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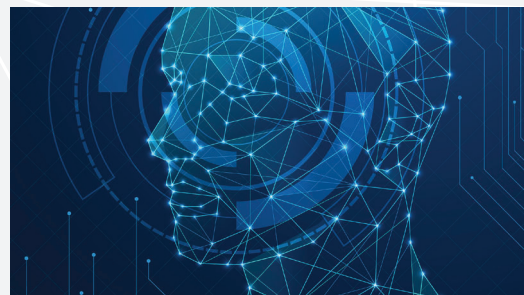
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## *Proceedings*

**Knowledge Valorisation in the Age of Digitalization**



30 January 2019 – 1 February 2019  
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## Classification and Use of Product Related Services in the Automotive Industry

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### Abstract

Because of saturated markets and of the low profit margins in the sales of cars, car manufacturers focus more and more on profitable product related services. This paper deals with the question how to classify product related services in the automotive industry and which characteristic product related services are offered to the end-users (consumers) in a standardized format. Two research studies on the provided product related services in 2010 und 2017 by 15 car manufacturers and 20 exemplary automotive brands in Germany revealed that the application degree by the OEM (original equipment manufacturers) in these years increased considerably. While in 2010, the average range of services only amounted to 33%, the value in the automotive industry increased until 2017 to 57%.

### Keywords

Product related services, automotive, classification

## 1 INTRODUCTION

According to Bullinger, product related services (PRS) are those services, which are provided by producing enterprises to respond to the need or to solve a problem of the customer in connection with the product [1]. This service is provided in addition to the primary product pre-sales, sales, or after sales and either refers to the primary product lifecycle [2] or is independent on it [3]. The automotive industry mainly focuses on the primary product "car" even if some car manufacturer adapt the primary product to "mobility" in response to the changed customer behaviour in recent years [4,5]. In this respect, terms like "Product Service System (PSS)" or "Customer Solutions" were defined in literature. It designates the marketable bundle of product and services which is characterized by the fact that the benefit for the customer is higher than the value of each component in common [6]. In delimitation thereof, PRS in the automotive industry are defined as services that can be marketed as a service product in connection with the car in all phases of the product lifecycle or independent on it, which in this way generates an added-value to the primary product for the user to satisfy a need of the customer or to solve a problem of the customer. Hence, the sales and distribution of new or used cars in this sense is a primary performance and no product related service.

Due to saturated markets and low profit margins in the sales of cars, the car manufacturers see their profitability focus more and more in PRS [1]. The objective of this document is to analyse the offer of product related standardized services by the car manufacturers to private end-users and to identify the changes in the last years. To answer this question the public offer (websites of the manufacturers) of different OEM was analysed. A systematic analysis

requires to first describing the scope of PRS in the automotive industry. For this purpose, first a scheme of features was generated. This feature scheme forms the basis for the validation of the PRS of the automotive industry as well as for the statistic execution of a typology.

## 2 TYPOLOGY OF SERVICES

To be able to have a closer look at the diversity of services it is necessary to classify them in different groups. The segmentation of services knows different classifications or typologies. A classification is the result of a division of objects in groups or classes. The objects are grouped by the characteristics of selected features. The characteristics form the classes. [7]

In a typology, features and characteristics of features can have relations and unclear boundaries to each other. In contrast to a classification, a typology has the additional property that it does not need to be complete. Some objects can belong to several types and others in turn do not belong to any type at all. In spite of the disadvantage of incompleteness, a topology suits to structure complex and vast objects by far better than a classification. [8]

To generate a model for the product related services of the automotive industry, the typology method is used for classification, for the following reasons:

- PRS show a large number of features.
- Between the features, strong relationships may occur. This property is identified by the typology types, which are described below.
- With services in general and with PRS in particular, multiple characteristics of features can be fulfilled in one feature.

Typologies and services in the literature are divided into two- or multidimensional models. Schmenner [9] divides the services by the features “working intensity” and “interaction intensity” and describes four types of services with two characteristics, each (high, low). The service typology of Barth, Hertweck and Meiren [10] divides the services by the features “contact intensity” and “variant diversity” and refer to the same four types. The feature scheme of Jaschinski [11] (see Figure 1) was derived from the effect carriers of the service products which are used by the company, the external factors which are mostly coming from the customers in the production process, the interaction of factors with each other as well as the result and profit of the service production.

Feature Scheme for the classification of services			
Product type	Individual product	Module product	Standard product
Main application factors	Human performance	Technic, devices	Information-/ Communication systems
Main object of service	Customer	Material objects	Immaterial objects
Product scope	Individual performance		Performance package
Product type	End-user-/ consumer related	Enterprise related	
Planning of customer order	Short (< 1 day)	Middle (< 1 month)	Long (> 1 month)
Provision period	Short (< 1 day)	Middle (< 1 month)	Long (> 1 month)
Interaction site	Supply oriented	Demand oriented	Separate location
Process stability	Low	Middle	High
Role of customer	Actor	Audience	Without direct participation

Figure 1 - Typology of services [11].

### 3 DEVELOPMENT OF A FEATURE SCHEME FOR PRODUCT RELATED SERVICES OF THE AUTOMOTIVE INDUSTRY

The cluster analysis is a procedure, which summarizes the investigated objects in groups [12]. This procedure recognizes patterns, structures and relationships in a comprehensive and possibly vast area, from which further information can be gained and handling fields be recognized. The objective of cluster analyses is to create groups as homogenous as possible in itself and as heterogeneous as possible to other groups. Consequently, the objects in a group should be as similar as possible with reference to the used feature characteristics. Objects, however, which belong to different groups, should be as different as possible in their characteristics. [12]

The range of the PRS of the automotive industry forms the solution space for the generation of the feature scheme. A solution space contains all sources of revenue of the relevant area. Consequently, the solution space includes all PRS, which are provided by the automotive industry. The following three areas are used to determine the features in this space:

- Services,
- Product related services and the
- Automotive industry.

The PRS frame is a subset of the service space. The PRS of the automotive industry which, according to the set theory, form the intersecting set between the

automotive industry and the PRS space, are a subset of the PRS range.

$$PRS \subseteq SR$$

$$(AI \cap PRS) \subseteq PRS$$

PRS ... Product related service range

SR ... Service range

AI ... Automotive industry

Analog to the theory of inheritance of properties, a subset is described by subset features as well as by other specific features of the subset. It describes the PRS range in the automotive industry by service-, product related service range and by domain-specific features. The form of this inheritance is shown in Figure 2.

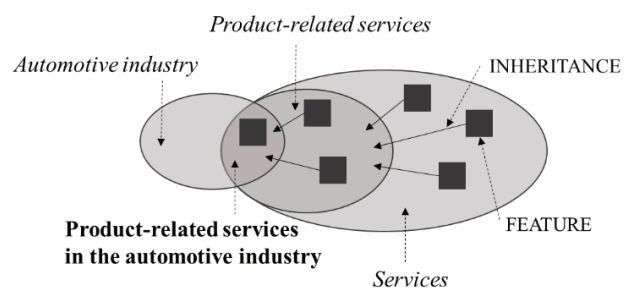


Figure 2 - Definition of product related service range in the automotive industry [13]

The investigation by features is done separately in the three observation spaces. Then, the typology of Jaschinski was transferred to the domain of the automotive industry where the non-relevant features were eliminated and the following features were derived:

- Internal factors (from main application factors)
- External factors (from main object)
- Product scope
- Provision period
- Interaction location with the occurrences: service provider, customer, separated location and footless services (customer and service provider go to the location where the service is executed)
- Role of customer

In addition to the features from the typology acc. to Jaschinski, other features were found in the areas of service production and product related services. The feature “sales form” describes in how far a connection exists between two product related services in sales. If a sales related connection to another PRS is missing then it is designated as “independent”, else as additional service (add-on). An example would be a replacement car in connection with the repair of the own car.

“Sales cycle” describes the time point of service provision in the sales cycle of the main product and/or the car. The sales cycle is divided into the phases Pre

Sales, Sales und After Sales [14]; PRS, however, can also be offered independently on the sales cycle.

The need of a customer often goes beyond the purchase of a tangible good. To provide the customer with an added value and to meet the requirement of the customer in its totality, PRS are offered in addition to the object. The offer of PRS orients to the customer's benefit and can be subdivided into the following five customer benefits:

- Product (additional products to main product, e.g. merchandising articles)
- Function /Product oriented (functional capability of the product, e.g. oil service or cosmetic repairs)
- Benefit oriented (e.g. insurances)
- Result oriented (e.g. Roadside-Assistance)
- Service (pure service, e.g. pick-up and delivery service)

In addition to the already described features, further features were determined from the literature referring to the domain of the automotive industry. Services, which offer mobility benefits, provide the users with human and technical performances to satisfy cognitive and emotion dominant mobility needs. These needs can be divided into three areas [15]:

- Mobility creating services (e.g. leasing)
- Mobility securing services (e.g. full comprehensive insurance)
- Mobility extending services (e.g. telemetry services)
- Mobility independent services (e.g. plant or factory tour)

The feature "car type" describes in how far the product related services are linked with the primary product (car) of the automotive industry.

From the customer's point of view, a new car is understood to be a purchased car, independent on new or used. These features show those product related services, which can only be used in connection with the purchase of a car. To them belong, among others, car credits, credit protection insurances, and guarantee contracts.

To the area "rented cars" belong all product related services where rented cars are delivered as internal production factors. Examples are travel events where the customer gets a car. The feature "own car" includes those product related services which are linked with the ownership of a car and which are primarily offered in the After Sales phase. To this area belong, among others, repair, maintenance and sales of spare parts and accessories.

Figure 3 gives a summary of the feature scheme for the classification of product related services in the automotive industry.

<b>Feature Scheme for the typology of product-related services in the automotive industry</b>					
<b>Service-specific features</b>					
<b>Internal factors</b>	Human performance	Technik, devices	Information-/ Communication systems		
<b>External factors</b>	Customer	Material objects	Immaterial objects		
<b>Product scope</b>	Individual service		Service package		
<b>Provision period</b>	Short (< 1 Tag)	Middle (< 1 month)	Long (> 1 month)		
<b>Interaction site</b>	At service provider	At customer	Separate location	Footless services	
<b>Role of customer</b>	Actor/active		Audiance/passive	Without direct participation	
<b>Planning of customer order</b>	Short (< 1 day)	Middle (< 1 month)	Long (> 1 month)		
<b>Product-related specific features</b>					
<b>Sales form</b>	Additional service (Add-on)		Independent		
<b>Sales cycle</b>	Pre Sales	Sales	After Sales	Independent	
<b>Customer benefit</b>	Product	Function oriented	Application oriented	Result orientged	Service
<b>Domain-specific features</b>					
<b>Mobility</b>	Mobility creating	Mobility securing	Mobility extending	Mobility independing	
<b>Car type</b>	New car	Own car	Rented car	None	

Figure 3 - Feature scheme for classification of PRS in the automotive industry [13]

The first survey was executed from October to December 2010 with 15 car manufacturers and 20 brands. The companies were selected by their sales quantity in 2008 and included American, Asian, and European manufacturers to also include cultural differences. When selecting the brands, attention was given to the representation of all market segments. In total, the first survey identified 658 product related services, which were offered on the German market. A second survey followed from April to June 2017 with the same selection of automotive companies and brands on the German market.

The data was checked for statistical independence. The calculation of the cluster based on the distance scale of Lance and Williams and on the Ward Clustering procedure, and first formed nine clusters (2010) which was expanded because of the extended service offer to ten (2017) for PRS in the automotive industry.

#### 4 ANALYSIS OF PRODUCT RELATED SERVICES IN THE AUTOMOTIVE INDUSTRY

With reference of the unused potential, different analyses can now be executed. First, a brand-specific offer of PRS in relation to the total offer of all brands can be presented. Furthermore, a delta results between the total potential used in the automotive industry, and the actually possible theoretic potential, as well as a potential of the future need. The three potentials are shown in Figure 4.

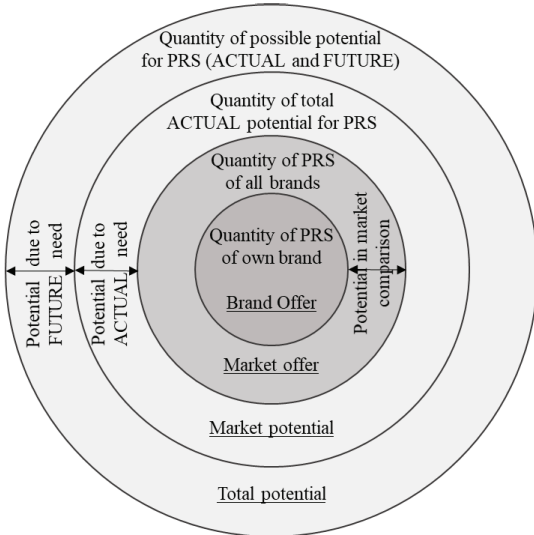


Figure 4 - Potential product related services (PRS) in the automotive industry [13]

In response to the brand-specific use compared with the potential total offer of the automotive industry, a definition of the characteristic PRS is necessary.

After elimination of context-related similar services, 60 characteristic PRS of the automotive industry were defined (see Figure 5). They represent the current total offer of the automotive industry (in Germany).

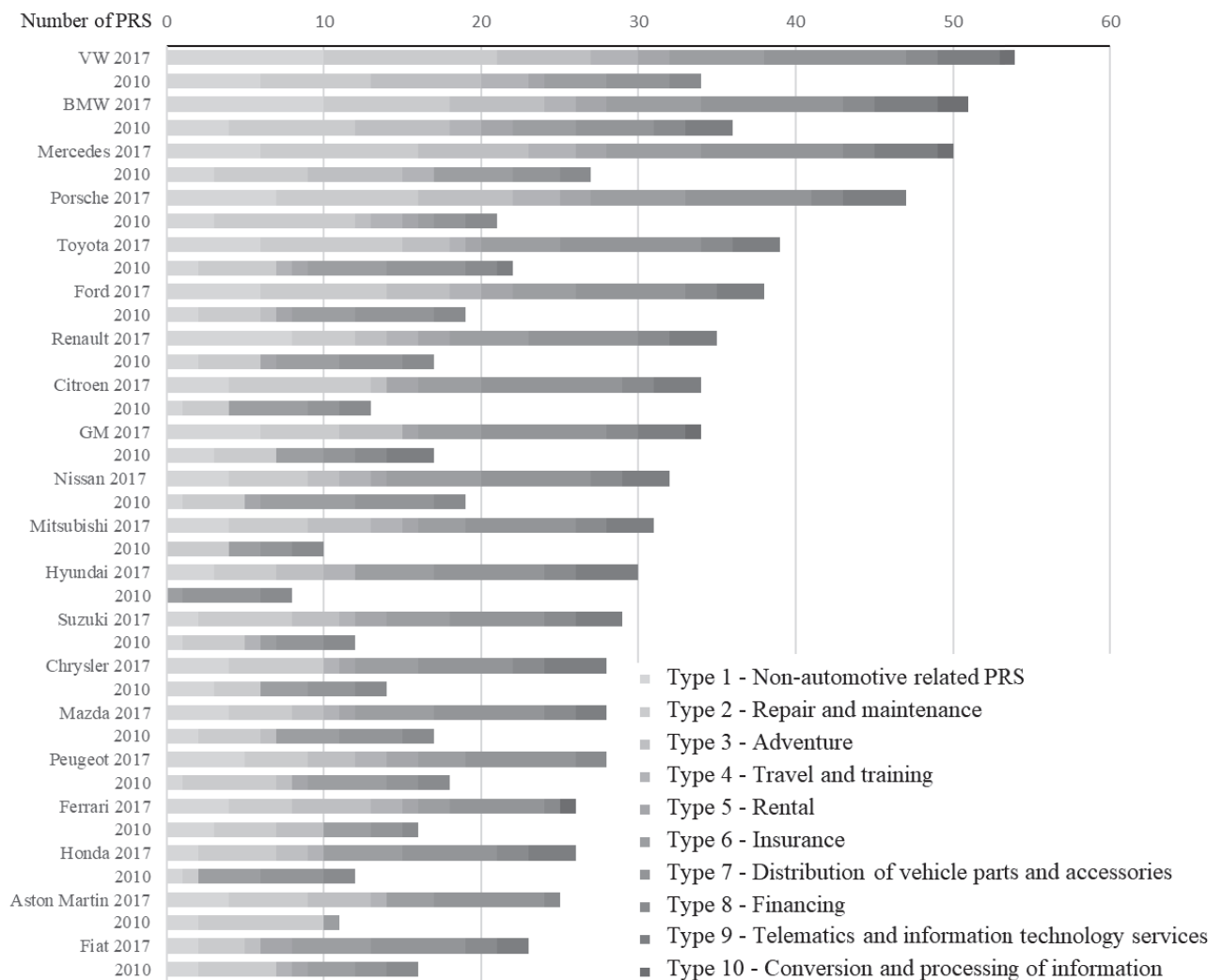
#### Characteristic product related services (PRS) in the automotive industry

<b>Type 1 - Non-automotive related PRS</b> Number: 12	<b>Type 5 - Rental</b> Number: 2
- change requests for existing contracts	- replacement car
- car sharing	- rental car
- account and securities transactions	<b>Type 6 - Insurance</b> Number: 7
- credits	- gap insurance
- charging station	- warranty extension
- merchandising	- car and fully comprehensive insurance
- online games	- instalment protection insurance
- parking aid	- legal expenses insurance
- publications	- racing insurance
- phone contact	- maintenance contrac
- ticket sale	<b>Type 7 - Distribution of vehicle parts and accessories</b> Number: 9
- insurance	- driving aids
<b>Type 2 - Repair and maintenance</b> Number: 11	- navigation updates
- installation and modification	- original parts
- storage	- care products
- express service	- wheels and tyres
- collection and delivery service	- technical literature
- inspection	- tuning parts
- roadside assistance	- certificates
- car care	- accessories
- repair	<b>Type 8 - Financing</b> Number: 2
- restoration	- loans
- accident handling	- leasing
- maintenance	<b>Type 9 - Telematics and information technology services</b> Number: 4
<b>Type 3 - Adventure</b> Number: 7	- internet
- adventure park	- communication service / apps
- vehicle pick-up	- navigation service
- guided tours	- radio
- rental spaces	<b>Type 10 - Conversion and processing of information</b> Number: 3
- museum	- data collection
- restaurant	- anti-theft protection
- events	- fault detection
<b>Type 4 - Travel and training</b> Number: 3	
- automobile travel	
- driving trainings	
- course	
	<b>Total Number: 60</b>

Figure 5 - Potential product related services (PRS) in the automotive industry [13]

With reference to the analysis in 2010, this space increased from 54 to 60 used services, i.e. by 11%. This growth took place in Type 1 (non-automotive product related services) and in Type 10 (conversion and processing of information). The latter type with three characteristic services was not offered by the automotive industry in 2010 at all. The degree of use of the service frame in the automotive industry increased on the average for the observed 20 brands from 33% in 2010 to 57% in 2017. The best brand value in 2010 amounted to 67% and in 2010 to 90%. The highest increase of a single brand between two observation dates was 40%. The offer of the investigated single brands is shown in Figure 6.

## Offer of product-related services in the automotive industry in Germany (comparison 2010 and 2017)



**Figure 6 - Offered product related services in the automotive industry (number of PRS in Germany, comparison 2010 and 2017)**

## 5 SUMMARY

The objective of this document is the introduction of a feature scheme to classify product related services (PRS) in the automotive industry and to define characteristic PRS in the automotive industry. This enabled to make statements about the degree of use in the automotive industry. The investigation was executed in 2010 and 2017. It could be stated that the degree of use by the car manufacturers in these 6.5 years increased significantly. While in 2010 only 33% on the average of the offered range was used, the value increased to 57% until 2017. In particular, the German car manufacturers increased their offer on the domestic market by 35% and achieved the highest value of about 90%.

PRS to use information and knowhow could be identified in the meantime in 2017 in comparison with 2010, although free-of-charge offers still prevail. While in 2010, the product range offered by the car manufacturers seemed partially to be rather wilfully, a structured proceeding seems to prevail in 2017. In

total, it can be derived from the considerable efforts of all car manufacturers and brand to complete the offer, that the product related services will develop from a brand-differentiating feature to an important own competitive factor.

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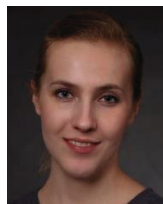
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