in the 48 h after the ticket's opening, during this period the brand will study the case and, if necessary, will send a DTR to directly analyse the problem. In addition to that, all parts involved need to be preserved for at least 30 days.

Here is a short resume of an example of DID-s passing through the warranty office:

A repairer asks to get a warranty restoring cause to the loss of door lock, he has been stopped asking for some digital documents. The doubt was that the problematic was due to a theft attempt (not covered in warranty).

Are Received some photo:



Figure 7 Damages to door lock

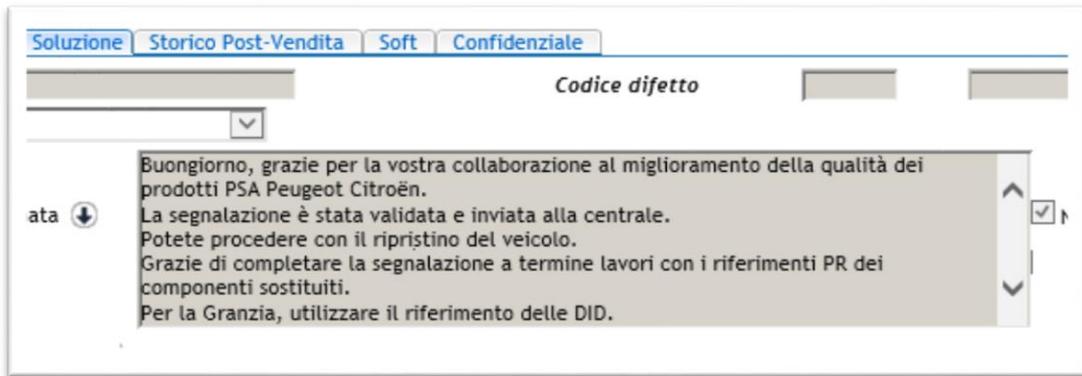
After that, the DTR has been contacted and office ask to do a DID-s.

Descrizione SIT: carrozzeria, equipaggiamenti esterni/ Carrozzeria	
Sintomo Cliente	
Mancata conformità dell'elemento carrozzeria	<input checked="" type="checkbox"/> Elemento mancante
Condizioni di comparsa	
frequenza dell'anomalia segnalata dal cliente	<input checked="" type="checkbox"/> in permanenza
Condizioni di parcheggio	<input checked="" type="checkbox"/> in piano <input checked="" type="checkbox"/> con forte pendenza
Lingua della chiamata	IN MARCIA IL CLIENTE HA PERSO NOTOLINO IMPARIGLIO PORTA ANT SX E MANIGLIA , HA RITROVATO MANIGLIA OPER STRADA MA NON IL BLOCCHETTO CHIAVE SULLA PORTA ANT SX .
Lingua della piattaforma	Pouvez-vous de toute façon prendre en chargement la problématique ?
Diagnostica	
Lingua della chiamata	CATTIVO SERRAGGIO DELLA VITE DE CILINDRETO PORTA
Lingua della piattaforma	Le technicien ne remarque pas d'interventions précédentes sur le véhicule et estime que la vis de fixation de la poignée n'a pas été serrée correctement de l'origine.
Rimedio	
Lingua della chiamata	SOST. CILINDRETTO PORTA E MANIGLIA ED INSERITO FRENA FILETTI SULLA VITE DI FISSAGGIO
Lingua della piattaforma	Pour rétablir le véhicule on doit remplacer la manilia et le verrou de la serrure. Connue >> le verrou de la serrure a été perdu

Figure 11 Pamir repairer/DTR interface.

Here is the DID-s, note in capital letters what the repairer has written, in lower case the DTR and in yellow the level 2 and write (in French) that the problem is known.

The DTR answer to the repairer by using Pamir:



Ticket opened at 04/04/2018 17.17, ticket closed at 06/04/2018 14.48. In the meanwhile, the repairer has already ordered parts and after the closing of the ticket has been authorized to work on the car and to give it back to the owner. During this period, the owner has benefited of the courtesy car.

Conclusions

This experience in the After Sales Service has the purpose to better understand how a brand could increase a quality product after the sale. Main actors of the after sales environment are various but most important are two: the car owner and the car. Car vehicles represent a durable good, where owner usually spend lots of time, where owner invest considerable economical sources to pay all relatives costs and, in addition, in case of failure car could generate high discomfort and expensive repair cost. For these reasons, after sale in automotive area is an interesting environment to better understand when and where the quality of a product is effectively successful. In this thesis most of offices related to the after sales of a product have been presented, they work in autonomous way and even if the work of a single office is independent from others, to get a real customer satisfaction, all the sectors should work fine. In an ideal flow, a car with a mechanical issue is quickly offered road assistance, and then a courtesy car while the car is to repair. To pursue that, if necessary, repairer can ask for assistance the central assistance platform, where the problem is correctly registered and reported to R&D department with the aim to increase quality products.

In this experience it is pointed out the longer time gap that the brand needs to improve quality of components that, after the production, become protagonist of drift expenses. Also the bigger and very various authorized repairer network risk to have a long inertia to learn new procedures if he is not correctly keep upgrade. The PSA Groupe, except some attempts in the past, doesn't have hybrid vehicles on the market. We know that in the future hybrid and electric technologies will be fundamentals for an automotive group, indeed from the end of 2018 to 2025 are expected 40 new electric or hybrid models.

The challenge will be to upgrade all authorized repairer network to new procedures and new hardware instruments will be necessary. Through all these new kind of engines, the improvement in product quality should be quicker in order to adjust and improve new components, by also studying data of DIDs and warranty expenses. At the same time, customers services will have available more technological vehicles that will permit the development of new services: from improved remote technical assistance to new kind of road assistance for electric vehicles and, in general, new services that will exploit the potential of preponderant software components in new vehicles.

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