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Value-Oriented Design of Vehicles Along Emotional Personality Structures and Character Traits of Customers

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ABSTRACT

Over the last decades, the requirements for designing vehicles increased. Due to accelerating number of technological inventions, constantly changing social and aesthetical trends, the increasing smartification of products and the increasingly atomizing target groups it is becoming ever more difficult for car designer, to transfer the requirements successfully into a vehicle design. This creates a need of rethinking the design process in terms of how to collect user data, define target groups, identify trends, and derive relevant information to generate target group specific product design characteristics. This paper explores a data-based approach of target group description to derive vehicle characteristics including demographic and cultural information, emotional personality structures as well as character traits of customers. The findings presented in this paper based on a survey with a sample number of about 1.000 respondents from 5 nations from 3 different continents.

Keywords: Customer values, Automotive design, Emotion, Limbic types, Product value pyramid, Customer value pyramid, Design process

INTRODUCTION

Buying a vehicle is a highly emotional process (Helander et al., 2013). Within this buying process the customers have to handle various issues, such as the purpose of buying a car, the fundamental relationship to cars, relevant functionalities, their financial frameworks, vehicle features with which they personally identify, values they want to communicate (or not communicate), influencers like family members, social and aesthetical trends and the overall trust/loyalty into a car brand.

Vehicles reflects in a strong manner the personality of the customer and thus becomes a highly emotional artifact. Design is an important strategic instrument for emotional value creation (Charles H. Edle, 2008). Designers face the challenge to design vehicles in a way that the customer's personal values are addressed under the above mentioned circumstances. However, the design process has become a challenge due to the variety of influences that affect the user and the product and the dynamic changes of those influences. Dynamically changing social and aestethic trends, technical innovations, and

the increasing smartification of products make it difficult to clearly define a target group and make design decisions. The high number of influencers makes it necessary to extract relevant data and condense them into relevant information before making design decisions. Today, predominantly demographic data is used for this purpose. Anyhow, this data source just indicates target groups ("who") and does not give user context ("why").

At this point, psychographic data becomes relevant. However, the psychographic characterization is often only based on subjective assessment of the user information. For example, a lot of product developers define the emotional characteristics of the target group using personas or mood boards based on experiential knowledge. This leads to a bias in the soft factors of a target group conditioned by the individual perception of each product developer and is therefore prone to error. Currently, there is a lack of methodical procedures for translating customer values into vehicle elements.

Therefore, the questions arise, how value profiles of target groups can be extracted from data sources, and how vehicle characteristics can be derived from it.

LITERATURE REVIEW

For value-oriented design, personas are a commonly used method among designers. The Goal of this method is to extract value profiles and needs of the expected target groups at the vanguard of the design process. On the one hand, Personas support to better empathize with target groups and identify their needs, and on the other hand, this method communicates a unified understanding of the target segment and its requirements within the team. To be able to explore the usage framework from the target group's point of view, psychologists refer to as "perspective taking" (Epley et al., 2004).

The way people adopt customers perspectives in personas is an iterative process. It starts with the assumption that the user has similar motivations and behaviors as oneself. Personas help to adapt this view step by step until it matches to the expectation and observed behavior of the target group. This requires an understanding of the direction in which the target group model is to be altered and experiencing the actual behavior of the formed person model to test the iterated model against it (Peter Bagnall et al., 2005).

However, since a persona is fictional, customer behavior requires an observation of real people in the usage context and the quality of results therefore relies on the experience of the designer. In the best case, a high number of moments with very similar types of people is needed to recognize relevant patterns. But in terms of efficiency, it is not possible for designers to go through the personas process for a larger amount of target groups (even more if it comes to Niches or very specific target groups).

In addition, there is a bias, as user of the personas method usually start from their own motives and values which will be transferred to the target group(s). There is yet less research through field studies in ethnographic science in order to prove a bias-free usage of persona method (Friess, 2012).

METHODOLOGY

The methodological structure is divided into three sections: 1) Identification of the emotional personality structure, 2) Specification of the personality structures by interests, attitude and values, and 3) specification of preferences towards vehicle features.

1) Identification of the emotional personality structure

For the determination of the personality structures and character traits and emotional types of a target group, an international tool was sought. Early approaches are Digmans "five-factor model" (Digman, 1990) and Goldmanns "big five" (Neyer and Asendorpf, 2018) which describe personality in five main dimensions: Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. The mentioned characteristics can be described in different intensities. The combination of the intensities of the characteristics finally describes the personality. Extensive questionnaires such as the NEO-PI-R with 205 pages can be used to determine the personality type (Berth and Goldschmidt, 2006). The big advantage of the big five is the heritability of 50%. This means, half of the personality can be explained by the influence of genes. 40-45% are environmental factors and 5-10% are fault points. This can be particularly interesting when it comes to the development of products in the distant future when assumptions must be made about potential target groups. For the application in this study, a more compact model was used which, however, has its origins in the Big Five.

A recently developed approach which fits to the methodological requirements of this study is the "Limbic Map" (see Figure 1). This model originate from the field of neuropsychology and was developed by Dr. Hans Georg Häusel (Häusel, 2019). The method is based on the basic motives and emotions of people which are deeply anchored in the subconscious. On the Limbic Map, all values, motives, and desires can be depicted and placed in relation

Figure 1: Limbic map (Häusel, 2019).

to each other. These are decisive for consumer and purchasing behaviour as well as brand preferences.

Different types, so-called limbic types, can be located on the map. Limbic types are based on the motivational and personality system of the human and condense complex emotional personality structures into superordinated dimensions. The model is similar to DISG (Dauth, 2017) or Insights MDI, but has the advantage that with just a few questions a tendency can already be derived whether the person is more likely to be assigned to the dimension of "Dominance", "Stimulance", "Harmony" or "Balance" (see Figure 2).

Dimensions Overview

Dominant personality groups strive for recognition, power, success, victory, and prestige. The proportion of men within this group is often very high. They have a high affinity for status products and are very often interested in the latest technology.

Stimulance types are constantly searching for something new. This unsteadiness runs through the whole life. Hedonists, open-minded or adventurous people can be found here. They love modern and extravagant products and have a positive attitude. Indulgence, enjoyment, and being different are concisely in the foreground here.

Harmony personality is characterized by caring and bonding. The basic attitude is very optimistic and factors such as family, social harmony, home, and hearth play a predominant role. They are often cautious but very open to other people.

Balance types overlap with Harmonizers. Traditionalists make up a large proportion of this personality group. They tend to be conservative, examine things very meticulously, and can be described as rather cautious, sceptical, and preserving. Their thinking is oriented toward the past and the status quo.

2) Specification of the personality structures by interests and values

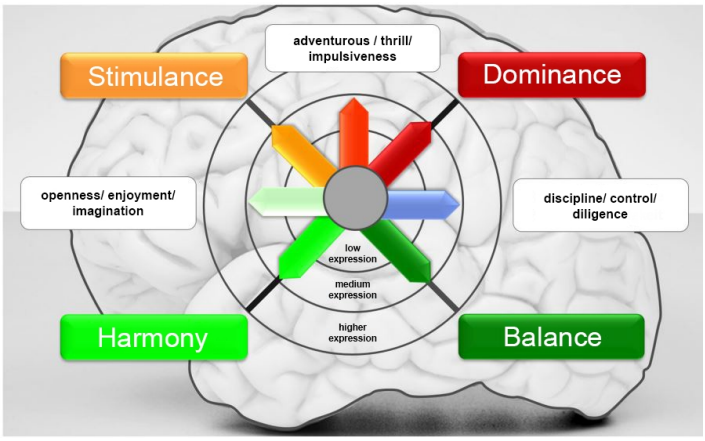

Figure 2: Overview of the four main fields of emotion (Häusel, 2016).

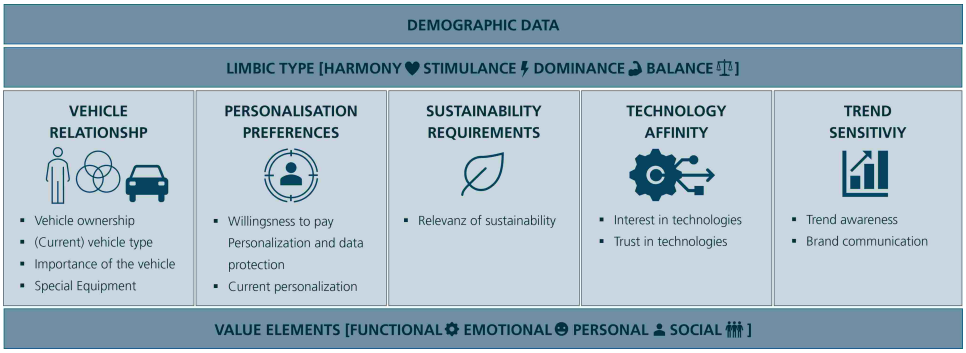

Figure 3: Overview of the collected target group information.

To specify the target group types in terms of their interests and to include global trends such as sustainability, personalization, and interest in technology, the following variables were added (see Figure 3):

- Current ownership of vehicles
- Vehicle body type preferences
- Importance of the vehicle in life
- Willingness to pay for special equipment, personalization
- Data protection
- Personalization options that are currently in use
- Interest and Trust in (new) technologies
- Trend Awareness
- Brand trust

3) Specification of vehicle features regarding personality structures and character traits

The above collected target group information defines the profile for determining a target group. To compare these with specific vehicle characteristics, the product "car" must be broken down into individual elements. For this purpose, the Bain & Company's B2C Pyramid was transferred into a Product Value Pyramid with specific vehicle features (see Figure 4). This approach was developed within a joint applied cooperation project with Hyundai Motor Company and Kia Corp.

Bain & Company's value pyramid is based on the principle of Maslow's pyramid of needs and hierarchizes functional, emotional, personal, and socially relevant values.

Adapted to the use case "car", elements from the above mentioned Pyramid have been adopted (for example like "Reduces Effort" became in the Product Value Pyramid the element "Automated Functionalities" or "Provides Access" becomes "Trends").

In the next step, an online survey was prepared and conducted. To take intercultural differences into account, a total of 5000 respondent were surveyed (1000 people each from China, South Korea, America, Italy, and Germany). To prevent gender bias, attention was paid to ensure a balanced ratio of men to women in this survey. Demographic questions formed at

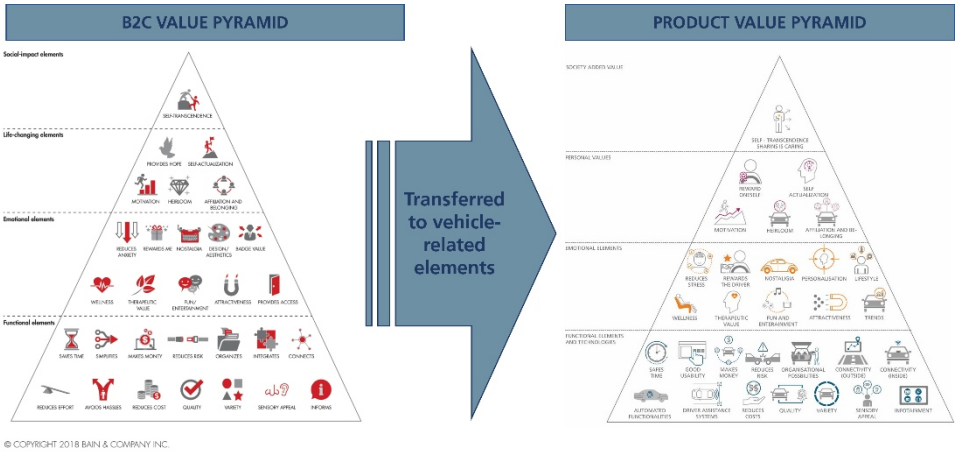

Figure 4: B2C value pyramid from Bain & Company Inc. and product value pyramid developed by Fraunhofer IAO and Hyundai Motor Company and Kia Corp.

the beginning, followed by a Limbic Quick Test to determine the emotion type, followed by questions on sustainability, technology affinity, trends, and expectations towards the brand. The respondents were asked to select three functional, two emotional and one personal element of the Product Value Pyramid. For a better understanding, the abstractly formulated elements were provided with practical examples. Finally, the test persons could decide for or against a socially added value. Social added value can mean, for example, that you make your vehicle available to other people when it is not in use.

The results were examined according to different criteria and the selected elements from the Product Value Pyramid were correlated with character traits.

RESULTS

It is noticeable, that in all conducted countries the harmony type is the most common type with a share of over 22%. Closely followed by stimulant types, accounting for at least 19%. Dominance types come in third place with 5.6 - 8.69% and finally stimulus types with a share of less than 4.7%. If we correlate the limbic types with different vehicle types, we identify that most sports cars are owned by dominance and stimulus types. In addition, dominance types own SUVs significantly more often than harmony types. Dominance types have also a very high affinity for technology, followed by stimulance types. Stimulance types place the highest value on sustainability closely followed by dominance types. When we look at Trend sensitivity, balance and harmony types are less interested in following the newest trends. In contrast, dominant types are very interested in trends and even prefer to set trends themselves. Regarding personal data balance types prefer to personalize their products themselves instead of automated personalization, followed by harmony types. In contrast, dominance and stimulance types are more willing to provide their personal data for automated personalization. What's noticeable is that Harmony types are the second most likely to personalize products on

their own but the least likely when it's about personalizing their vehicle. In the following, exemplary results of the country-specific particularities with regard to the limbic types are shown (predominantly for China and USA).

Limbic Types in China

If we look at the limbic types within China (see Figure 5), we see that the same functionalities are decisive for all of them: Driver Assistance Systems, Quality, and Automated Functionalities. Looking at the emotional elements, harmony, and balance types prefer trends, fun, and entertainment elements in their vehicles. Stimulance and Dominance types are also trend-oriented but prefer in second place elements that are attractive, for example, a special streamlined shape or exclusive rims. When it comes to personal elements, all emotion types choose vehicle features that are related to their own reward. This is often special equipment that has to do with strong individualization, such as exclusive materials in the interior or a limited-edition sport steering wheel. Germans also prefer self-rewarding elements.

Limbic Types in North America

The situation is different for American limbic types (see Figure 6). Harmony, balance and dominance types prefer features that support the driver in achieving his goals. For example, features and functions that help them drive more energy-efficiently to be more sustainable. Stimulance types also prefer Heirloom elements. That means when those types invest into the vehicle the concern the resale value or is willing to share the car with family members. Therefore, vehicle characteristics are interesting, like a high resale value or special quality.

It is noticeable that in China, Korea and the USA dominance types are least likely to choose willingness to self-transcendence. Self-Transcendence means that features and functions of the vehicle add value to the society. Cross-cultural tendencies within the Limbic Types can be derived via the frequency distribution of the preferred elements. With the help of a lift analysis, it was

	HARMONY	BALANCE	STIMULANCE	DOMINANCE
SELF.	Self Transcendence 90,9%	Self Transcendence 90,3%	Self Transcendence 94,6%	Self Transcendence 88%
PERSONAL	Reward oneself 30,5%	Reward oneself 30,3%	Reward oneself 35,1%	Reward oneself 35,9%
EMOTIONAL	Trends 50,6% Fun and Entertainment 30,0%	Trends 45,4% Fun and Entertainment 38,2%	Trends 45,9% Attractiveness 32,4%	Trends 44,6% Attractiveness 31,5%
FUNCTIONAL	Driver Assistance Systems 46,5% Quality 44,4% Automated Functionalities 37,9%	Driver Assistance Systems 47,5% Quality 45,0% Automated Functionalities 42%	Driver Assistance Systems 56,8% Automated Functionalities 45,9% Quality 40,5%	Quality 52,2% Driver Assistance Systems 46,7% Automated Functionalities 42,4%

Figure 5: Overview of the preferred product values of the individual limbic types in China.

	HARMONY	BALANCE	STIMULANCE	DOMINANCE
SELF	Self Transcendence 46,2%	Self Transcendence 44,7%	Self Transcendence 38,5%	Self Transcendence 35%
PERSONAL	Motivation 33,1%	Motivation 32,5%	Motivation 28,5% Heirloom 28,5%	Motivation 38,8%
EMOTIONAL	Therapeutic Value 38,5% Reduces Stress 30,8%	Therapeutic Value 38,8% Trends 34,2%	Trends 41% Fun and Entertainment 38,5%	Therapeutic Value 37,5% Trends 35%
FUNCTIONAL	Reduces Costs 54,6% Driver Assistance Systems 50,4% Quality 35,4%	Reduces Costs 56,1% Driver Assistance Systems 49,4% Automated Functionalities 32,5%	Reduces Costs 56,4% Driver Assistance Systems 51,3% Quality 38,5%	Driver Assistance Systems 57,5% Reduces Cost 52,5% Quality 33,8%

Figure 6: Overview of the preferred product values of the individual limbic types in USA.

also possible to determine which element combination has a particularly high probability of being selected. For example, for the German balance type the lift for the functional element "Driver assistance systems" and the emotional element "Reduces Stress" is marked with 1.14. This means that if one element is chosen, there is a high probability that a German balance type will also choose the other.

This has the advantage that elements can be derived based on probabilities if there is a lack of information. This has the advantage that elements can be derived based on probabilities if there is a lack of information.

DISCUSSION

By comparing psychographic data and design elements of vehicles, overriding characteristics can be integrated into the design process at early stages. This creates a valid basis for making and justifying design decisions.

In the data evaluation process, it became apparent, that the sample of 5000 participants could have been larger. A larger sample would be helpful, especially when looking at marginalized groups.

CONCLUSION

With our study we could prove that the usage of limbic types is an efficient way to incorporate emotional characteristics of target groups into product design and development and therefore can be considered as successful.

However, in order to integrate character expressions more specifically research should be conducted to use complexer model than the limbic map – for example a modified form of Goldmann's "Big Five".

Furthermore, additional research should be carried out to adapt the car value pyramid to other products such as consumer products and/or medical devices as well as in terms of researching the influence of cultural differences in design decision making.

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