Value-based Product Design –
the Customer’s Voice in Product Development

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Summary

The success of new car models is the result of a balance between the benefits to the customer and price. All too often, the development of cars and their pricing does not begin directly with customer benefits, but rather with competitors’ cars in the corresponding segment. From this, manufacturers will then derive the positioning, equipping and pricing for a new car and calculate the target costs based on an estimation of volumes and defined target margins.

Yet the truly essential question is, how can one quantify the customer benefit of product features, even during product development. Because if this were possible, new leeway could be unlocked for manufacturers for strategically optimizing product and equipment features during their development within their price and target cost framework.

This can be realized if one takes advantage of applying an innovative and pragmatic method in which the customer’s voice and benefits to the customer are „built into“ the development process without having to consult the customer about every single new product decision. For this, Strategy Engineers and Vocatus have developed a multi-stage process: the value-based product design.

This approach develops a “unified currency” which for the first time allows the customer benefits to be integrated into the hard key number system of Development (cost, weight, etc.) on an equitable basis. With this, Development receives a valid and directly useable measurement system, which enables the making of clearly faster, more transparent and sustainable product decisions.

And so the product assets can be optimized in each step of development on the basis of the relationship between customer benefits and manufacturer costs. Introducing this method contributes considerably to the integration of the customer voice in the decision process of product development.

The article describes in detail this method tested successfully in many previous projects and gives practical examples from current customer projects. It also sketches in concrete terms how this procedure can be integrated into the company processes and structures of the Automobile Manufacturers.
Major trends in the automobile industry require systematic integration of the customer’s voice in the planning and development of vehicles (see Fig. 1).

» **New markets and customer needs**: There is not „one type“ of customer. Today’s automobiles are becoming more segment specific and their markets are becoming more global. Customers from different cultures and market situations must be provided with ever newer car concepts. And the preferences from different regions can sometimes differ explicitly. Often in development the necessary information is not available about which product features are relevant in other markets and cultural groups.

» **Competition**: Especially through the steadily increasing pressure of competition even more niches will be occupied to which the OEMs must react. These require setting clear limitations and objectives for the arrangement of a car, in order to appeal to target groups with attractive offers. The available knowledge during development about these new car concepts is often low.

» **Technologies**: Developments from other industries, for example from the area of consumer electronics, due to the increasing interconnectedness of our world, must be incorporated efficiently and quickly into the structures of new cars – sustainable and long-term trends must be differentiated from short-lived hypes.

» **Efficient development processes**: In order to keep the variety of models while simultaneously meeting reductions in the development cycles, all OEMs set up platform and modular design systems which however constrain the degrees of freedom for product differentiation. Here it is critical to hit home with the customer with the remaining levels of freedom.

**Customer-Developer Interfaces as Essential Challenge**

The framework requirements mentioned above for product development require an approach which can quickly and pragmatically evaluate how the customer reacts to the various product versions and product contents. For every question which has an influence on the product design of a car, a consumer survey or customer study cannot be conducted. This is firstly due to the need for decision speed and secondly due to the wealth of detailed choices, which in total constitute the product assets of the car without being economically expedient. Our value based approach is therefore structured such that it can be integrated into the product development process without having to ask the customer about every product decision. Additionally it delivers reproducible and transparent results in order to guarantee a high degree of decision stability. The approach consists of four elements which we will further detail below (see Fig. 2).
1 Process Integration

The integration of the „voice of the customer“ in the development process is not a new challenge and there have been many well-recognized methods and approaches, however, in practice these have failed to catch on. The best known method is perhaps “Quality Function Deployment (QFD),” with which the systematic product functions and requirements of customers are connected with one another. The implementation in the industry however has not been successful since the application of the method is expensive as well as complicated, it usually has no natural “owner” in the organization, and it is only inadequately appropriate to support the communication involved in decision-making at the interface between customer and Development.

The procedural integration of the inclusion of the „voice of the customer“ is dependent on the phase of the development process. If the questions at the start of usually large conceptual considerations are, for example, how technologically innovative or functionally a car should be designed, then the questions will become ever more concrete over time, ever more detailed and varied. During the series development, questions of customer relevance become very detailed and the still vaguely formulated product features listed in the specification sheets will be backed up with specific measures. That is deliberately scheduled in order to have the flexibility for new framework conditions, for example to be able to react to new offers by competitors. In doing so, there are clearly “cultural” differences to account for between the producers in their respective implementations. While Japanese manufacturers usually consider the earlier defined requirements during the development of a series very strictly, European and especially premium OEMs retain a relatively high degree of flexibility in order to set the benchmark for a newly developed automobile. Here it is even more important that late stage decisions are made consciously than trying to have high stability.

Also at the end of the development process, customer relevant questions will always arise which must be answered in the final detailing of their development. As an example, the design of the gas pedal acceleration control mapping for a better acceleration response is often mentioned: here, which road performance is desired in the end must be weighed. These different questions throughout the development process cannot be answered using the same approaches. The method presented here focuses especially on the questions which must be answered during the early concept phase in the product definition. In this phase the requirements in the specification sheet are codified and the majority of decision points of customer relevance are made, which altogether shape the character of the automobile. Figure 3 below illustrates the typical questions which arise during the development process.

Fig. 2: Four elements for the integration of the customer’s viewpoint in value-based product design.
2 User-Oriented Customer Knowledge

The interface between market / customer and Development is one of the most difficult of the passenger car-OEMs. For those responsible in the Sales and Marketing Organization, who must integrate the customer’s voice into the development, the special demands of Development are usually not known. There exists for example little feeling for the difficulty of extrapolating the concrete technical requirements from the desires expressed by Sales, and to bring these together coherently.

On the other hand operationally responsible (component) developers do not understand the complexity and necessity to consistently collect the customer’s voice through a worldwide multiple level Sales and Marketing Department. At practically no other interface in the automobile industry is there such a low level of knowledge about the „opposite side” of each process. For example, an exchange of staff could help, but there are few market experts who switch into Development positions and even fewer developers who find their way into the Sales and Marketing Division. All of this leads to the fact that at the interface between Sales/Marketing vs. Development, words are spoken at cross purposes with much lost through the gap, as Figure 4 illustrates.

At no other interface in the development process is the point missed more often than between Sales/Marketing and Development.

Fig. 3: Along the development process different problems arise depending on the phase, which make the integration of the viewpoint of the customer necessary – the value-based product design focusses the definitions of the product.

Contributing to it are market studies which often are formulated rather abstractly and developers who have difficulty in interpreting the meaning of the results for their concrete work (what does the change in demographics have to do with any implications for designing the luggage compartment?). This often leads Development to initiate their own examinations (for example observations of the usage of luggage compartments at a supermarket parking lot) which however do not meet the specifications of market research regarding

Fig. 4: The differing foci of Sales/Marketing compared to Development lead to poor understanding and result in interface losses.
representativeness and therefore do not satisfy the needed statistical power needed to support the statement. Results of such studies are not acceptable to those responsible in Sales and Marketing. The results are discussions which are emotional and informed by gut feelings, which lead to unstable decisions and to frequent further iterations. Acute loss to friction as well as higher complexity due to non-acceptable decisions and changes made too late are the results.

The method introduced addresses these difficulties in that they provide the basis for decisions, which can be acceptable to all sides.

3 Quantification of the Benefit to Customers

The work of developers is controlled according to quantitative key numbers. In focus here are the detailed specifications as well as the target costs (production costs, investments, costs of tools, etc.) or quantitatively easily collectible measurements of quality (guarantee costs, breakdown frequency, etc.). This is all in one very stringently-timed development process with clearly defined milestones. The measurement units are directly recorded in the target system of the developer. Quantified target sizes for the customer value of a product still do not exist. These are available qualitatively in the form of their overall product demands. Because of their poor measurability, decisions are therefore often made on the basis of measurable targets such as for example costs, weights, timing or package. The customer value, therefore, will sink systematically to a lower priority. Therefore, the goal must be to install a “hard” measurement system, which accommodates the entry of the customer value or customer opinion as a decision quantity into the product definition and product development.

An additional demand for the need for the quantification of the customer benefit comes from the considerable importance of using “trade-off decisions” in development. With goal costs being specified, the budgets must be employed so that the maximum customer value can be achieved. Decisions result from these, such as, for example: Of what importance does the luggage compartment design have in comparison to the acceleration, to the operating concept or to the driver assistance systems? Simply said: for this car concept, does the customer rather desire 20 Litres more luggage compartment room or rather a motor with 20 HP more performance?

The basis for a customer value measurement system of this kind should ideally be supported with an appropriate customer study. One of these kinds of studies must satisfy two essential requirements:

» Unified „currency“ for the developer: The customer benefit must be quantified in one unified „currency“ (for example a point system), which makes the rating of various product features comparable and which thereby can be entered directly into the development process.

» Features must be translated into one understandable language for customers: Product features must be presented to the customer for evaluation as they would experience them in a real purchase decision. Only then can the customer provide a valid evaluation.

The most valid measurement of the customer value is one which most closely reflects the actual decisions of the customer in reality. An evaluation using benefit dimensions which are too abstract or too rigid („is driving performance more important than economy“) is to the contrary less expedient:

» Too abstract: What customers, for example, understand “driving performance” to be can be very different from, and must not be identical to, that which developers would rea-
sonably understand that it is: This applies to acceleration as much as it does to reach, driving comfort and safety (see Fig. 5).

Too rigid: Product features do not necessarily influence only one, but rather multiple use dimensions (for example, a hybrid motor on “efficiency,” “sportiness” and “environmentally friendly”). A too rigid priority of product features for the use dimensions is hardly reasonable, especially where it involves a new concept such as electromobility.

The following results of a customer survey show which benefit aspects of the dimension “road performance” the customer understands:

One achieves the best results through the concrete assessments of equipment configurations when the customer can compare, as he would if he were filling out a configurator template on the internet or on-site at a dealer (for instance: which equipment package would you choose? The xenon light package with adaptive curve lights and an automatic lighting system, or rather remote control and programmable auxiliary heating?).

With the maximum difference scaling (MaxDiff), a conjoint variation, market research has a proven and simple to implement tool available with which the customer can make a series of such choices regarding car configurations:

For all tested equipment measures the procedure delivers very concrete benefit values on one unified scale. This way it becomes clear to both the developer and product manager how the component development and product definition exert their influence on the car.

The best results are delivered by customer studies which realistically model the decision process of the customer.

Fig. 5: Compact and Midsize car drivers do not necessarily understand “driving performance” in the same terms as the developers. – Source: Customer survey

Fig. 6: With the conjoint “maximum difference scaling (MaxDiff)” procedure, customers make a variety of choice decisions, such as they would arise in the course of a purchase.
assets and thereby also influence the value to customers. With these, the following essential questions about customer value can be answered:

» What additional value will be generated, if an additional feature in the product concept is incorporated?

» To which benefit dimension(s) does(do) this feature contribute?

» Which loss in value will be acceptable if a feature were removed from the concept?

When applied systematically, an extensive library of customer knowledge across car segments and features is created. Also very specific development questions (for example, „Should a luggage compartment remote backseat unlock control be placed in the equipment package of a series?“) can then be answered in light of available customer knowledge, for example through:

1. **Classification into benefit dimensions**, where those features to be measured make their contribution (for example „Luggage compartment remote backrest unlocking control“ into „comfort“ and „interior“)

2. **Determination of the maximum customer benefit**, which can be reached through this feature

3. **Calibration of the customer benefit** through weighting of the highest achievable customer benefit according to previously defined rules

The classification into benefit dimensions (1) usually takes place through expert assessment. For the identification of the maximum customer benefit (2) along with empirical data from the study, analogies to possibly previously executed or externally referenced studies can be made, drawing on, for example, the New Car Buyer Study (NCBS), JD Power Initial Quality Study (IQS), or the Automotive Performance, Execution and Layout (APEAL) Study.

(„The luggage compartment remote backrest unlocking control, on the benefits side, has been assessed to have a similar amount of influence on comfort that the tailgate/hatchback emblem exerts on the design“). For the calibration of the customer benefit (3) clear, transparent rules are used whereby the starting calibration factors will be designated, for example:

» Is the *customer perception* clear, in other words, how vividly does the customer perceive the feature?

» Are *standards* met, that is, does the customer expect to encounter this feature in the segment under consideration?

» In this segment, is it a unique selling proposition, in other words, can we excite the customer with it?

In this way, the achievable customer benefit can be calculated, also for concrete product features, as Fig. 7 makes clear.
4. Cross-Functional Assessment

The study described ideally provides the basis for the assessment, in that it gives one unified quantification of the benefit dimensions in a point system, in other words, a “currency”. Furthermore, for a comprehensive assessment of the product decisions, additional information which is available in the company should also be taken into consideration. This information is often found scattered in very different places, which means they exist in different functions from different perspectives or are, so to speak, held within tasks or objectives, for example:

- **Central Market Research**: Responsible for general, representative customer surveys and product clinics – usually commissioned by Sales / Marketing or model series
- **Sales / Product Marketing**: Coordination of the demands from various countries within the Sales organization (by handlers, over the wholesale level), usually in the product determining core markets – controlled by the sales organization
- **Quality**: Collection of quality field data or studies (for example JD Power IQS)
- **Competitor analysis**: Consideration of the concepts of the competition in order to support the definition of the requirements
- **Central units for definition of the requirements**: consolidation of market-side legal and technical requirements of the product concept

In order to increase the usability of the information the owners (the “customer experts”) must be brought together directly with the users (usually product planners and developers). That means the specific question of whether, for example, unlocking the backseat rest from the luggage compartment for a specific car model can bring an especially high benefit to the customer, must be discussed directly with the relevant “customer experts.”

The methoidical approach in Value-Based Product Design is to bring the experts and their respective vantage points together in a cross-functional “customer-expert” team. Fig. 8 shows the possible composition of such a team.
Since every internal customer advocate must contribute valuable knowledge, the institutionalization of cross-functional evaluation teams is highly expedient. Moreover, the understanding at the interface between customer and development will be strengthened. Through the operative work in the assessment committee, valuable informal relationships emerge at the working level. Furthermore, through the inclusion of different experts who typically come from different company divisions (primarily Development Quality, Sales), a high decision stability is given.

In order to assure that the discussion is not characterised by individual opinions, a neutral process leader (litigant) is necessary. Different places for these roles are possible here (for example, organization of a series, development / management of requirements). In addition, the process leader needs deep knowledge of the current state of development. He must make sure that only those matters will be introduced to the evaluation committee which have the required maturity in terms of:

» **Technical maturity**: The product entity must be able to be integrated into the product concept, or respectively with any concept alteration, the changed concept must be realized within the timing of the development process.

» **Transparent effects on the customer**: The effects on the customer must be clearly and qualitatively worked out in detail (for example, the improvement of the variability through a remote control unlocking of the backseat rest).

The product characteristics for which the customer benefit would be quantified, can be, for example, contrasted with their manufacturing costs, as clarified in Fig. 9:
This gives the product manager the possibility to optimize (balancing the contents of the product) the customer benefits of the car, according to the specifications of the target costs, by leaving out less useful features and adding more useful ones.

Path to implementation

Sustainably anchoring the customer’s voice in the development process is a process involving the four previously introduced elements

1. Process integration of the customer’s voice in existing processes
2. Systematic determination of user-oriented customer knowledge
3. Quantification of the customer value from product contents
4. Cross-functional evaluation for the stabilization of decisions
However, especially the implementation is an often long-term change process. The tendency to fall back into „old“ approaches is high and when in doubt, also seems less risky for those involved, because a greater effort in the concept phase endangers the timing guidelines for the development. Here the support of management is needed as it must provide space for the systematic incorporation of the voice of the customer in the development process.

The advantages of the methods introduced here will be, however, directly observable by those involved in their use. This is everyone who significantly shapes the product along the development process, meaning especially the responsible engineers, those responsible for the automobile project and Sales / Marketing.

Despite the extensive institutionalization in our applications we were able to achieve very concrete short-term effects with the approach:

» Lowering of the development costs through early identification of which, from the customers point of view, is the best solution: avoidance of parallel development

» Avoidance of expensive changes through high decision-making stability and transparent decision factors

» Resolution of overlapping divisional and departmental conflict situations through cross-functional expert committees

The implementation generally happens through piloting development projects. The effort in doing this is dependent on the availability of customer information for the respective matter in question. Figure 11 shows a possible project.

Fig. 11: Depending on the data basis, value-based product design can be piloted for concrete car projects within 8 weeks.

1. Analysis of Data Basis / Decision processes

In the first step the available data basis will be analysed. Afterwards it will be transparent, how far the available data can support the upcoming decisions to be made. At this point, it can be examined, together with the customer, whether through the insufficient availability of data, limitations which are too great exist which therefore make it necessary to collect further data. Additionally, it will be established at which point in the decision-making process the new method should be piloted.
2. Conception of the Logic of Assessment, Choice of Pilot

Together with the expert team, the logic of the assessment will be developed, the procedural embedding will be reconciled, and the product decisions to be assessed will be established.

3. Pilot Implementation, Roll-Out Preparation

The defined product features are prepared and evaluated in an expert committee. The results will be played out to the respective decision committee. The pilot experiences will be absorbed with the project team ("lessons learned"). Based on this a roll-out plan for further use can be compiled.

As with every method it is crucial, that the "pure doctrine" not be brought to bear; rather the existing situation in the respective company should be taken as the basis and the approach should be adapted accordingly. Existing and well-practiced processes can be integrated. Existing decision committees should be used in order to achieve the quickest possible acceptance of the new approaches.
About Strategy Engineers

Strategy Engineers is one of the leading strategy and management consultancies for the automobile industry and its associated branches. From offices in Germany, Sweden, as well as China, Strategy Engineers supports clients with solutions along the entire value creation chain.

As part of the AVL Group headquartered in Graz, the worldwide largest independent development service provider for the Automobile industry, Strategy Engineers differentiates itself through the effective combination of distinctive analytical consultancy competencies with comprehensive and profound technical and technological knowledge.

In a study of management consultancies in Germany the business magazine *brand eins* and *Statista*, named Strategy Engineers the „Best Consultancy 2014“ in the categories of „Auto Maker and Supplier“ as well as „Operations Management."

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About Vocatus

Vocatus is an internationally active, innovative market research and consulting company and is the leading institute in the area of psychologically based decision research. We advise clients from the automobile and auto-supplier industries covering all phases of the customer value-based product development.

Vocatus has received many national and international awards for its innovative studies and practical concepts. As an internationally competent project partner, Vocatus supports clients in more than 80 countries worldwide.

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