

“Seven Tools for New Product Planning”: Powerful Tools for Kansei Engineering

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Abstract

Purpose – This paper introduces the “Seven Tools for New Product Planning,” proposed by Kanda, Nagasawa, *et al.* in 1995, revised in 2000, those are a set of tools to create hit products appealing to the *Kansei* of consumers.

Methodology/approach – The details of “the Seven Tools for New Product Planning” will be described in this article. These tools are as follows;

- (1) Interview Survey: Qualitative survey technique for arriving at hypotheses
- (2) Questionnaire Survey: Quantitative survey technique for verifying hypotheses
- (3) Positioning Analysis: Method of positioning products and directing planning
- (4) Idea Generation: Procedure for efficient generation of ideas
- (5) Idea Evaluation and Selection Analysis: Method of evaluating and objectively selecting ideas
- (6) Conjoint Analysis: Technique for identifying optimal concepts
- (7) Quality Table: Method for linkage of Planning and Design

Findings – This article describes the “Seven Tools for New Product Planning” in broad generalities and discussed the stage in process planning in which they should be used. The details of these seven tools will be discussed in this article.

Research limitation/implication – We insist that the “Seven Tools for New Product Planning” are also effective and powerful for *Kansei* Engineering.

Originality/value – Though the “Seven Tools for New Product Planning” are well known in Japan, those are not globally introduced because there are quite a few papers and books concerning the “Seven Tools for New Product Planning.”

Keywords – *Kansei*, new product planning, Seven Tools for New Product Planning, total quality management (TQM).

Paper type – Overview.

1. Introduction

The “Seven Tools for New Product Planning,” proposed by Kanda, Nagasawa, *et al.* in 1995, revised in 2000, are a set of tools to create hit products appealing to the *Kansei* of consumers. It is designed to be used systematically as if it contains the story and is a methodology that can be usefully employed to generate creative new products satisfying the objective needs of customers by systematizing the product planning process and combining marketing and originally developed methods with QC methods. In particular, the “impact” found commonly in hit products is an important feature. From this viewpoint, we introduced QC methods formulated to realize the ideal product planning system instead of the traditional QC approach. “Seven Tools for New Product Planning” consist of the following tools:

- (1) Interview Survey: Qualitative survey technique for arriving at hypotheses
- (2) Questionnaire Survey: Quantitative survey technique for verifying hypotheses
- (3) Positioning Analysis: Method of positioning products and directing planning
- (4) Idea Generation: Procedure for efficient generation of ideas
- (5) Idea Evaluation and Selection Analysis: Method of evaluating and objectively selecting ideas
- (6) Conjoint Analysis: Technique for identifying optimal concepts
- (7) Quality Table: Method for linkage of Planning and Design

This article argues the verification of “Seven Tools for New Product Planning.”

The Seven Tools for Product Planning (or “P7”) have been developed and are recommended as techniques for creating “hit” products that will appeal to the *Kansei* (feeling or sensibilities) of consumers.

They are a set of powerful, easy-to-use tools designed to foster product planning that leads to certain success.

Nagasawa (2003) introduced some cases where corporations were able to get good results using the “Seven Tools for New Product Planning,” such as development of Pioneer mini-component Stereo “MDX707,” development of Ricoh digital copying machine “IMAGIO MF-200,” and development of Kobayashi Kirokushi sealed postcard “Post de Seal.”

In addition, the “Seven Tools for New Product Planning” contributed to developing the Ricoh CD-R/RW Drive “MP6200 series”, forecasting orders for Nissan “Stagea”, developing Tombow Pencil correcting tapes and developing Nissan “X-TRAIL.” It is considered that the effectiveness of product planning by applying the systematic tools mentioned in “Seven Tools for New Product Planning” has been verified by the examples mentioned above. Not all of the seven tools mentioned in “Seven Tools for New Product Planning” were used for each application, and the ways in which these tools were applied differed according to the specific conditions prevailing at each corporation and for each product. As products developed to date are introduced in this article, the tools used for planning these products are what “Seven Tools for New Product Planning (P7-1995, former edition)” recommends.

The “Seven Tools for New Product Planning” introduced in this article was well received by the public and made the headlines in Nikkei Business. In the light of these facts, it is expected that publication of the revised edition and a series of practical editions in three volumes have given fresh impetus to seven tools in the future. There are some examples where the revised “Seven Tools for New Product Planning” has already been used for actual product planning and its applications are increasing. When the revision and updating of its content are required, we intend to improve the current edition of seven tools.

2. Interview Survey: Qualitative survey technique for arriving at assumptions

The Interview Survey involves two methods; Group Interview and Grid Evaluation Method.

2.1 Group Interview

If the primary objective of the questionnaire survey described later is to provide a quantitative survey, then this Group Interview is its qualitative survey counterpart. Group Interview is a method where a small number of consumers are gathered together and their opinions are explored deeply until they are understood. The Group Interviews are performed for one or both of the following objectives.

- (1) It is performed when hypotheses about the product to be developed are not clear, Group Interviews are performed so that these hypotheses can be extracted.
- (2) To check the hypotheses the planners have.

2.2 Grid Evaluation Method

Characteristics of Grid Evaluation Method are as follows:

- (1) Products are presented in paired comparison and the evaluation is recorded in his own speaking. Interviewer never leads the evaluation so the roll of interviewer is simplified. The skill of interviewer, time and place of interview are less effected.
- (2) It is easy to make a hierarchical structure modeling of the results.
- (3) Using the whole structure modeling the latent needs of customer can be revealed from the usual point of view.
- (4) In spite of the above, the results are effected by the choice of the samples to be presented and the free and liberated opinions derived in the group interview are hardly obtained. These two methods are complementary to each other.

Figure 2 shows a brief example of the evaluation structure drawing for PC of Grid Evaluation Method.

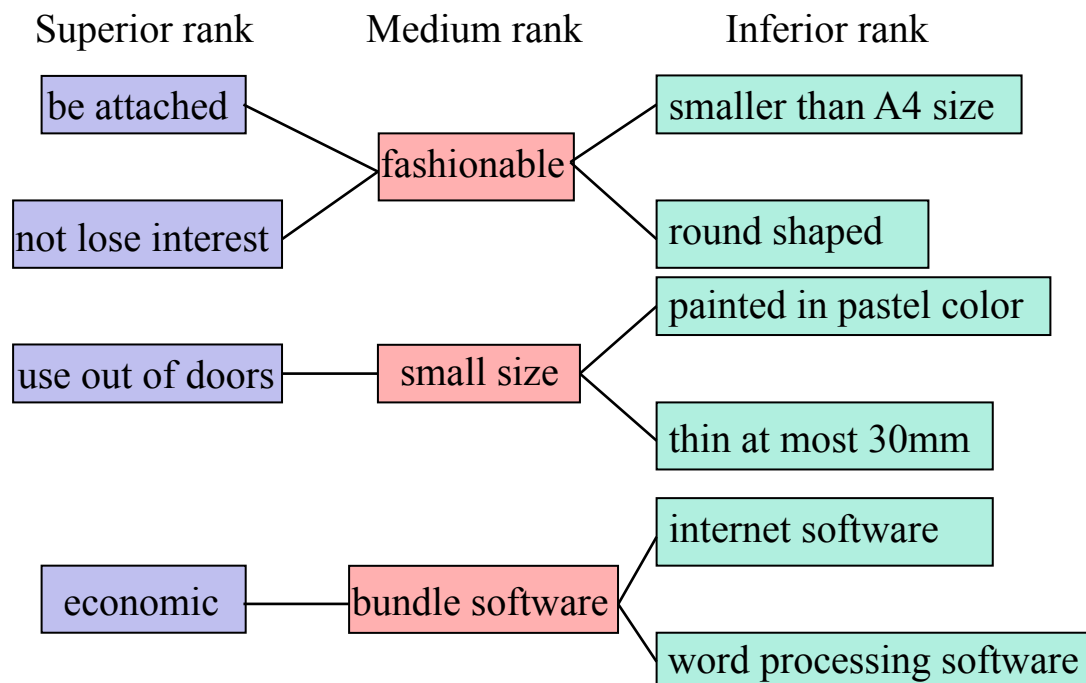


Figure 1: Brief example of the evaluation structure drawing for PC of Grid Evaluation Method

Source: Nagasawa, Shin'ya and Pi-Ju Tsai (2007), *Marketability of Environment-Conscious Products: Application of "Seven Tools for New Product Planning,"* Koyo Shobo, p.174, Figure 2.

3. Questionnaire Survey: Quantitative survey technique for verifying hypotheses

This approach quantitatively examines assumptions acquired from Interview Survey (group interview and/or Grid Evaluation Method) that collect replies from a large number of consumers.

Care should be taken in setting questions and answer options, and reviewing expressions. Determination of target segment and sampling method should also strictly made.

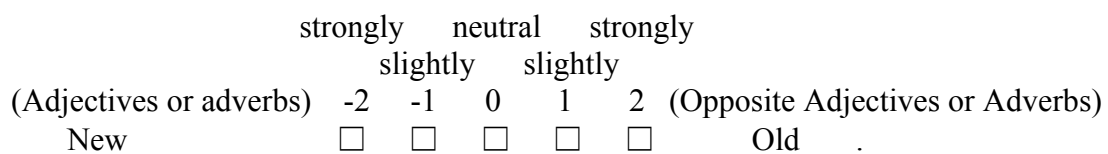
3.1 Significance of Questionnaire Survey

While the Interview Survey is typical of qualitative surveys, the Questionnaire Survey is typical of quantitative surveys. Even if the same questionnaire is used (or in other word, even if the survey asks the same questions), the various methods by which the surveys are performed are categorized how the survey form gets filled in (i.e. mail surveys versus drop-off surveys, telephone surveys, interviews, etc.). There is also a variety of ways in which the subjects can be sampled, such as the random sampling method (often used in public opinion surveys), relying on contracted monitoring organizations, the method of using responses from product or service users, etc. Each of these methods has its strengths and weaknesses. In terms of the format, the most reliable method is to have expert researchers visit the appropriately sampled respondents in person to perform an interview thus obtain results; however, this is extremely costly, and often the researchers lack experience because they are only part-time workers, leading to problems. Mail surveys are quite common, and while they are inexpensive, they have long lead times, and unless some type of reward of incentive is included, the response rate will be poor, leading to biases. However, in all of these cases the following points are the same:

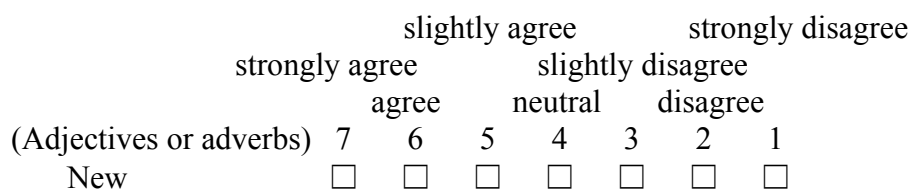
- (1) The same questions are given in the same order to all the respondents.
- (2) Normally the responses are categorized in advance (or afterwards).
- (3) Although room is left for the expression of free opinions, open-ended questions are not central to the survey.

3.2 Design of Questionnaire Survey form

The questionnaire form for part of the Seven Tools for New Product Planning uses either the SD (semantic differential) scale method where a pair of antonyms are placed on either end of a scale, or uses the Rating Scale method as shown in Figure 2.



(a) Semantic Differential Scale method



(b) Ordered categorical scaling method

Figure 2: Ordered categorical scaling method

Source: Nagasawa, Shin'ya and Pi-Ju Tsai (2007), *ibid.*, p.177, Figure 3.

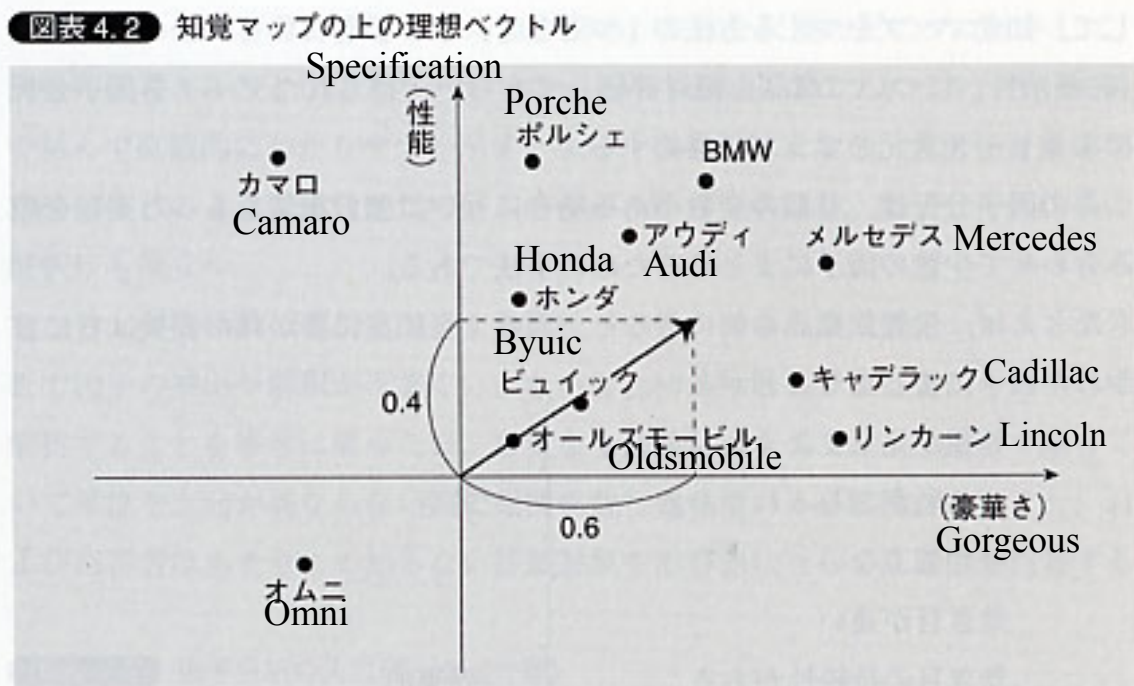
4. Positioning Analysis: Method of positioning products and directing planning

Using the results of the quantitative survey (questionnaire survey) conducted on the preceding step, the product manager should successively apply the Positioning Analysis, which is a technique to identify a product's place in the market, and to clarify the direction of development as shown in Figure 8. He should better implement the analysis using a PC. He will be able to fully understand the advantages of "the Seven Tools for New Product Planning." He should hold active discussions among his colleagues in project team and identify hit-product planning directions.

"Positioning" basically refers to assigning a product a position in the market. Specifically, existing products (including brands, services, etc.) which can be chosen by the consumers are plotted onto a diagram drawn by some type of method which includes some type of basis and some type of shape, and each product is given some position in this plot.

Looking at it from another perspective, the act of creating an expression of a space that is a multi-dimensional space, such as a map, or in other words creating a "positioning map," can be referred to as "positioning." Positioning is sometimes referred to as "mapping" because a "map" is created.

In marketing this space is often created based on the perceptions of the customers in response to what the customers think of the various products. This is because this element of "perception" or "image" is thought to have a huge influence on product selection decisions. For example, the "attractiveness" of an automobile owned by a typical customer is thought to be structured from several subjective characteristics such as "it feels sophisticated" or "it feels individualistic" rather than by the product specifications of the automobile itself. The positioning of these perceptions is formed not just by the physical characteristics of the product itself, but by the advertising methods, the promotions, etc.



出典) 上田隆徳・江原淳 (1992): 「マーケティング」, 新世社, p.69

Figure 3: Example of Positioning Map (Preference regression on the Perception Map)
Source: Nagasawa, Shin'ya and Pi-Ju Tsai (2007), *ibid.*, p.186, Figure 8.

5. Idea Generation Method: Procedure for efficient generation of ideas

The product manager should learn how to generate unique ideas. The manager should also be challenged to generate innovative ideas based on the hit-product planning directions identified by Positioning Analysis. Everyone will learn how to generate surprisingly unique ideas.

5.1 Significance of Idea Generation

Modern business and businessperson must find ways to produce excellent results with limited time and limited budgets. There is especially great interest in new product development because whether or not new hit products are sent to the market in a timely manner has a direct impact on the firm's bottom line.

Over 100 creativity and idea generation methods have been published throughout the world. We make no attempt to categorize and introduce all of these, but rather will narrow our focus on five useful tools for product planning;

- (1) Analogy Idea Generation Method
- (2) Focus Idea Generation Method
- (3) Combination Idea Generation Method
- (4) Idea Checklist Method
- (5) Seeds Idea Generation Method

5.2 Analogy Idea Generation Method

In situations where the seeds for known needs are not yet ready, or situations where the product image just does not seem to come into focus, then the Analogy Idea Generation Method is used. In this method one creates an analogy with the "keywords" (key ideas for generating new ideas) for focusing in on and solving the problem, and then through combining these keywords with the topic is able to generate ideas. When using the Analogy Idea Generation Method, the subjects should not resemble each other externally. Although it is important that they are similar in essence. Because of this, selecting a completely unrelated subject for the analogy will result in the discovery of a broad range of rich ideas.

In order to use Analogy Idea Generation Method effectively, it is important that the problem be clearly specified, and that the keywords provide direction for problem solving. This is based on the assumption that the members are good at changing their feelings. If the members can completely relax, many analogies will be put forward. Afterwards, all that needs to be done is for one of the more experienced members to flesh out the idea. Table 1 shows results of Analogy Idea Generation.

Table 1: Results of Analogy Idea Generation (Example of hit website)

No.	Common sense	Reverse	Problem	Key word	Analogy	Idea
No.1	Useful for a hobby	Not useful for a hobby	Necessary to buy technical magazines	Never miss the target	Large family	A site for increasing new hobbies
No.2	Useful for study	Not useful for study	Necessary to attend a class	To recruit a substitute student	Pinch hitter	A site for having a paper written by a substitute student
No.3	Useful for writing a paper	Not useful for writing a paper	Failing the course	To make friends with someone seated at the front of the classroom	Short-term contract	A site serving as an intermediary for concluding a short-term contract to get a paper written
No.4	Useful for club activities	Not useful for club activities	Cannot find match opponents	Reliably facilitating contact between potential opponents	Intermediary	A site serving as an intermediary for arranging matches for sports circles

Source: Nagasawa, Shin'ya and Pi-Ju Tsai (2007), *ibid.*, p.194, Table 9.

6. Idea Evaluation and Selection Analysis: Method of evaluating and objectively selecting ideas

Idea Evaluation and Selection Method consist of two methods; the Weighting Evaluation Method and the Paired Comparison Evaluation Method.

The product manager should learn how to select unique ideas, and to optimize them.

Significance of idea evaluation and selection, and the proper use of the Weighting Evaluation Method are to be explained. The Paired Comparison Evaluation Method is omitted for explanation.

6.1 Significance of Idea Evaluation and Selection Analysis

It is often true that it is difficult to evaluate and select (narrow down) good ideas generated using the idea generation methods in P7-1995 (former edition).

Nevertheless, there was no tool to cope with these situations.

Therefore, tools which allow ideas to be evaluated from several criteria and then selected synthetically have been added as ways of narrowing down ideas.

Specifically, the Weighting Evaluation Method and the Paired Comparison Evaluation Method (AHP) have been adopted.

The Weighting Evaluation Method is a way of rating each idea generated by customers or persons in charge of evaluating products. The ideas are weighted alongside each evaluation criteria including charm, originality, practicality, level of technical difficulty and cost. Although this method is easy to apply, products are likely to be weighted or rated from a personal point of view.

The Paired Comparison Evaluation Method (AHP) is a way to estimate weight and scores by comparing a pair of products or evaluation items. In the case where there are many evaluation items and ideas, the number of paired comparisons increases and their objectivity also increases correspondingly.

6.2 Weighting Evaluation Method

Using the Weighting Evaluation Method, ideas were evaluated according to each evaluation item against different criteria, to obtain the overall evaluation of each idea.

Table 2 shows results of the Weighting Evaluation Method

Table 2: Results of the Weighting Evaluation Method

Ideas	Novelty (×3)	Practicality (×2)	Feasibility (×1)	Overall evaluation	Prospective
A site for obtaining a smattering knowledge on various topics from quiz programs	0	3	1	7	○
A site for accessing beautiful passages from great writers	2	2	1	11	◎
A site for getting ideas for new hobbies	2	3	1	13	◎
A site for correcting sentences	0	2	2	6	○
A site serving as an intermediary for arranging matches for sport circles	2	2	2	12	◎
A site about certificate courses	0	0	2	2	
A site for making friends with celebrities	0	0	2	2	
A site for renting useful things for leisure activities	1	2	0	7	○
A reverse-direction site (a site that sees a user)	0	2	1	5	

Source: Nagasawa, Shin'ya and Pi-Ju Tsai (2007), *ibid.*, p.196, Table 10.

7. Conjoint Analysis: Technique for identifying optimal concepts

The product manager should learn how to apply scientific and clever approaches in order to refine complex ideas, and to derive optimal concepts.

The purpose of Conjoint Analysis is to estimate simultaneously the effects of individual elements with conjoint scales when rank order relationships of the multi-dimensional combinations of elements has been established. The analysis of objective variables on ordinal scales has been developed in various fields such as psychology; however, this type of analysis quickly drew the attention of consumer research and of the field of marketing as a method by which preference analysis could be performed.

In the field of marketing research, conjoint analysis was defined as a method for deriving the worth (or utility) value for each different level of an object (the product, etc.). Also, this worth value is not a preference for an individual attribute, but rather is evaluated based on the full set of preference data regarding a "bundle of attributes," which data defines a product or a hypothetical product. Also, Noguchi and Isogai (1992) discuss conjoint analysis as follows:

"Conjoint Analysis is a method for calculating measures for individual evaluations of each factor in such a way that these evaluations will be as reproducible as possible, where the calculations are done from an overall preference evaluation of the subject (the product, etc.) using a combination of elements prepared in advance."

Niki and Asano (1979) explain the name "conjoint analysis": The name "derives from the fact that while the value of a tangible or intangible product is the effect of a host of attributes (size, weight, style, etc.), these jointly exist in a single product, and are indivisible."

The starting point for theoretical research regarding conjoint analysis was with the public attention garnered by the paper written by Luce and Tukey regarding the effects of measuring individual explanatory variables in relation to an ordinal-scale objective variable, presented in 1964 by the psychologist Luce and the statistician Tukey. Following the paper, theoretical research in this field progressed rapidly the late 60s, and many papers were presented even in Japan by the likes of Ohsawa, et al. (1980,1984) and Katahira(1984).

Recently, conjoint analysis has moved beyond marketing and is used in many fields. Also there are many varieties of techniques which are all referred to by the term "conjoint analysis" so it is difficult to produce a general definition which includes them all. However, we can summarize the positioning of conjoint analysis as a preference analysis tool in marketing as follows:

"Methods to derive the partial worth values for each factor (including methods such as preference regression)"

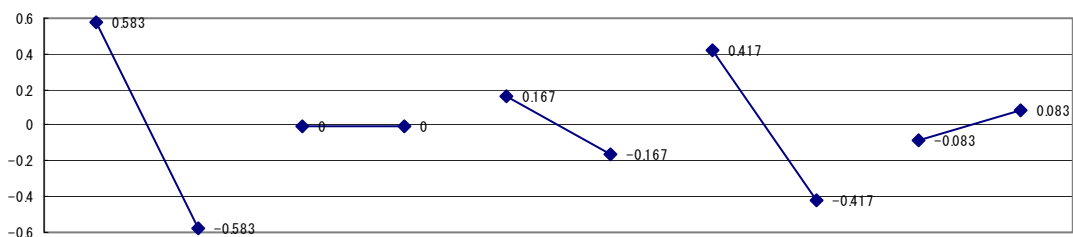


Figure 4: Results of Conjoint Analysis (Utility Value)
Source: Nagasawa, Shin'ya and Pi-Ju Tsai (2007), *ibid.*, p.201, Figure 11.

8. Quality Tables Method for linkage of Planning and Design

Quality Table is well-known in QC in Japan as a method for linkage of Planning and Design.

Although the concept can be made more concrete by employing the demanded Quality Deployment approach, the product plan can be made more concrete by deploying it into technical characteristics. As described above, Quality Tables are charts for converting customer requirements into technical characteristics. Even if the customer requirements are under-stood, if the firm is unable to convert these into technical quality characteristics then it will be unable to fully specify the product.

For example, a substitute characteristics for the customer requirement is "easy to carry around" might be "mass" and if no specific value such as "500 grams" is determined as the design value of this characteristic, then the product cannot be manufactured. The product can only be manufactured after specific design values are selected – and not just for the characteristics "mass," but for "length" and "thickness" as well.

These quality characteristics of "length" and "thickness" may have some relationship to actualizing the demanded qualities "easy to receive" and "easy to handle," so it is necessary to add these demanded qualities as well and decide on their design values.

To do this, a matrix is drawn using the demanded Quality Deployment chart and the quality characteristic deployment chart, and the customer requirements are specified more concretely by showing the relationships between the customer requirements and the technical characteristics. The Quality Table is made and used following this way of thinking. Although the quality characteristic deployment chart deploys the quality characteristics of the product, planned product is specified more concretely by setting design values for these quality characteristics.

9. Concluding Remarks

We proposed "the Seven Tools for New Product Planning," those are selected from various types of tools, including marketing and QC, and combined them into a set. These tools consist of Interview Survey, Questionnaire Survey, Positioning Analysis, Idea Generation, Idea Evaluation and Selection Analysis, Conjoint Analysis and Quality Tables. The outlines of these seven tools are explained in this article.

For further details, please refer bibliographies.

It is our hope that these tools will be broadly applied.

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