



Individual corporate players' evaluation criteria of mobility alternatives: a repertory grid test approach

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Abstract. Research on the decision criteria of companies about mobility alternatives concentrates on cost. To estimate the substitutional potential of electric mobility for commercial purposes the key challenge is to make sure that individuals' (both conscious and unconscious) criteria in choosing mobility alternatives for company purposes are identified and evaluated. This contribution presents the results of an investigation of corporate players in Hamburg, using the repertory grid technique (Rep Grid).

1 Introduction

Current registration figures of battery-powered electric vehicles (BEVs) in Germany show a gap between predicted and actual registered figures. One presumption of this contribution is that this gap may be influenced by the fact that research approaches on estimating the substitution potential of BEVs for commercial purposes often focus on "objective" hard factors, such as costs. The evaluation of objective factors often goes hand in hand with a research design based on exploring a set of pre-arranged questions that test persons need to answer. The methods therefore depend on a comprehensive, a priori understanding regarding the evaluation dimensions to be explored. The lack of choice of assessment criteria by the test person itself can lead to their true preferences and their definitions not being revealed in full, especially when the test person has yet to gain experience of the mobility alternatives to be assessed. As a consequence, researchers need to make sure that the findings of surveys are no self-fulfilling prophecies, when the intrinsic interpretations of the respondents' criteria are not revealed, but rather the researchers' constructs are evaluated.

In this work it is argued that in a rather new research field such as electric mobility for commercial purposes, a key challenge is to make sure that

individuals' criteria in choosing mobility alternatives are truly identified and evaluated.

For such a research objective, this contribution explores if and how the repertory grid technique (Rep Grid) can contribute toward enhancing the research approaches that are usually used to evaluate mobility alternatives. To increase the understanding of the attitudes of commercial players, the constructs of the drivers as well as the decision-makers are being analysed.

2 The Role Construct Repertory Test

The Role Construct Repertory Test (Rep Test) is based on the Theory of Psychology of Personal Constructs developed by Kelly [1]. Central components of a grid test are elements and constructs. Kelly ([1], p. 137) defines elements as "things or events which are abstracted by a construct". A construct, according to Kelly ([1], p. 86), is "a way in which at least two things are alike and at the same time different from at least one other thing". Their bipolar structure sets the limits within which a person can choose alternative perceptions and behaviours [1].

Because of limited space, only the chosen research approach is presented. The investigated issue was substantiated by re-formulating the research

question. Following Fromm [2, 3] the initial question was broken down into its parts. These parts were replaced one after the other by alternative experimental concepts, leading to different reformulations of the initial question. As the result of this “substituting” process, the following research question was formulated: “By means of which assessment dimensions do corporate players rate the use of battery electric vehicles for their corporate purposes?”

The precise formulation of the research intention determines the fundamental element type, which again was used to build an element set. Each element was specified in such a way that precisely the constructions that the person explored uses to make sense of the context can be identified [4, 5, 6]. For the investigation 12 mobility alternatives were determined.

To elicit a test person’s personal constructs there are different ways of presenting the elements - for an extensive overview see [7, 8, 9, 10, 11]. Here a triadic comparison is used. That means three of the elements were presented to the test person. The test person named a common characteristic at least of two of them. Afterwards the test person was asked for the opposite of this characteristic [1].

In Kelly’s Rep Test the test person is called on to evaluate for each construct all the elements by means of its poles before the next construct is elicited and evaluated [1].

A construct’s poles span the area the person orders things [12]. In this area the evaluation of elements can take the form of either a rank order form or a rating form [6, 13, 14, 15, 16, 17].

To present element and construct relations in this investigation the principal components of analysis are used. By observing the distance between elements and/or constructs inferences can be drawn as to their similarity [2].

Data collection and analysis were conducted with computer assistance using the software solutions sci:vesco [18] and Idiogrid [19].

3 The Sample

The test persons for the Rep Test were acquired within the research project “Wirtschaft am Strom” in Hamburg. In this project, companies could lease BEVs at special rates. The companies signed a contract and obliged themselves to be part of the research agenda. The companies represent 17 out of the 21 industries according to the industry classification scheme of the German Federal Statistical Office.

One objective of this research was to identify criteria for choosing mobility alternatives of cooperate players. In these 66 in-depth interviews, 600 constructs (1200 construct poles) were collected from 40 decision-makers and 26 drivers in total.

4 Findings

Using content analysis, the constructs were merged into 47 categories. 77% of all categorized constructs fall into 19 categories. It can therefore be accepted that they are very widespread in the awareness of corporate players for mobility alternatives. These range from economic and ecological evaluation dimensions to evaluation dimensions that express the perception of a single individual. Thereby understanding of a construct, e.g. ‘comfort’, can vary widely between individuals.

The construct poles of today’s battery-powered electric vehicles span external impact, future orientation, environmental impact, and economic aspects, and were on average evaluated as better than conventional and hybrid vehicles. In almost all other categories, above all those that concern operational suitability and purchase price, the battery-powered electric vehicle was seen as worse than other types of vehicles mentioned.

The deviation between electric vehicles and other mobility alternatives in terms of categories that refer to external impact, future orientation, environmental impact, and economic aspects, was according to the evaluation of corporate players, likely to increase in the future. In operative categories they expect significant convergence: even in part, parity between electric vehicles and conventional and hybrid vehicles. In the ‘range’, ‘simplicity and appropriateness’ (with reference to fittings and handling) and ‘expenditure of mental and emotional energy’ categories corporate players evaluated electric vehicles clearly behind conventional vehicles (partly also behind hybrids) in the future.

On the other hand, those questioned, with reference to the purchase price in the future, expect the electric vehicle to be lower in price than the other two vehicle alternatives.

From similar evaluations for ‘labour mobility 2020’ and ‘electric vehicles 2020’ we can derive that corporate players expect future electric vehicles will be present in company mobility. This corresponds approximately to ideal mobility, the ideal work vehicle. From the similarity of the ‘ideal’ evaluations it can be taken that to a large extent, the corporate players see no real difference. Exceptions are seen in the evaluation dimensions for ‘dependence’, ‘expenditure of mental and emotional energy’ ‘simplicity and appropriateness’ (with reference to fittings and handling) and ‘purchase price’. In these areas the corporate players expect, also in the future, deficits in electric battery-powered vehicles in comparison to ideal labour mobility or the ideal work vehicle.

Finally, the study shows that users and decision-makers differ in their evaluation dimensions, which were used to evaluate mobility alternatives. That implies the need for different ways of addressing to improve the acceptance of BEV by each group.

5 Conclusion

The study demonstrates the repertory grid technique makes it possible to reproduce the test person's understanding of the world with his own constructs and not with those that the researcher has specified [5, 10]. With the repertory grid technique, mobility alternatives can not only be assessed by the test person, but also the reasons of the assessment can be reconstructed. By using quantitative principal component analysis, similarities not only between elements but also between constructs were revealed. Patterns were recognized in the data that were not apparent in what the test persons said.

It can be concluded, that in order to estimate more accurately the substitution potential of BEV more information about the underlying subjective decision dimensions and understandings of corporate players, such as identified with Rep Grid, is needed. The repertory grid technique combines qualitative data collection and analysis as well as quantitative data analysis. In combination with Kelly's theory of personal constructs it offers an end-to-end toolkit with close interlocking of theory and method on which to collect, analyse and interpret data.

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