

A COMPARISON STUDY ON THE USE OF REVIEW PANEL EVALUATIONS FOR DECISION-MAKING IN VEHICLE DESIGN BY JAPANESE, EUROPEAN AND U.S. AUTOMAKERS

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ABSTRACT

As consumer products have become increasingly diversified, new product categories are emerging, and existing ones are either expanding or consolidating with others. In the midst of these ongoing sweeping changes, combined with growing competition in the global market, consumer products companies find it critically important to develop and successfully launch creative and innovative products in the market on a timely basis. This makes it even more important for manufacturers to make a timely and speedy decision about industrial design to be applied to new products. That said, a significant part of the design development process is carried out in the creative minds of industrial designers, and only a small part of it is apparent to visual observation, as compared to a more visible manufacturing process. Therefore, the decision-making for evaluating and selecting the visible part of a design process is all the more important.

Decision-making about industrial design is affected significantly by the design-evaluation system, the organizational structure and functions of an in-house design unit, its positioning in the corporate structure, and its areas of responsibilities, among others. In this study, we look into how major Japanese, European and U.S. automakers conduct formal review panel evaluations—asking parties not directly involved in vehicle development to review and evaluate proposed vehicle designs—and how they act upon the results, to identify patterns and differences among them.

Keywords: *Design Management, Panel Evaluation, User Involvement*

1. STUDY BACKGROUND

When you look at the auto industry, you see that automakers organize their product development processes in a fairly elaborate fashion, as they normally involve making substantial R&D investments and cover an extended period of time. These processes are usually carried out as part of a major project in which the role of each division and affiliated company is clearly defined. Therefore, except in small ad hoc development projects, the product development processes of automakers are not designed to be able to adapt flexibly to changes in the market.

Nevertheless, automakers are under constant pressure to make timely and speedy decisions about the industrial design to be applied to new vehicle models. In reality, however, we found in an earlier study [1] that automakers have established neither qualitative and quantitative criteria nor standardized models for decision-making with regard to industrial design—each company has its own design management policy and system.

Decision-making with regard to industrial design is affected significantly by the design evaluation system, the organizational structure and functions of an in-house design unit, its positioning in the corporate structure, and its areas of responsibilities, among other factors. In this study, we look into systems, processes and methods that major Japanese, European and U.S. automakers use for their decision-making with regard to auto designs, and to identify patterns and differences among them. In particular, we look closely at how these automakers organize and conduct review panel evaluations*—considered critical to design review processes—and what they attempt to gain from the evaluations. We also determine whether conducting review panel evaluations make good business sense for automakers.

*A type of formal design evaluation system employed by many automakers in which parties not directly involved in product development (“panelists”) are asked to make an evaluation of a proposed design (“review panel evaluation”) at several stages during vehicle development. Panelists are recruited from either within or outside a company; a design evaluation made by people outside a company is more commonly referred to as a clinic or a product clinic, as opposed to a peer review. For the purpose of this study, a review panel evaluation includes a peer review and a clinic.

2. STUDY PROCEDURES AND FIELD OF COMPARISON

First, as a baseline model, we chose a few leading Japanese automakers to look into the vehicle and design development processes that their industrial design units follow. Second, we shed light on what systems, processes, and methods these automakers apply to decision-making in industrial designing, with a focus on the use of review panel evaluation. And third, we used Japanese automakers’ practices as a basis against which to compare those of European and U.S. automakers.

Three years of research into and interviews with European and U.S. automakers resulted in two of our previous studies—“Study of Decision-making in Product Design” and “Differences of Design Decision on Product Design Development through Comparative Research on Japanese, European and American Automobile Industries” [2] [3] —both of which provided basic data concerning European and U.S. automakers for this study.

For this study, we also interviewed design managers and other personnel at the following automakers: Toyota Motor Corporation and its group companies (Daihatsu Motor Co., Ltd., Hino Motors, Ltd.), Nissan Motor Co., Ltd. and Renault; Mazda Motor Corporation; Suzuki Motor Corporation; Hyundai Motor Company; Volvo; Daimler; and Peugeot.

During our research for this study, we referred to data compiled by 14 market research companies – five in Japan, six in Europe and three in the United States.

In this study, we have focused on comparison among Japanese, European and U.S. automakers primarily regarding: (1) the design evaluation systems they use for design processes; (2) their design development cycles; and (3) functions, organizational structures and positioning, and responsible business areas defined for their in-house industrial design units.

3. DESIGN PROCESS AND EVALUATION SYSTEM INCLUDING THE USE OF REVIEW PANEL EVALUATIONS

3.1. Design Processes and Evaluation Systems Adopted by Leading Japanese Automakers

3.1.1 Design Processes

We prepared as a baseline model graphical representations of the standard procedure used for vehicle development (Fig. 1) and the standard process for design development (Fig. 2) that a leading Japanese automaker follows, and compared them for analysis with design processes that European and U.S. automakers follow. We also ascertained what process and management insight play an important role in decision-making regarding automotive design.

These two diagrams indicate how the automaker arrives at a final design by using a series of peer reviews to narrow down a variety of proposed designs; using external clinics to confirm the validity of decision-making; and using results obtained from internal and external design reviews to arrive at a final decision.

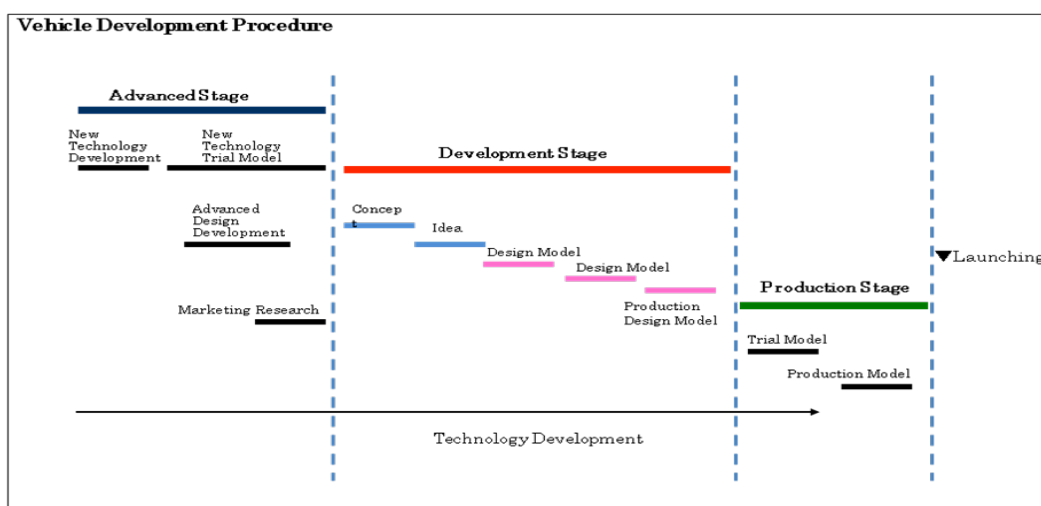


Figure 1: Standard Procedure for Vehicle Development

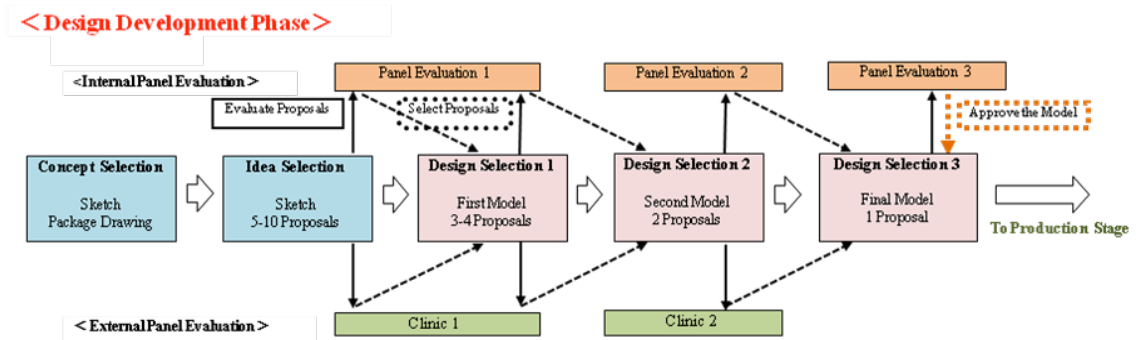


Figure 2: Standard Process for Design Development

3.1.2 Types, Roles and Expected Benefits of Review Panel Evaluations Conducted by Japanese Automakers

The decision-making process that many Japanese, European and U.S. automakers—with a few exceptions—follow for product design development usually comprises three distinct phases: a concept selection phase, a proposal selection phase (two- and three-dimensional product design), and a final design selection phase. The process involves people of varying responsibilities and interests, from product design managers to top management, throughout the process. One of our earlier studies [4] found that while in European and U.S. companies vehicle design is finalized by a relatively small number of decision-makers, Toyota and other Japanese companies, with the exception of foreign-owned companies operating in Japan, adopt a collegial system for decision-making regarding automobile design, in which members from relevant departments, including the product planning department, the sales department, and the engineering department, are asked to participate in a series of meetings to build a consensus among themselves. In this approach, not only product designs but also problems and issues associated with them are addressed and solved through a series of decision-making meetings. This enables participants to resolve, at one stroke, complex engineering and cost issues arising from conflicts with the proposed design, ensuring timely and appropriate decision-making.

- a) **Role that Review Panel Evaluation Plays during Concept Selection Phase**
 During a typical review panel evaluation that Japanese automakers conduct during the concept selection phase, four or five different designs proposals are presented to panelists chosen internally, using sketches, scale models and/or full-size mock-ups, for review and feedback on the direction of product styles and designs. Additional evaluation criteria may be added to a standard set of criteria as needed, or different sets of criteria may be used for different types of vehicle. The purpose of a review panel evaluation in this phase is to solicit from panelists information that can be used primarily to determine the general direction that vehicle designs should take.
- b) **Role that Review Panel Evaluation Plays during Proposal Selection Phase**
 During the proposal selection phase, two full-size mock-ups of proposed designs are normally presented to external panelists for review, and one of them is chosen as the candidate for the final design, based on results of the evaluation. As the evaluation is also used to assess which design is more likely to result in a marketable vehicle,

panelists are asked to give the rationale behind the ratings they give to the proposed designs. This phase is considered an important step toward selecting a single final design.

c) Role that Review Panel Evaluation Plays during Final Design Selection Phase

As the candidate for final design has been chosen in the preceding phase, a review panel evaluation during this phase is conducted generally to confirm the validity of that choice by looking at the quality of the proposed design, that is, determining whether it retains the design concept approved in the previous phase and whether it is likely to result in a marketable vehicle. Results of the evaluation are taken seriously in this respect.

3.1.3 Japanese Automakers' Use of the Review Panel Evaluation System and its Impact on Decision-making [5]

- a) Case 1: One Japanese automaker has a pool of more than 100 registered panelists selected from relevant departments in the company. These panelists are asked to make multiple evaluations of proposed designs during the course of a vehicle development project, the results of which are used as secondary information in choosing the final design to be incorporated into a production model by decision-makers. Panelists are chosen primarily from staff in planning departments, such as the product planning department, domestic projects department, and overseas projects department, who are considered to have a deep understanding of the concepts behind the proposed vehicles and to be good at making near-future-looking assessments beyond the current frame of perspective.

The results of a clinic are of secondary importance in design selection, and a proposed design that is rated highest in a clinic is not always chosen as the final design.

- b) Case 2: Another Japanese automaker contracts with an independent third-party to conduct design evaluations. The contractor recruits panelists from among the public that are representative of the demographic characteristics of the owners of the automaker's vehicles; these panelists tend to stick to their current frame of perspective when making design evaluations. The company appears to place a relatively high weight on these evaluation results due to their cost-effectiveness, among other factors.

3.1.4 Japanese Automakers Use Evaluation Results as Secondary Information for Decision-making

For the most part, Japanese automakers use results of review panel evaluations and clinics as no more than secondary information. They often deliberately remove from further consideration proposed designs rated highest among panelists when making design decisions. One Japanese automaker considers evaluation results, especially those from external clinics, simply reflective of vehicle owners' current frames of perspective; identifying a trend from overall evaluation results, members of its design assessment committee discuss and choose a design that best illustrates the two-to-three-year future direction of vehicle design in a collegial decision-making manner.

3.2. Design Processes and Evaluation Systems Most Commonly Adopted by European Automakers

3.2.1 Design Processes

European automakers use design processes quite similar to those of Japanese automakers, with the exception of the length of development cycle and the use of a clinic. We will discuss the development cycle in Section 4. Many European automakers use external clinics more commonly than peer reviews, primarily to confirm that an almost-finalized design is the right choice.

3.2.2 Types, Roles and Expected Benefits of Review Panel Evaluations Conducted by European Automakers

Unlike their Japanese counterparts, few European automakers use peer review panels to evaluate proposed car designs; instead they recruit current owners of their vehicles and those of their competitors as panelists to evaluate designs near a final stage of design development. A final decision on design is often made by a small number of people in upper management.

3.2.3 European Automakers' Use of Review Panel Evaluation Systems and its Impact on Decision-making

While many automakers of European nationality now utilize a clinic system originally developed by their U.S. counterparts, these European automakers make decisions about product development based primarily on their own product development philosophies and brand values. Therefore, they use clinics mainly to identify unknown issues.

3.2.4 European Automakers' Decision-making Practices

European automakers' design decisions are often made by a small number of senior executives, with evaluation results relegated to a secondary role in identifying and tracking unknown issues associated with their brand values and designs. In other words, European automakers ensure first and foremost adherence to their branding guidelines, based on which chief industrial designers and chief design officers are responsible for evaluating and refining proposed designs.

3.3. Author Design Processes and Evaluation Systems Most Commonly Adopted by U.S. Automakers

3.3.1 Design Processes

As Japanese automakers follow the design process originally developed by U.S. automakers, naturally a basic similarity is found in design processes and techniques among automakers on both sides of the Pacific. However, a distinct difference has emerged between the two processes in recent years as Japanese automakers have continuously refined those originated in the United States. Specifically, design mock-ups that U.S. automakers present to panelists for review lack the level of detail that are normally found in those prepared by Japanese automakers. This is simply because U.S. automakers include just enough design details on mock-ups to verify their overall design aesthetic, and do not see any need to make them look like real cars, which affects the reliability of results obtained from a review panel evaluation.

3.3.2 Types, Roles and Expected Benefits of Review Panel Evaluations Conducted by U.S. Automakers

U.S. automakers primarily conduct external review panel evaluations, which are referred to as product clinics or focus group interviews (FGI), using evaluation methods that have been standardized. Moreover, a large number of car owners are asked to participate in and share their opinions in a single clinic, the results of which significantly affect the selection of a final design.

3.3.3 U.S. Automakers' Use of Review Panel Evaluation Systems and its Impact on Decision-making

Many U.S. automakers have been using the product clinic system since the early postwar years, and a clinic has become an integral part of their design development process. They value its results so highly that a proposed design that receives the highest score in a clinic usually finds its way into a production model. In this approach, a more basic, less edgy design is often chosen, which may make it difficult to determine who is to blame when a vehicle of the chosen design sells poorly or who should take credit when it sells well. It is worth mentioning that U.S. automakers place a much higher priority on being successful in the domestic market than on being successful overseas, while their Japanese and European counterparts attempt to generate substantial sales outside their domestic markets.

3.3.4 Most U.S. Automakers Rely on Evaluation Results for Decision-making

U.S. automakers conduct review panel evaluations, large-scale product clinics in particular, and rely on their results for decision-making whenever they develop new vehicles. They recruit as panelists for a clinic current owners of a vehicle model for which a new version is being developed, as well as owners of competitive vehicle models; automakers ask panelists to rate proposed designs presented as sketches and mock-ups, and solicit their detailed opinions through an FGI session to identify what is good and what is not about the designs; and the feedback is used to refine and improve the designs. This approach appears to be practical and valid; the problem with it, however, is that panelists often voice their opinions from their current set of perspectives, rather than from forward-thinking perspectives. U.S. automakers are willing to overlook this apparent shortcoming when making decisions, which may largely explain why the clinic system is not working in the U.S. auto industry. The thing is: "a prospective car buyer may have a positive impression of a car of a certain design presented in a focus group, but may actually buy a completely different one. What results of a clinic reveals is simply prospective buyers' preferences in car design at the time the clinic is conducted, which may change by the time they make purchase decisions." (Norihiro Kawaoka. *Nikkei Design.*) [6]

While Japanese automakers take a consensus-building approach to decision-making among all parties concerned, U.S. automakers heavily rely on results obtained from clinics for decision-making about vehicle design. They have built a transparent decision-making system for design by having in place elaborate guidelines and manuals for it. This is partly because the United States is a nation of immigrants of diverse values and beliefs, and there is a valid need to reduce dependence on individuals' skills and expertise in decision-making. They use findings from extensive market researches to make design decisions in an effort to ensure transparency of the process.

4. DESIGN DEVELOPMENT CYCLE

In this section, we briefly look at different design development cycles set by Japanese, European and U.S. automakers as they affect, as much as a design process does, how decisions are made regarding design development.

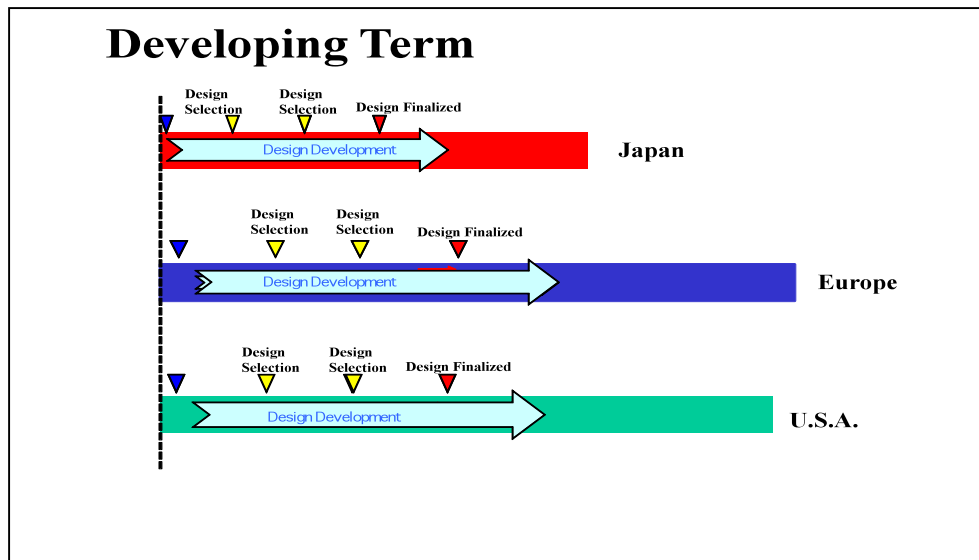


Figure 3: Comparison of Development Cycles

4.1. Design Development Cycle Set by Japanese Automakers

The use of sophisticated CAD and VR technologies has helped Japanese automakers shorten the cycle of product development, including design development, year after year. In a fierce race to develop new vehicles, they have also dramatically reduced the lead time between finalizing vehicle design details and beginning production. A shorter development cycle enables them to reduce the likelihood of a mismatch between how review panelists react to a proposed design under development and how buyers react to a new car of that design when it is introduced in the market.

4.2. Design Development Cycle Set by European Automakers

The design development cycle of leading European automakers is longer than that of Japanese automakers. Our earlier study showed that they spend six to twelve months more in design development than their Japanese counterparts, although they have been attempting to shorten the cycle in recent years. European automakers, particularly U.S.-owned European automakers, use external product clinics extensively, building them firmly into the decision-making process for vehicle design. A series of panel reviews need to be conducted at various stages during a long development cycle to ensure that a chosen design will stand the test of the market.

4.3. Design Development Cycle Set by U.S. Automakers

U.S. automakers spend more time developing car designs than Japanese automakers, but less time than European automakers. They have built the use of external clinics into their design development processes for years and have been systematically using evaluation results, which are accountable to shareholders and other third parties, for decision-making about vehicle design. Taking a “no-questions-asked” approach to a clinic of an established

format may have trapped U.S. automakers into having blind faith in its benefits, with nobody bothering to try to assess the system’s effectiveness. This may partly explain why U.S. automakers are having such a hard time bringing out attractive cars that strike a chord in the car-buying public.

5. FUNCTIONS AND ORGANIZATIONAL STRUCTURES AND POSITIONING DEFINED FOR IN-HOUSE INDUSTRIAL DESIGN UNITS

It is important to factor in how an in-house industrial design unit fits into the corporate structure of an automaker when one looks at the company’s decision-making process and use of review panel evaluations for developing vehicle designs.

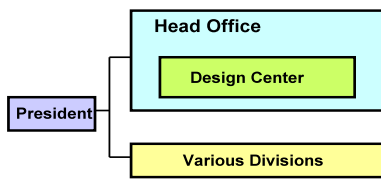


Figure 4: Organizational Structure Type A

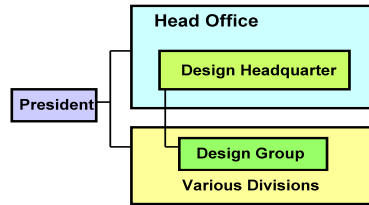


Figure 5: Organizational Structure Type B

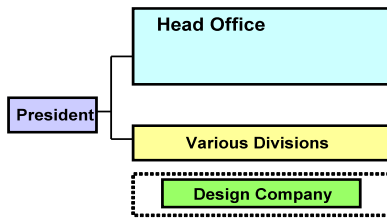


Figure 6: Organizational Structure Type C

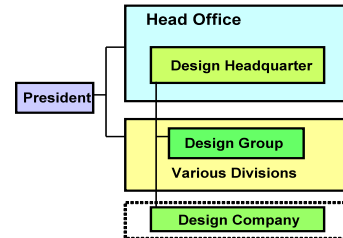


Figure 7: Organizational Structure Type D

In our earlier study [7], we identified four distinct types of organizational structure for a design unit and discussed differences among them. In this section, we discuss how decisions are made in each type of organizational structure.

5.1. Organizational Structure Type A-Central Control #1 (Fig. 4)

In a Type A structure, an in-house design unit is part of either the engineering division or the product planning division at company headquarters, and reports directly to the president or executive vice president of the company. Most automakers adopt this type of structure. As the design unit is closely related to the engineering and product planning divisions, and is perceived as an important unit by those outside the company, it is for the most part capable of prompt and accurate decision-making. On the other hand, the engineering and product

planning divisions tend to have a larger say, and this may create conflict with the sales division.

As, in this structure, the design unit has a close working relationship with the product planning and sales divisions, it is relatively easy for the unit to recruit staff members from those divisions as panelists for peer design reviews; moreover, these staff members are more knowledgeable about the auto market and are more keenly aware of the market trend than end-user panelists. The downside is that they tend to put their divisions' own interests ahead of others. Type A is commonly seen in many Japanese consumer products companies.

5.2. Organizational Structure Type B–Central Control #2 (Fig. 5)

In a Type B structure, often seen in consumer electronics makers, a company's headquarters and business divisions have their own design units; the one at company headquarters is managed by a chief design officer and is responsible for centrally managing the company's brand strategy and design philosophy as well as product designing conducted by a design unit in each business division. The downside is that the corporate design unit often exercises more power and influence than divisional design units.

In this structure, the extent of the use of review panel evaluations markedly varies from one business division to another; an external clinic is conducted to evaluate acceptance of user interfaces as needed.

5.3. Organizational Structure Type C– Diversified Integration #2 (Fig. 6)

In a Type C structure, the design unit is completely independent of a company's headquarters and business divisions, and is often managed by an executive or a general manager in charge of headquarters functions. Many companies in various industries have this type of structure in place.

The design unit in this structure is allowed to remain autonomous and proactive to a greater degree and act like an independent design firm. The downside is that staff members of this unit may feel isolated from those in the product planning and engineering divisions, and find it difficult to work with them.

5.4. Organizational Structure Type D–Diversified Integration #2 (Fig. 7)

A Type D structure looks similar to Type C in that the design unit is independent of a company's headquarters and business divisions. The key difference between them is that the design unit in a Type D structure is loosely linked to the corporate design headquarters, which manages the company's brand strategy and design philosophy. Type D is an extension of Type C, with the latter's inherent shortcomings removed, and is adopted by consumer electronics companies.

In Type C and D structures, design units often contract an external research company to conduct review panel evaluations.

6. SUMMARY

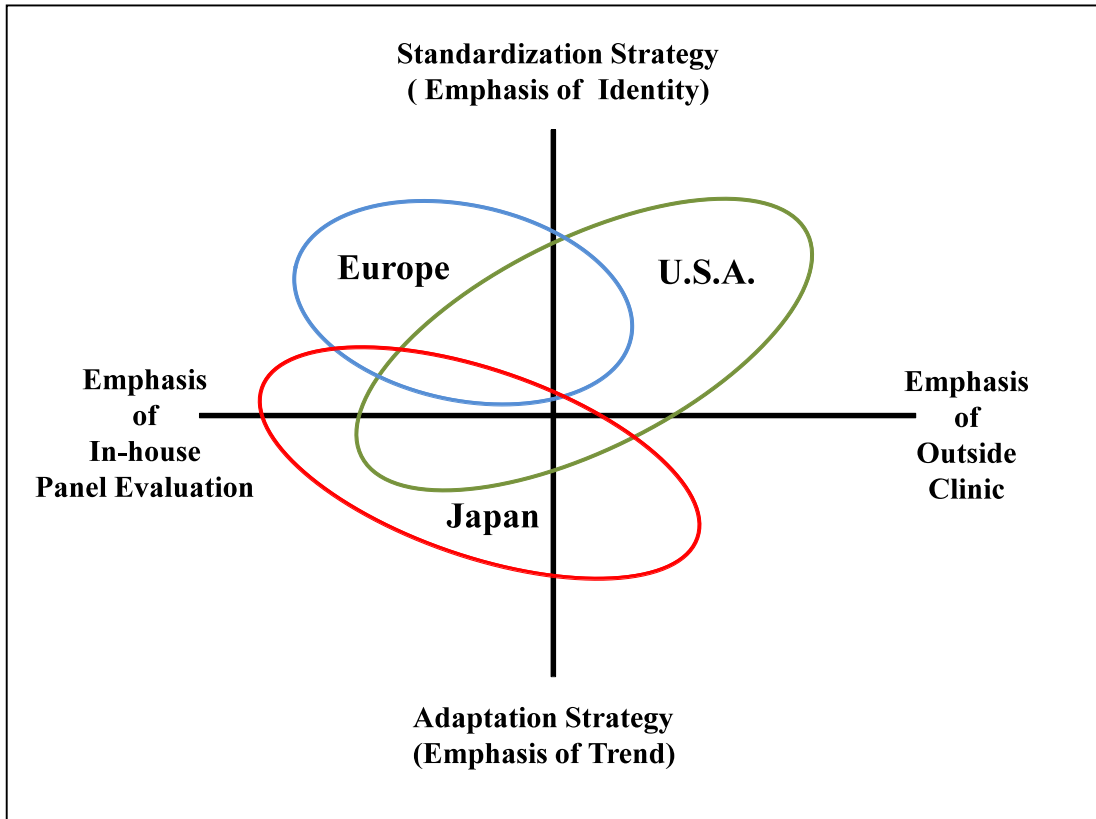


Figure 8: Positioning Map for Decision-Making Initiatives for Vehicle Design Review

As an automaker commits major management resources to developing a new car and its design, its commercial failure could be a fatal threat to the business continuity of the company; thus, there should be no room for failure. For this reason, senior management of an automaker has high expectations of its industrial design unit and shows a keen interest in the unit, which is responsible for creating designs that can either make or break the sales of a new car—arguably more than designs affect the sales of other consumer products. Whether a chosen design will be well received in the market is, therefore, the major concern of automaker executives, who are tempted to gauge the level of acceptance of a given design as accurately as reasonably possible before it is incorporated into a production model. That is where a review panel evaluation system comes in. But, seen from the perspective of institutionalizing user participation in car development to ensure greater customer satisfaction with an automaker's products and services, there should be a greater variety of review systems other than the widely used panel reviews. We hope that automakers will refine current panel review systems and come up with something better that will help them achieve enhanced customer satisfaction.

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