

Research on User Involvement in Automobile Design Development

Focusing on the Problems of Design Evaluation

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Abstract. The problems of design evaluation and decision-making have been ongoing challenges since design has held a position in industry. The large amounts of development investment in the automotive industry, and the importance of design in ultimate product value, have made the development of systems for evaluation and decision-making urgent topics. However, they have yet to achieve perfection, and are still beset by many problems. In our research on these topics, we have focused our research on user-participatory product design, especially the problems of evaluation and decision-making in the midst of the design development process. This paper discusses the current state of one aspect of these, the panel evaluation system, and looks at the challenges it faces.

Keywords: User involvement, panel evaluation, and design management.

1 Research Background and Process

Automobiles are hardware packed with the most advanced technologies, but they are also products that users use with all of their senses — it would be fair to call them emotional products, with an impact on people's feelings. It is therefore no exaggeration to say that the purpose of automotive design development is all about using the senses to create designs that will attract consumers. By "design" here, we are not referring merely to exterior aesthetic design (styling design). Because users use all of their senses when using automobiles, every contact point involved in their usage must create customer satisfaction. On the other hand, from the standpoint of corporate management, since new vehicle development requires huge investment, there is no room for errors that would prevent companies from recovering their investments. Therefore, top management expects designers to utilize their capabilities to the fullest extent and push them to develop innovative, original designs that are unlike, or even slightly better than, those of their competitors. The challenges in design management are how to retain talented designers and how to create systems and structures that elicit designers' full potentials. However, even if companies could succeed in retaining and utilizing talented designers, this does not guarantee that original designs will

be realized. The reason is that regardless of the quality of the ideas the designers create, if those ideas are not picked up and commoditized in a timely and appropriate manner, the ideas that the designers worked so hard to create will remain unseen by the public. The key to eliminating this problem lies in the method of design decision-making during the development process. Major manufacturers have been making efforts to improve the method and process of design evaluation and decision-making to minimize decision-making errors. One of these methods is called the "clinic." This consists of soliciting the thoughts of actual car users, or people representing them, as reference information during the stage of developing designs. Specifically, a third party not involved with the development evaluates the product development concepts and results, or completed products, verifies the design's merits and points out potential and actual negative points, with the goal of increasing the product's ultimate marketability and enhancing customer product satisfaction. When this evaluation is performed by potential customers outside the company (target-users), it is said that there was "direct user involvement in design evaluation", and when it is performed, for confidentiality reasons, by people inside the company who are not directly involved in development, serving as customers, that there was "indirect (provisional) user involvement in design evaluation."

The automobile development process has been largely standardized around the world. An overview is presented below.

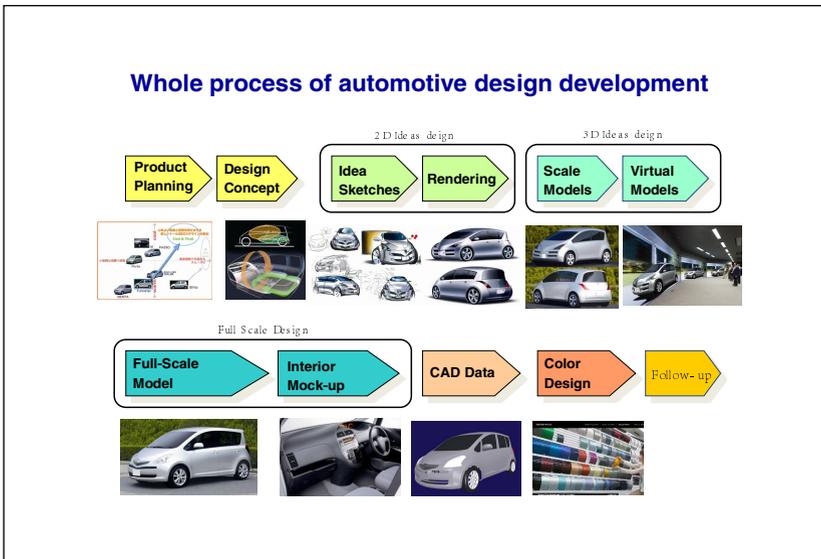


Fig. 1. Automotive Design Development Process

Looking at the current situation of user involvement in the process of vehicle development, as broadly described in the figure 1 above, there are several points to note in the process stages from upstream to downstream. First, one point we can mention in the upstream part of the process is market and consumer surveys to obtain

information required for the development of new models or updates to current models. The first checkpoint in avoiding failures in new car development is verifying facts such as whether the market exists for the model to be introduced, and what kind of current car users are going to want next. Therefore, market and user surveys are a must at the product planning stage, and the first step in user involvement is early-stage contact with potential and current users by staff involved in vehicle development.

Second, a typical example of user involvement in the midstream is the so-called "panel evaluation system", in which intermediate design results are evaluated by selected people ("panelists") who are not involved in product development. This system is widely used in the automotive industry. The panelists described here are sometimes employees from inside the company, though they are sometimes from outside the company. When in-house members perform evaluations, it is called "provisional user involvement in the evaluation process", and when outside participants perform evaluations, it is called "user involvement in the evaluation process." Finally, a typical example of user involvement in the downstream is the activity of asking actual users to evaluate a product after the product's launch. The primary objective in this case is to reflect the opinions and requests of users in related models or next-generation models. Another major objective is to verify if there is any difference between the results of the panel evaluation conducted during that particular model's development stage and the evaluations of customers post-launch. If a significant difference is discovered, it may indicate some problems and room for improvement in the methods used during the panel evaluation and in the design decision-making process. Starting from this problem awareness vantage, we studied and analyzed recent trends in user involvement, focusing on major Japanese manufacturers, in the upstream, midstream, and downstream stages of the automotive development process, while also taking into consideration the perspective of user experience, including human interfaces.

2 Upstream User Involvement in Design Development Evaluation

Assessing market needs and trends is essential when developing new cars or updates to current models, and is the first step in successful development. In-house research divisions have accumulated many years of survey data, which serve as a base for product planning, but they also perform surveys of target users for the vehicles they are developing. A typical method used is the FGI (Focus Group Interview). FGIs use specific methods to select, invite, and gather opinions from envisioned target users. Lively discussions, led by a moderator, are held, and users' awareness, latent needs, and desires are elicited. Concept panels and image sketches are shown in order to better express the vehicle concepts being developed, and determine trends in the design images users desire. What developers want to know is what future users desire, but, generally speaking, users are very familiar with the present situation, but cannot clearly express themselves regarding the future. For example, when discussing

keywords such as "advanced design," "originality," "sporty," or "luxury," users have a wide range of impressions and images, which are difficult to understand, both in terms of content and intensity. Therefore, actual photographs and images of automobiles or other products are used, to estimate content and intensity. The human interface method of evaluation can be used for this. Data can be obtained from a statistically significant number of study subjects, and threshold values and trends can be analyzed, the results being used in decision-making.

3 Midstream User Involvement in Design Development Evaluation

The midstream area is the most important part of "user involvement." A typical method used is the "panel evaluation" which this research has looked at. "Panel evaluation" is defined as below.¹

It is a frequently used evaluation method in the automotive industry. The people selected to take part in these evaluations are called "panelists." Panelists may come from within or outside the company. To distinguish between these, an evaluation process using panelists from outside the company is often called a "clinic" or a "product clinic." From here onward, "panel evaluation" will be used as a general term that includes "clinics"

3.1 The Panel Evaluation and Clinic Systems of Japanese Automobile Manufacturers

The Toyota Motor Corporation, a major manufacturer using panel evaluations, has at all times over 100 registered potential panelists in various departments within the company. Multiple evaluations are performed during the model design phase, linked to the project development process. These evaluation results are used as reference materials by the design decision meeting to select which models to commoditize.

The panelists come primarily from planning divisions such as the product planning, domestic planning, and overseas planning divisions. They have sufficient knowledge and capabilities to understand new car concepts, and, notably, are able to perform not only evaluations of present conditions, but also forward-looking evaluations. These panel evaluations are considered as reference information only, and the highest evaluated designs are not necessarily the ones that are ultimately selected.

On the other hand, the Nissan Motor Company used to have its own external, independent evaluation company, which it had perform evaluations. Evaluations were held by outside panelists from the general public, with a high degree of similarity to

¹ Panel evaluation" is a method which consists of obtaining evaluations of designs during the product design development phase from the standpoints of third parties who are not directly involved in development, verification of design value, and identification of latent and manifest negative points, in order ultimately to improve product value and customer satisfaction.

target users, but they tended to evaluate designs for cars to be released several years in the future based on their current knowledge and sensibilities. A great deal of money was spent on these evaluations, and a great deal of importance was placed on the results. However, in recent years, especially after the partnership with Renault, it is said that the panel evaluation system itself has almost fallen out of use.

Japanese manufacturers show a major tendency to position the results of panel evaluations and clinics as reference information only, and it is not uncommon for the ideas and models given the highest evaluations to be passed over in actual design decision-making. In particular, Toyota considers evaluation results (especially from outside clinics) to be nothing more than current user evaluations, and the company looks at evaluation trends, not clinging to the model with the most positive evaluations, but discussing the trends in a design committee looking two or three years into the future when making decisions. Decisions are not made by a small number of members, but through a greater consensus.

3.2 Problems with Current Panel Evaluations and Clinics

Prior research has discovered the following problems and challenges faced by the current panel evaluation and external clinic system. When looking at the results of panel evaluations, people are swayed by the scores assigned by panelists, and, depending on the composition of the discussion members, it may be impossible to freely express opinions. Many cases have been observed in which designs that were selected based on the results of panel evaluations and ultimately made into products were not properly verified for how they would be evaluated in the actual marketplace. That is, evaluations, selection processes, and judgments are not given proper verification. For some time, many companies used external clinics, but recently there have been many results which point to a lack of potential effectiveness in this approach, so we have heard that in recent years, Toyota has completely abandoned external clinics.

3.3 New Efforts by the Toyota Motor Corporation

The panel evaluation system has become an essential part of Toyota's decision-making process, with the system being repeatedly improved, but this has also had negative effects. One, for example, is that the company has shown a tendency to aim for the average. One aspect that has been pointed out is that there is a tacit panel evaluation 'pass' score for approval, and committee members (executives) participating in the design decision-making discussions are influenced by these scores.

This is why a new evaluation method was used for the "86" project, the first sports car design in some time for Toyota, and one which held a special place in the heart of the new president.

As Japan's automotive industry has matured and diversified, one sports car model after another has been discontinued. Toyota is no exception. Lagging sales resulted in models no longer being profitable, and, spurred by the prolonged recession, production was discontinued. For a time, Toyota had no sports car models. However, sports

cars have ardent fans, and popularity remained high for rare used sports cars and foreign cars. Young people are losing their interest in automobiles, and Toyota, in order to restore the allure and dream of cars, believed that it was important to propose new styles, which would pursue the "fun to drive" attraction of automobiles to its ultimate extreme, while at the same time responding to environmental and other demands of the day. They also believed that the key to the success of the sports car would be in creating new added value, such as by creating environments and opportunities that would provide greater joy to users. Toyota also had a history of famous FR sports cars that even today maintain an overwhelming level of popularity, such as the S800, the 2000GT, and the 86 (previous original model), and it heard the voices of those calling for these cars to be rolled out again.

In particular, since the launch of the original 86, users and various parts manufacturers have developed tuning parts and kept the 86 alive. Their efforts helped make the model a classic, and one of the few sports cars that is truly user-centric. The chief engineer decided to bestow the name of "86" on the newly developed sports car model, carrying on the spirit and history of the sports car.

The chief engineer decided to go back to basics and change the automotive design process from the ground up. His goals were twofold. "Creation of a car based not on numbers, but on pursuing the ultimate in fun," and "a level of individuality that creates strong opinions, both pro and con, instead of an automobile project based on internal consensus."

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Fig. 2. Previous Model 86



Fig. 3. New Model 86

The design department followed the chief engineer's lead, deciding to greatly overhaul their own design decision-making process. They were led by a belief that when developing a sports car, the standard consensus-driven decision-making process, in which the tastes and opinions of many people are reflected, would prevent the creation of individualistic designs, the achievement of the designers' ideals, and the production of a sports car that would enthrall fans. They decided to select "sports car panelists" for their internal panel evaluation, get feedback that closely reflected the opinions and tastes of customers, and make design decisions with a small number of people. They created a list of sports car drivers inside the company, had them give their evaluations of and comments regarding sketches and trial models, added them to the standard panelist evaluation results, and reported the results to the design deliberation committee. The model positively evaluated by this special panel differed completely from that selected by the standard panelist evaluation, and the scores of the two groups clearly diverged. In the end, the model (design) which was positively evaluated by the sports car panelists was selected as the production model, and, as hoped for, the car received a lot of buzz for its unique design.

The design decision-making processes used by Japanese automotive manufacturers such as Toyota was to present the results of panel evaluations using a seven point scale to executives at the design evaluation committee meetings, using them as reference data for decision making. Interviews with Toyota showed that although these evaluations were called 'references', in reality, depending on the model and type, there were implicit required threshold scores which had to be met for the vehicles to be approved.

Our latest interviews found that scores have not been reported in design evaluation committee meetings in the past few years (especially since the head of the design division changed), and that panel evaluation results are no longer reported as scores in official design evaluation committee meetings, instead, only opinions and comments from the evaluations are presented. Also, with the conversion of Lexus brand into an internal company (as Lexus International), deliberations are held independently, and decisions are made by small groups, with 10 or fewer executives in attendance. Compared to the past, when almost 50 related executives would attend, as well as the respective managers, and consensus would be sought within this large group, its current decision-making style has clearly shifted from the traditional Japanese model to a more Western model. Time has yet to tell whether this approach is appropriate, but

looking at the distinctive Toyota designs shown at recent motor shows, it is clear that tremendous changes are taking place.

4 Downstream User Involvement in Design Development Evaluation

Finally, an example of downstream user involvement is, as discussed earlier, asking users to evaluate a product after the product's launch. Generally speaking, this is performed between 6 months and a year after the product roll-out. The primary objective is to reflect the opinions and requests of users in related models or next-generation models, but, more importantly for design development, to verify if there is any difference between the results of the midstream panel evaluation for that model and the evaluations of customers post-launch. This type of evaluation is not being performed sufficiently, and there is a lack of objective verification of the effectiveness of the panel evaluation system, casting its reliability into question. There is therefore a need to create and use tools to achieve sufficient communication with users and as criteria for decision-making.

5 The Future

The panel evaluation system has a long historical accumulation of use in the automotive industry, but its effectiveness is beginning to be disputed. However, this does not mean that new, effective measures have been developed to replace the panel evaluation system in order to tackle the eternal challenge of error-free design decision-making. Nor could it be said that the current system has been perfected, with no room for improvement. Automotive design has traditionally focused on exterior design development, but user evaluations now encompass the entire user's experience, and it may be time to recognize the need for the implementation of more multidimensional perspectives in design evaluation itself. This is a new challenge for design management.

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