Technical Route of Consumer Research in Automobile Planning Process

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Abstract

This paper expounds the technical route of consumer research at different stages of the automobile planning process. Consumer research can play a role in the four stages of the automobile planning process: concept research, definition research, pre-market diagnosis and post-market verification, to carry out three technical studies on the definition of consumer groups, the clarity of consumer group characteristics and portraits, and the requirements for vehicle usage scenarios.

Keywords

Consumer Research; Automobile Planning Process; Technical Route.

1. Concept Definition

In the model planning of automobile enterprises, in addition to model product genealogy and product combination, user research is an increasingly important consideration. Whether automobile enterprises can do a good job in user research or not, it plays an increasingly important role in the success or failure of model planning.

From macro to micro, user research can be divided into user positioning, feature portrait and scenario requirement, etc. [1]. User positioning is to delineate the user group, the feature portrait is to further define the features and portrait of the target user group, and the scenario requirement is to tap into the needs of the target user in different car usage scenarios.
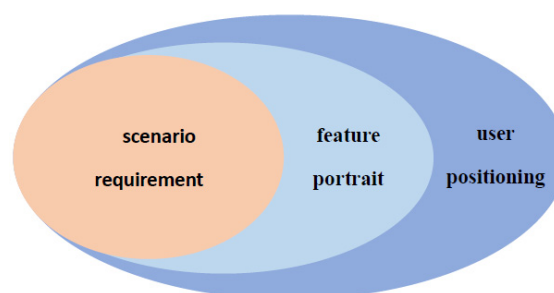

Fig 1. User research diagram

According to the whole life cycle process of car model development, the model planning of automobile enterprises can be divided into four stages: concept definition, product definition, product pre-market testing, and product post-market research. The pre-concept definition stage includes the market opportunity definition and product concept strategy; the product definition stage is to make the development level of product indicators and benchmarking models clear; the pre-market testing stage is various user tests from the product's development and trial production to the appear on the market, including picture model, hard model, sludge model and real vehicle test; the post-market research stage is user research on market after the model appears on the market.
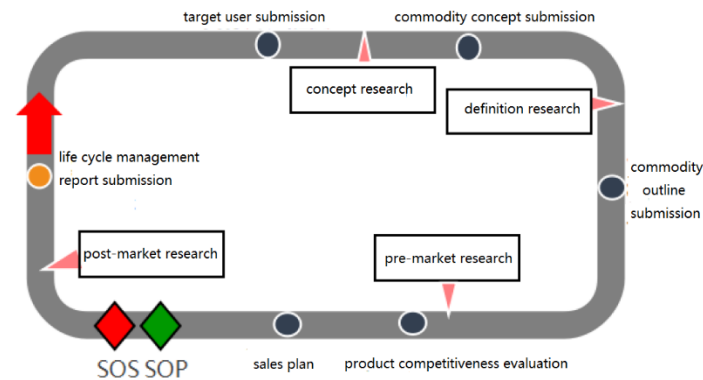
Fig 2. The whole life process cycle of model planning of automobile enterprises

There are different contents in user research has, the emphasis of user research has different technical routes at different stages of model planning. The technical routes here are the contents, steps, methods, and key issues that automobile enterprises focus on in user research during the process of model planning.

2. User Research in the Concept Research Stage

2.1. The Contents and Ideas of the Concept Research Stage

The concept research stage is in the early stage of the model planning process, and can be subdivided into pre-concept research and concept research. The pre-concept research is at the forefront of all processes in the overall planning process, and the success or failure of its research determines the ultimate fate of the product. Concept research is at the stage of model development, which determines the direction of the product, makes the positioning of this product from competing products clear, and forms effective differentiation competition in the market. The main task of the pre-concept research stage is two aspects: make market trends and opportunities clear, and make product strategies. The overall idea is to first determine the target market and make its product positioning and competitive strategy based on market trends and opportunity analysis, and then combine the research on competing products in the target market and the needs of target users, form product concepts and carry out verification and optimization.

2.2. Technical Routes of User Research in Concept Research

From the perspective of user research, pre-concept research corresponds to the selection and determination of target users, and concept research corresponds to submitting product concepts by understanding and tapping into user requirements. They correspond to the target user submission and product concept submission two nodes of in the model planning process, respectively.

In the judgment of market trends and opportunities, from the analysis of the macro market environment, market size and trends, and the competitive landscape of the market segments, we can determine the market segments and directions with opportunities. The role of user research is to find market group with opportunities, and to define the group as a whole, namely delineate the target user group.

After the market feasibility analysis, it is necessary to make product strategies to solve the problem of which target markets the product competes in and how to compete against the target market, it is developed from the four dimensions: market positioning, competitive positioning, crowd positioning, and price positioning, solve the positioning and segmentation of the product in the target market and within the enterprise, etc. The crowd positioning is to

define the delineated target users, focuses on grasping their requirement points from three aspects: function, emotion, and spirit.

First, the concept formation makes the definition of the "concept" clear, according to marketing theory, the product concept consists of three parts: consumer viewpoint, interest point, and support point, consumer viewpoint is related issues raised from the perspective of consumers, namely what are user requirements; the interest point explains what advantages the product can provide to consumers, namely what is the USP selling point of the product; the support point explains how the product solves the problems raised in the consumer's viewpoint, namely the features of the commodity. In specific analysis, the product concept is divided into three levels: emotional concept, model concept and product attribute concept, whether it is concept formation or verification, test should be carried out based on these three levels. The emotional concept describes the concept of the model's external communication; the vehicle concept is the major product concept of the model, describes the unique selling point of the model in comparison with competing products; the product attribute concept is to support the various features and functions of the product. Moreover, the three levels of the concept also correspond to the three attributes: product dependency attribute, form attribute and functional attribute. Dependency attribute is the additional sign and symbolic meaning of the product, corresponding to the emotional concept; the form attribute describes what the product looks like, corresponding to the commodity concept; the functional attribute of the product is the product functional feature, corresponding to the concept of the commodity attribute.

3. User Research in the Product Definition Stage

3.1. The Contents and Ideas of Product Definition

The product definition is at the stage after the model concept is submitted. It is the relevant definition of the physical attributes that support the product concept. Its content is to carry out definition of development level and benchmarking models for product index.

The main ideas are as follows: first, according to the catalog system of product index, determine the indexes to be defined at all levels;

Then conduct the research on user attention and user evaluations of existing models on product indexes, obtain user attention on product indexes and user evaluations of existing model indexes;

The priority of product index development can be obtained from the user index attention, and the development urgency of product indexes and model banding can be obtained from the evaluation of existing model indexes;
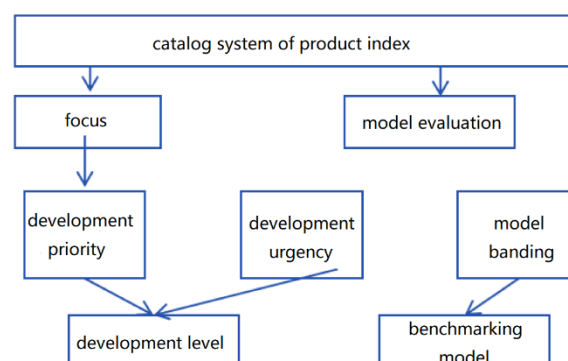

Fig 3. The ideas of product definition

Finally, combine development priority and development urgency of product indexes, as well as the model strategies of automobile enterprises, jointly determine the development target of product indexes; moreover, select the benchmarking model from the model banding.

Finally, the whole product definition should output the development level and benchmarking models of product indexes.

3.2. Technical Routes of Product Definition

3.2.1. In the Determination of the Development Level of Product Indexes

The first is to carry out preliminary division from the user's attention to product indexes and the evaluation of existing models. That is to carry out IPA model research on product indexes, make the user's attention of various indexes and the satisfaction with the performance of existing models.

Moreover, according to the discrete situation of the user's evaluation of the existing model index satisfaction, the model index satisfaction is optimized, finally, the model index development level is divided into four directions: T=transcend, L=lead, A=average, and B=basic.

The above two steps are to determine the development level of product indexes from the two aspects: user requirement and user satisfaction evaluation of existing models, and are defined from the perspective of user requirements.

3.2.2. In the Process of Determining the Benchmarking Models of Product Indexes

The benchmarking model of product index is determined from the significance analysis of the user's satisfaction evaluation for the existing model. According to the significant judgment of the user's evaluation for the existing models, the existing models are banded on the same index. Moreover, the benchmarking models are jointly determined in combination with the development level of product indexes.

Finally, the final product index definition is completed from the two aspects: index development level and benchmarking models.

3.2.3. The Product Definition of "User Standard" is Increasingly Important

This set of product definition method is based on user requirement and is the result according to user evaluation standards and habits; however, the standards in engineering development often differ from user evaluation standards.

Specifically, in the product definition, we define the development level of the indexes and the benchmarking models in accordance with user standards. Moreover, the development department of automobile enterprise found that the results of the user evaluation were inconsistent with the results of the test and detection when developing in combination with the product definition list obtained, an obvious example helps everyone understand this inconsistency. For example, when testing the start acceleration performance of two competing cars, the users' evaluation result was found: the competing product was better than this product, the problem with this product is the starting slow, and the defined development level is that this product must reach the level of the competing product; however, when testing results, the 0-30 acceleration time of this product is less than that of the competing product, it means that the product starts faster than the competing product. Because the users' car usage habits are constantly changing, and the engineering development standards made earlier have not been adjusted in time to meet market requirements, as a result, the final developed models will not conform to the users' preferences and habits, leading to the fate of being eliminated. Therefore, how to incorporate "user standards" into engineering development is becoming more and more important.

In the above concept research and definition research two stages, the content of model planning is the research when the model has not yet been produced, namely the research for the products that will be marketed in the next 2 years or so, so the "forward-looking" requirements are

relatively high. One response to "forward-looking" requirements is "leading users", namely users who can represent the majority/mainstream demand in the market in the next 2-3 years. This type of users is called lead users and conduction users in the field of communication. According to the product features and target groups of different models, the "leading users" are defined from multiple dimensions and characteristics, and finally the "forward-looking" requirements are realized.

4. User Research before the Product on the Market

4.1. Research Contents before Product on the Market

For a period of time before product on the market, different types of researches can be carried out according to the development needs of the product, including image testing, new car model test is also called as plastocene model test, new car static test, and new car dynamic test.

From the product side, the image test is to help the OEM design more competitive products, more accurately identify competitors and know the advantages and disadvantages of the product, from the non-product side, initially identify target users, and provide preliminary references for marketing strategies. From the level of research contents, the image test includes four contents, the first is user evaluation on the appearance and interior design of new models based on design drawings, including the overall design evaluation and detailed design evaluation of the exterior/interior (such as the exterior front, 45 degrees on the front side, side face, 45 degrees on the rear side, and directly behind), evaluation of the matching degree of appearance and upholstery, etc.; the second is product positioning, including product style positioning, market positioning, preliminary price positioning, and setting rationality of selling points of new models. Whether the design level or the product positioning level, the evaluation of this product must be developed in combination with competing products; the third is target user analysis, at this stage, finding target users is preliminary judgment, and cannot be accurately positioned, usually, look for potential target groups that have preference or purchase intentions for this product among competing product users, analyze their images, characteristics, behaviors, concepts, vehicle-related behaviors and attitudes, etc., then combine them to analyze the requirements of target users, including functional needs clearly expressed by potential target users, emotional needs and spiritual needs that are not expressed orally.

The new model test, namely the plastocene model test stage, the test focus is the model design of the 1:1 plastocene model car. The 1:1 plastocene model is an important step in the transformation of the new car from the concept to the entity, it not only shows the appearance of the car product, but also has an upholstery model, which can do simple upholstery test. The main purpose of the sludge model test is to understand user characteristics and determine target users; understand users' vehicle demands and product evaluations, identify product improvement directions and improvement points; make the competitive relationship, product positioning, and competitive advantages and disadvantages of new cars clear; understand the price sensitivity of target users, help determine product pricing; determine the communication direction and concept of the new car.

In the static test in the real car test, the test model is a hard model car, and it is also a 1:1 real car, if the plastocene model is the three-dimensional artistic expression of the car body (belong to the category of art) based on engineering conditions, then the hard car model is not only an artistic expression, but also a means for the purpose of display or engineering analysis(belong to technical category)-it has all the characteristics of a mass market car, it can be seen, touched, and driven. The purpose of the real vehicle static test is to adjust the product, find the target group, and provide the basis for the pre-market marketing strategies based on the preliminary pricing.

In the dynamic test phase of the actual vehicle test, the vehicle type used is consistent with that in the static test, and the engine is installed, and can be driven in track normally. During the investigation process, corresponding test obstacles will be set based on the needs of the enterprise: generally, there will be setting the reverse zone, the straight acceleration zone (0-80km/h, 0-100km/h), an S-curve zone, and bumpy roads. Differing from the static real car test, the dynamic real car test focuses on the advantages and disadvantages of the dynamic performance of the vehicle and more precise price positioning.

4.2. Technical Routes of User Research before Product on the Market

There are usually three research models involved in the pre-market process, PSM model, CBC model and KANO model, all of which are tested based on user preferences.

The first is PSM model, which is the price sensitivity test model. Its principle is to ask the respondent to make four choices on the price gradient table (a bit high but acceptable price, a bit low but acceptable price, too high and unacceptable price, too low and unacceptable price), calculate the upward and downward cumulative percentages for these price points of the sample, take this cumulative percentage as the price demand elasticity curve, the intersection of the four curves marks the appropriate price range, optimal pricing point, and suboptimal pricing point of product.

The advantage of the PSM test is that it can accurately calculate the price range accepted by users and accurately calculate the recommended price point with the most profit; the disadvantage is that this method is non-statistical model, and the test error cannot be corrected by the internal calculation of the model, moreover, it also cannot reflect the price elasticity of new products under the changes of competing models [2]. [2].

When there is test deviation in the PSM, PSM test can be carried out on all tested competing models and obtain the results, and the difference between the test results and the actual price of the competing models can be compared. PSM test needs to introduce the joint analysis method for carrying out more complete extra analysis research.

CBC model, namely the joint analysis method, its principle is to simulate the virtual target market including new products, through analysis of the changes in user preference, study how the price elasticity of new products changes in the presence of competitors, and try to determine market acceptance of new product. The operating steps of CBC model are to first determine the product feature attributes and the level of each feature, carry out product simulation, collect data, calculate the price elasticity of the new product, and calculate the market share of the new product.

Through CBC joint analysis, it can help find the optimal price of a new car, namely the position of the price breaking point-when the price exceeds the price breaking point, the market share of the product will decline sharply.

The third is the KANO model-a useful tool for classifying and prioritizing user requirements invented by Professor Noriaki Kano of Tokyo University of Science, it is based on analyzing the impact of user requirements on user satisfaction, and it reflects the non-linear relationship between product performance and user satisfaction [3].

5. User Research before the Product is on the Market

The post-market stage is 3-6 months after the model is on the market, the main role of user research at this stage is to verify whether the new products after on the market meet the requirements of users.

5.1. Purpose and Contents of User Research after the Product is on the Market

The main purpose of user research after the market is two: one is to check: find out the key problems of the model; the other is to implement policies and recommendations: provide rectification directions for current product 5P policies or modified models/models of the year.

On the whole, user research after the product is on the market can solve the problems related to the product 5P, namely people, product, price, promotion, and place.

Starting from the user, first, carry out research on target users, including basic characteristics, the requirement of buying car and using car, values, etc.; verify the product market positioning based on target user research, first, verify whether the product market positioning is consistent with the plan, second, verify whether the market positioning of the product meets the needs of the target user, and understand how the target user wants the product to be improved; through the target user's research on vehicle models and product market positioning, verify whether the product's competition circle after on the market is consistent the plan, whether the core competing products have changed, and explore the reasons for the changes; through the research on target users and competition circles, find the focus users of the competing product, and deeply understand the reasons for the victory and defeat of this product model, verify the consistency of the selling point and the plan through the research on the attractiveness and recognition of the new product's selling points by target users and focus users; moreover, understand the satisfaction points of target users and focus users in product power, configuration, version, price, etc., as well as use pain points, and understand improvement suggestions; the above are the research ideas of products, users and prices.

From another level (the content on the left half of the idea), through the research on target users and focus users, we can also understand the overall awareness of new product brands and models, and explore the reasons; moreover, we can combine the selling points of the products, further verify the communication channel, communication content, communication effect and marketing activity preferences; this is mainly to promote relevant ideas; the third level (the content on the right side of the idea) is to study the target users, market positioning, cause of product victory and defeat, selling point, and price, which can be related to sales services, the attractiveness of marketing words, The attractiveness of marketing words and financial policy related aspects, and comprehensively verify the 5P of the new product.

The above is the basic research based on the commodity 5P theory, the main purpose is to provide basis for the improvement of commodity power and marketing strategies.

In addition to basic research, user research after the product is on the market will also carry out exploratory research on model changes and upgrade of automobile enterprises. For example: deeply understand the reasons for the victory and defeat of new products, provide effective support to enhance the product power. First, in the short term, deeply understand the user's pain points in product use, such as appearance, upholstery, configuration, etc., they can be effectively avoided or guided in marketing strategies; moreover, explore the reasons for the victory of new products in areas with better sales. promote them to other regional levels, in the short term, these two ways can promote the increase of sales, judging from the long-term recommendations for modified models, according to the reasons for victory and defeat, aiming to the pain points of users, the modified models can be upgraded and improved in combination with the enterprises' situation; for example, a certain model is different from competing products in product competitiveness, however, because it entered the market relatively late, and its reputation accumulation is not as good as that of competing products, so its sales volume is not as good as that of competing products, so how to make sales strategy to impress customers is a very important issue, in this way, the doubts of enterprises can also be solved in user research projects after the product is on the market, mainly by visiting the dealerships of excellent products and competing products, summarizing and refining the sales ways and

marketing words that can stimulate customers' interest in buying, help increase the sales of this product.

5.2. Technical Route of User Research after the Product is on the Market

Traditional post-market user research is generally divided into two stages, first: the first phase of CATI telephone interviews: telephone interviews with users of this product or defeated users, get a preliminary understanding of their evaluation of new products, and get preliminary hypotheses in market, competition and other aspects; afterwards, carry out the second stage of routine research, carry out in-depth research based on the input of stage one hypothesis, check the goals and plans of the new product at the initial stage of the market, and propose later measures; in the proportion of the entire time, the first stage is 20%, and the second stage is 80%.

The traditional research methods have been used for many years, which have their advantages and shortcomings, the main shortcomings are: (1) two-stage implementation, long cycle and high time cost; (2) although it can meet the needs of the project, it may be limited in information acquisition due to limited budget and sample size.

In recent years, big data has been gradually applied to all walks of life, and market research has also opened the exploration of big data, based on the increasing pressure of competition in the automotive industry and the broadness, objectivity, and authenticity of big data and data analysis, the application of big data in the automotive market research is gradually widespread.

The new research method for post-market user research is proposed based on the application of online big data, which is also divided into two stages: first, carry out the first stage of online big data research, and use the advantages of online big data to study product 5P as much as possible, and conduct preliminary verification of the plan; guide offline research, reduce the content of questionnaires and outline contents, and improve work efficiency. Many actual project operation experiences have formed the new method for CATARC to study post-market user: namely research system with big data first and offline research as a supplement.

Research highlight 1: a large amount of data obtained online is processed by ETL to obtain structured data, there were sentence segmentation, word segmentation, algorithm writing and training data before, study semantic database in combination with CATARC, develop emotion algorithm, index recognition & detection functions, and optimize files.

Research highlight 2: expectation inconsistency theory, fairness theory and value perception inconsistency theory are the theoretical basis for online big data satisfaction surveys. Reputation data is mainly the emotional release of consumers after consumption on pre-consumption attention indexes and newly discovered indicators after consumption. A large number of studies related to satisfaction have shown that emotion can directly affect or represent the satisfaction attitude.

Consumers will use different degree adverbs to describe the emotion of various indexes, which can represent the user's satisfaction with some indexes. In the field of semantic analysis, mature algorithms can be used to obtain emotion scores.

6. Conclusion

In the model planning process, judging from the technical route summary of user research, the target user group is defined in the concept research stage, and the characteristics and needs of the target user are made clear; in the definition research stage, according to the needs and preferences of users, determine the development level of and benchmarking models of model development indexes; before the model is on the market, according to the needs and preferences of the target user group, understand the comprehensive competitiveness and the direction of improvement of the commodity, ensure that the upcoming models meet the needs

and preferences of users; after the model is on the market, according to the needs and preferences of the target user group, make the comprehensive competitiveness of the commodity clear, and determine the upgrade direction of the product in combination with other competing products.

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