1. RESEARCH BACKGROUND

It is no exaggeration to say that the purpose of automotive design development is all about creating original designs that will attract consumers. 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 if slightly better than, those of their competitors. The challenges in design management are how to retain talented designers and how to create an environment that elicits designers’ full potential. However, even if managers 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 commodified 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. Since a new vehicle development requires huge investment, major manufacturers have been making efforts to improve the method and process of design evaluation and decision-making to eliminate errors. One of these methods is the “panel evaluation system.” In this system, at the several points of design development, a third party not involved with the development evaluates the intermediate development results, 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 its reception among customers. When this evaluation is performed by potential customers outside the company (target-users), it can be said that a kind of “user involvement in design evaluation” was accomplished.

2. HOW I ARRIVED AT THE IDEA FOR THIS RESEARCH

Looking at the current situation of user involvement in the whole process of vehicle development, 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. Because large amounts of development costs are incurred when developing new cars, a manufacturer must know whether the market exists for the model to be introduced, what kind of car current users are going to want next, and other things. Therefore, market and user surveys are must at the product planning stage so that the early-stage contact with potential and
current users by staffs responsible for the vehicle development can be called the first step in user involvement.

Second, a typical example of user involvement in the midstream is so called “panel evaluation system” that intermediate design results are evaluated by selected people (“panelists”) who do not touch on the product development. This system is widely used in the automobile industry. The panelists described here are sometimes invited from inside company (“in-house”) and sometimes from outside. Anyhow in case evaluations are conducted by participants from outside the company, it means that the “user involvement in the evaluation process” is achieved.

Finally, a typical example of user involvement in the downstream is the activity of asking 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 into related models or next-generation models. Another major objective is to see if there is any difference between the results of the panel evaluation conducted during that particular model’s development process and the evaluations of customers post-launch. If a significant difference is discovered, it may indicate some problems in the methods used during the panel evaluation, or that there is major room for improvement in the application of the results and the design decision-making process.

In this paper, I will examine a case study of midstream user involvement, the most important aspect of design decision-making.

3. PURPOSE OF THE RESEARCH

As a case study on midstream user involvement, which is regarded as the most essential element of decision-making for designs, I will present an example of research conducted during actual automotive design development through cooperation from a Japanese automaker (X Corporation). For this case study, I was given the opportunity to participate from the planning stages in the preparation and implementation of an in-house panel evaluation system for decision-making in the design development of a truck. I was given the opportunity to support the actual evaluations as well as the compilation of results and subsequent follow-up. X Corporation, in the development of previous designs commissioned by parent company Y Corporation, had prior experience in in-house panel evaluations (conducted within Y Corporation), but this marked its first attempt at conducting its own such evaluations on its own project. For this reason, the company conducted the evaluations itself following a process, starting by defining “what is a panel evaluation” and continuing to panelist selection, panelist training, trial and actual panel evaluations, compilation of evaluation results and follow-up. This provided an excellent opportunity to not only acquire know-how but also to work on the panel evaluation issues that had been detected in the prior research mentioned above.

4. CASE STUDY OF MIDSTREAM USER INVOLVEMENT IN DESIGN DEVELOPMENT

4.1 About X Corporation, the Subject of my Research

X Corporation, the subject of this case study, is one of the leading manufacturers in Japan that produces buses, trucks and other large vehicles. It is a subsidiary of Y Corporation, one of Japan’s major automakers. The company has a design department within its technological department, which develops designs for the company’s products and is sometimes commissioned by parent company Y Corporation to develop designs.

For this study, I participated from the planning stages in the preparation and implementation of an in-house panel evaluation system for decision-making in the design development of a truck. I was given the opportunity to support the actual evaluations as well as the compilation of results and subsequent follow-up. X Corporation, in the development of previous designs commissioned by parent company Y Corporation, had prior experience in in-house panel evaluations (conducted within Y Corporation), but this marked its first attempt at conducting its own such evaluations on its own project. For this reason, the company conducted the evaluations itself following a process, starting by defining “what is a panel evaluation” and continuing to panelist selection, panelist training, trial and actual panel evaluations, compilation of evaluation results and follow-up. This provided an excellent opportunity to not only acquire know-how but also to work on the panel evaluation issues that had been detected in the prior research mentioned above.

4.2 Definition of Panel Evaluation

In order to properly convey the essence of panel evaluations to the management of the design department at X Corporation for this evaluation, “panel evaluation” was defined in the following manner.

In the automotive industry, there is a widely-used method for evaluation (“panel evaluations”) of the deliverables for a design by persons who are non-parties to the product’s design development (“panelists”) who participate in evaluation midway through development. The panelists described here may come from inside or outside the company. To distinguish 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 the meaning of “clinic”).

In any case, “panel evaluations” are methods by which
a company receives evaluations of the deliverables of a design development from a third party’s perspective, then verifies the design’s value and points out potential and actual negative points, with the goal of increasing the product’s ultimate marketability and enhancing its reception among customers. Through careful survey and analysis of the evaluation results received, errors can be eliminated to the furthest extent possible, hopefully leading to more precise management decisions.

As an additional explanation of this definition, one important point to note is that these evaluations are the judgments of the panelists (the persons closer to actual users) at that point in time, and not judgments that fully consider future market trends, so there are various subjective aspects to their evaluations. Therefore, it was conveyed that the evaluation results should not be adopted wholesale, and should be used by management as a reference (indicator) during their decision-making. (In prior research, I indicated a case in which an American automaker had selected a final design based almost entirely on the evaluations of average people, resulting in an improper decision.)

4.3 About the Panel Evaluation Process

In automotive design development, each step of the screening process for selecting and determining ideas —step one (design selection), step two (design determination) and step three (design approval)— is conducted over a roughly three-month period. In many cases panel evaluation is also conducted before the screening for each step and applied to the decision-making in each step. (See Figure 1)

The deliverables presented to the panelists at each step include sketches, scale models, and full-sized models, which are shown in manner listed in Figure 1. In this case study, a 1/5 sketch, 1/2 model, and full-sized model were used, with panel evaluation conducted at each step.

4.4 Issues in the Current Style of Panel Evaluation as Determined in Prior Research

Here I will summarize the issues and challenges in panel evaluation as clarified in prior research.

4.4.1 Panelist Selection

In many cases, the selection of panelists is limited to the extremely narrow range (of positions) within the company, which leads to bias in evaluations and opinions and hinders the ability to make a proper judgment. Individual discrepancies in panelists’ abilities and qualifications also end up affecting judgments.

4.4.2 Panelist Training

Often the selected panelists are asked to simply make evaluations without having received proper training or explanation, which is a major cause of variations in evaluations.

4.4.3 Panel Evaluation Standards

For evaluation standards, general point tabulation methods are the norm, and we have seen many cases in which the points take on lives of their own. Particularly on five- or ten-point scales, points are often intuitively assigned, leading to frequent instances of point totals being concentrated in the averages, and making it difficult to understand how the quality of a design was determined.

4.4.4 Methods for Application of Evaluation Results

In many cases evaluation results are not handled in a predetermined manner. We have seen panelists’ evaluation results simply being accepted as-is in selection of design ideas, or being intentionally manipulated.

4.4.5 Verification of Divergence from Actual Customer Evaluations

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. Namely, there were many cases in which the evaluation and selection processes and the appropriateness of the judgment were not properly verified, which do not lead to improvements in the system of panel evaluation.

4.5 Efforts toward Improvement in the Panel Evaluation System in this Case Study

Panelist Selection In order to resolve the issues and challenges listed above, the following efforts were made when conducting this panel evaluation.
4.5.1 Panelist Selection

To prevent bias in opinions and to ensure a certain level of parameters, panelists were selected from a wide variety of positions within the company, including positions both directly and indirectly involved with the design development and positions not involved with the development but closer to the end user. Selections were made from the following departments:

Product planning, domestic planning, overseas planning, departments handling export countries (China, North America, Central and South America, Australia and Asia, Middle East), domestic sales, product development, body design, electronic design, vehicle testing, and design.

The system was arranged so that more than 100 panelists were registered and continuous participation of at least 80 panelists (a parameter) was ensured in an effort to increase the reliability of the evaluations.

4.5.2 Panelist Training

When panelists closer to the general users are selected to conduct the panel evaluation, there may be a significance in that evaluation can be conducted without any prejudice, but this method carries the risk of producing a failure like that of the Ford Edsel. Therefore, we conducted a simulation in which we used photos of models and actual sketches selected from bus designs released in the past that had received high evaluations in the marketplace to verify the evaluation capabilities and the qualifications of the panelist candidates. As a result, the design evaluation results by the panelists selected this time were almost identical to the evaluations in the market for buses, meaning that the reliability of these panelists could be verified to a certain extent.

4.5.3 Panel Evaluation Standards

For the evaluation scores used by panelists, a seven-step scoring method frequently used in sensory evaluation was adopted. This method is used by those who evaluate the flavor and other qualities of foods, and it gives panelists three degrees of both good and bad from the center. (See Figure 2)

For this case study, the following evaluation standards shown in Figure 3 and Figure 4 were established to adapt the method to automotive design.

These standard settings made evaluation easier in the opinion of most panelists. I was able to verify that giving specific explanations and setting supplementary evaluation standards based on the matters to be evaluated in this manner is very effective.

4.5.4 Application Method for Evaluation Results

I strongly advised that the company take the evaluation results as nothing more than opinions for reference and make the final decisions in discussions among management, rather than using the method often seen in American automakers in which evaluation results are simply imported directly into the design selection. This means that depending on the time and the circumstances, even designs with low panel evaluation results may be selected.
In other words, I indicated the importance of the management’s judgment on the possibility and promise of a design idea, rather than simply relying on the panel evaluation results. In this case study, the management’s decision ultimately conformed almost entirely to the panelists’ evaluation results. However, the process leading up to this included judgments made with the full consideration of opinions from the planning, technical, and marketing departments, so I have judged the decision-making to be appropriate.

4.5.5 Verification of Divergence from Actual Customer Evaluations

The vehicle in this project went on sale last autumn and has been well-received. In the near future, I plan to ask the panelists who evaluated it during its development to evaluate it in comparison with competing models for purposes of verification, and to look for divergences in evaluations post-release and during development.

5. CONCLUSIONS AND FUTURE FOLLOW-UP

Thanks to the effective application of the newly-adopted panel evaluation system, the decision-making for the design in this project was precisely executed at each step in the process, with design department managers praising the system as a form near the ideal for the future direction of the development process. However, to further improve the accuracy of the methodology, I will need to verify the discrepancies between the panel evaluation results and the evaluation results in the marketplace after this vehicle is released. To this end, I believe the following strategies are required.

5.1 Feedback to Panelists

Regarding the panel evaluation results and the design idea selected based on those results, I will report on the subsequent development process to the panelists, giving them a fresh recognition of the importance of panel evaluation in decision-making and also sharing the issues that became apparent in this study.

In addition, I would like to further improve the reliability of evaluations and give them significance that they are effective as matters of consideration in management decisions by verifying divergences in development and post-release evaluations as mentioned above.

I will give a talk on the latest design trends in Trucks, buses and other vehicles, using photographs from major motor shows around the world, in an attempt to increase their interest in design and enhance their awareness that they will continue to play a vital role as members of an evaluation panel.

5.2 Next Design Development Schedule and Plan for Conducting Panel Evaluation

I will clarify the issues and challenges from this panel evaluation and lay out a course and a plan for how to improve these points in the next design development project.

It is to be expected that panelists may change their positions in the company from the time of this panel evaluation, so in the event that new panelists will have to be registered, I will replace them and train the new panelists. (I will also readjust the balance of panelists from various departments and so on.)

5.3 Detailed Analysis of Panelists in This Study

I will carefully analyze the evaluations of each panelist to detect panelists who gave abnormal values, trends among departments, and so on.

I will analyze disparities among genders and age groups and other trends for some projects.

I will analyze evaluation trends by the evaluated parts of the vehicle if necessary.

5.4 Debate over Use of Outside Panelists

I will confirm the existence of discrepancies through comparison of in-house panel evaluations and product evaluations conducted after release, and if judged to be necessary I will consider the use of outside panelists.

I am considering selecting around 20 individuals from among the staffs of major dealers or major users as candidates.

I would like to use and verify these research results in various future projects and work to build an even more reliable evaluation system.
REFERENCES


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