Study on SWOT Analysis and Effectiveness Forecast in Design Project

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Abstract: We studied design projects by clarifying factors for successes and risks to maximize their effectiveness, and by studying advance evaluation methods of the result by project implementation. Regarding the former, we based our study on SWOT analysis. About 250 questions were gathered from past R&D studies regarding project merits. After review by four study members, 170 questions were chosen by judging validity and changing language of questions without changing their intents or meanings. As questions were considered the same in their objects, strengths and weaknesses, opportunities and threats except for orientation of evaluation, similar questions were combined/omitted, and particularly noted views were abstracted. As for strengths and weaknesses, there were 27 questions; three on human resources, seven on material resources, four on financial resources, two on time, seven on information, and four on other resources. As for opportunities and threats, there were one each on legal system and social situation, four on market environment, six on competitive environment, and two on related segments. We then examined two past design projects and one new project to confirm adequacy of these views. We successfully extracted various items of S, W, O and T, to thereby reach a conclusion that these views were adequate, and confirm validity of our study. Regarding the latter, we reviewed effects achieved by implementation of the design project based on the concept of stock type resources. From 41 types of viewpoints for SWOT analysis, 27 items were selected by paraphrasing the contents of 27 viewpoints

related to strength and weakness, which were self-controllable to those in the positive direction achieved by the design projects. Two study members conducted 4-stage evaluation on the cause and effect relationship of these 27 items using DEMATEL Method. We found out that "support of the top management" related to human resources and "effective use of patents" related to material resources would promote effectiveness of a design project. On the other hand, we found that the final effects obtained through the design project were "risks avoidable" related to other resources, "business expansion (including market segments)" and "economicalness of products" related to material resources, and "enhanced economy (efficiency) in the project scope" related to financial resources. As discussed, we prepared SWOT analysis-related items and learned which items would achieve the final effectiveness and which are to be achieved with top priority.

Key Words: Design Project, SWOT Analysis, Effectiveness Forecast, Design Strategy, Design Management

1. Introduction

Design activities in business may be described as parts of those to achieve desired business objectives and goals. In the field of information design, the main object of this study, overall examination from the strategic point of views does not seem to have been adequately performed even though examinations have been conducted of individual design factors such as usability, accessibility and visual identity. If a sub-project for design implementation was to be described as a design project versus the business implementation project, a viewpoint is needed in order to understand factors for successes and risks that maximize the effectiveness of a design project and that achieved by a design project, establishing and structuring the philosophy of evaluation and method is urgently needed.

The purpose of this study is to examine and structure the philosophy and the method similarly to the basic process of strategy planning in management. We shall refer to this issue in further detail below.

2. Relation between Design and Business

Fig. 1 summarizes the relations between design and business. As strategies in design projects are one measure to achieve business objectives and goals, target clients, needs, competitions, etc. are considered and their details established. As various other projects related to marketing, R&D, etc. are in progress simultaneously, we have to decide what degree of priority should be attached to the design project.

When the effects achieved as a result of design activities are ambiguous, the business side would like to limit the investment as much as possible, and the designers would want to achieve the best possible result, thus creating a gap. Currently, investments in a design project are often based on tacit understanding about experiences and consultations of those such as the business department and the design project executors, thus possibly and often inducing waste of investments as well as losses of investment opportunities.

3. Viewpoints of the Study

This study attempts to examine the factors for successes and risks in maximizing the effect of a design project and to examine the thinking and methodology of result evaluation of the design project in a manner similar to "SWOT Analysis" and "strategy selection" shown in the basic process of strategy development in management [1].

SWOT Analysis means defining challenges in business management by understanding Strengths(S) and Weaknesses (W) within the organization, Opportunities(O) and Threats(T) to self in the market, and to examine the mutual

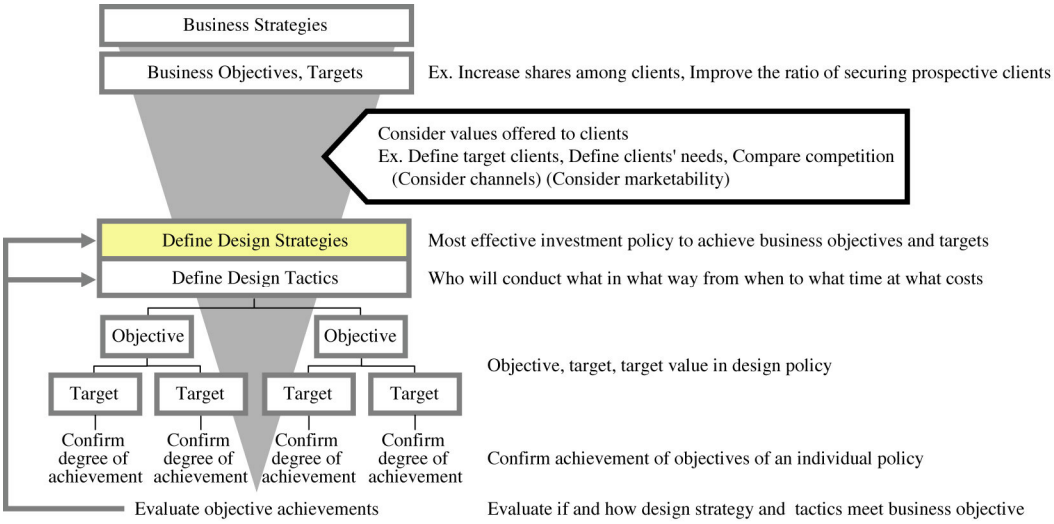

Fig. 1: Relation Between Design and Business

relationship between Strengths and Weaknesses or Opportunities and Threats. For instance, we can examine "what should one do to get the maximum use of Opportunity by using Strength as a weapon" or "what should one do to prevent missing an Opportunity because of Weakness". As we believe that understanding of these four factors of S, W, O, and T would facilitate defining factors for successes and risks, we conducted the following review.

Strategy selection means focusing on strategies to be implemented by examining anticipated results, necessary resources, and difficulties of implementation. Return of Investment (ROI) is anticipated as a result, but quantification such as the above would be difficult in a design project [2]. We therefore decided to divide the management resources into two; the flow-type resources that need constant supply and the stock-type resources that proliferate and improve on their own in quantity and quality depending on the management [3]. We defined those related to the latter as an investment or "effect" of an implemented design project in the following discussion.

4. SWOT Analysis in Design Projects

4.1. Extraction/Selection of Items and Paraphrasing of Terms

Approximately 250 questions targeting at project evaluations from among past R&D studies [4,5] were collected. Four members of this study sampled those that would be appropriate as questions for a design project, and prepared 170 items by paraphrasing wording but taking care not to change their intent or meaning.

4.2. Streamlining Items and Extracting Viewpoints

Objects of evaluation for Strengths, Weaknesses, Opportunities and Threats are considered the same except for the direction of evaluation, positive or negative. The viewpoints of questions are extracted after merging and/or eliminating similar questions.

Extracted viewpoints related to Strengths and Weaknesses were classified into six management resources [6]; human resources, material resources, financial resources, time resources, information resources and other resources. As for Opportunities and Threats, they were classified into five; legal system, social situation, market environment, competition environment and related parties by referring to past studies [7,8]. The viewpoints were further

classified by categories and subcategories.

Table 1 shows the results regarding Strengths and Weaknesses; three categories such as “top management” for the human resources, four categories such as “design marketability” for the material resources, four sub-categories of the design marketability such as “originality”, totaling seven. Thus, the result was four categories such as “resource acquisition” for the financial category, two categories such as “time to finish” for the time resources, seven categories including three on subjects such as “knowhow” for the information resources、and five sub-categories such as “information gathering capacity” under “knowhow”, two categories for other resources such as “existing clients/stake holders” and its three sub-categories such as “environmental changes”, totaling 27 in all.

Table 2 shows 14 different viewpoints related to Opportunities and Threats; one category of “legal system”, one category of “social situation”, four categories of the market environment such as that of “market trend”, six categories of the competitive environment such as that of “human resources” as well as two sub-categories of “business partners” under that of relations with outside, and two categories of “standards in business venue” for the parties related.

4.3. Verification of Viewpoints

In order to confirm the validity of viewpoints, we studied two past design projects, “Hitachi Group Internet” and “Client-oriented Web System Design” (hereinafter referred to as the Past Design Projects ① and ②), and a design project proposed at the time of our survey, “Hitachi Group Specific Internet Site” (hereinafter referred to as the New Design Project ①).

Table 3 shows Strengths and Weaknesses of the Past Design Project ①. For Strengths, there were cited “enthusiastic urging from client to top management” and “project team members remained the same from the start” concerning the Human Resources; and “budget for investigation secured at the start” concerning the Financial Resources. For Weaknesses, “no direct communication regarding challenges and measures as conceived by top management” regarding the Human Resources, and “had no such big-scale guideline in the past” regarding the Information Resources.

Table 1: Viewpoints for SWOT Analysis regarding Strengths and Weaknesses

	SN	Category	Subcategory
Human resources	1	Top management	
	2	Personnel allocation	
	3	Positive allocation of personnel	
Material resources	4	Design marketability	Originality
	5		Business expansion
	6		Adaptability
	7		Brand
	8	Design economy	
	9	Design concurrence	
	10	Patent utilization	
Financial resources	11	Resource acquisition	
	12	Existing resource utilization	
	13	Investment	
	14	Scope	
Time-related resources	15	Time needed until completion	
	16	Time of completion	
Information resources	17	Knowhow	Information gathering capacity
	18		Analytical capacity
	19		Development capacity
	20		Deployment capacity
	21		New areas
	22	Rights	
	23	Partners	
Other resources	24	Existing clients/stake holders	Changes in environment
	25		Value of use
	26		Relationship
	27	Risks	

Table 2: Viewpoints of SWOT Analysis regarding Opportunities and Threats

	SN	Category	Subcategory
Legal system	1	Legal system	
Social situation	2	Social situation	
Market environment	3	Market trend	
	4	Design marketability	
	5	Client evaluation	
	6	Client trend	
Competitive environment	7	Human resource	
	8	Capacity	
	9	Evaluation	
	10	Trend	
	11	Relation with outside	Business partners
	12		Influence
Relations	13	Standards in market	
	14	Trend	

Table 4 shows Opportunities and Threats. For Opportunities, “Internet users increasing, and increased importance on its usability and accessibility expected”; and “was possible to interview key person(s) in competitors with head start” regarding the competitive environment. On the other hand, “two competitors with head start had already gained recognition of the society in respect of their unification and accessibility” in Competitive Environment, and “de facto design as a corporate site subject to change by technology and fashion” in respect of related parties.

Table 3: Some Examples of Strengths and Weaknesses Obtained by Verification of the Past Design Project ①

	SN	Strengths (S)	Weaknesses (W)
Human resources	1	Strong urging from client to top management	Unable to hear directly about challenges and measures envisaged by top management
	3	Project members organized from the start of project	–
Financial resources	11	Budget for project including research was secured from the client	–
Information resources	19	–	Had never handled such a big scale guide-line drafting project

Table 4: Some Examples of Opportunities and Threats Obtained by Verification of the Past Design Project ①

	SN	Opportunities（O）	Threats (T)
Social situation	2	Internet users expanding, and increased importance on usability and accessibility anticipated	–
Competition environment	7	Key persons at competitors with head start interviewed	–
	9	–	Two competitors with head start gained recognition by the society in respect of standardization and accessibility
Relation	13	–	De facto design as a corporate site liable to changes by technology and fashion

Similarly, various items regarding S.W.O.T. were obtained from the Past Design Project ② and the New Design Projects ①, enabling us to define features of respective design projects.

We determined that these 41 viewpoints were adequate and the analysis using these items was effective from the above.

5. Effectiveness Forecast in Design Projects

5.1. Sampling and Preparing Items

The items for forecasting effectiveness will explain the effects brought about by the design project implementation based on the concept of stock type resources.

From 41 items for SWOT Analysis, we selected 27 related to Strengths and Weaknesses that are controllable by the company, and paraphrased them for positive evaluation or the effectiveness obtained from the design project implementation. For instance, the top management of human resources was re-phrased to read as “support from top management available”. We then prepared 27 items shown in Table 5.

5.2. Influence among Items

Some sort of causal relationship (influence) seems to exist among these 27 items. To understand the relationship, two study members analyzed the relationship by DEMATEL (Decision Making Trial and Evaluation Laboratory)

Table 5: Items for Effectiveness Forecast Selected from the SWOT Analysis of Strengths and Weaknesses

	SN	Effects of Design Project Implementation
Human resources	1	Support from top management available
	2	Adequate allocation of human resources (including experts)
	3	Early allocation of human resources secured
Material resources	4	Merchandise originality enhanced
	5	Business (including market segmentation) expansion
	6	Foundation for other merchandise established
	7	Brand image firmly established
	8	Economicalness (efficiency) of product enhanced
	9	Parallel design development restrained
	10	Patent use increases
Financial resources	11	Budget, equipment, resources, system, etc. sufficiently obtainable
	12	Use of existing budget, equipment, resources, system, etc. flexible
	13	Investments in budget, equipment, resources, system, infrastructure restrained
	14	Economicalness (efficiency) of the scope of project improved
Time-related resources	15	Time required to complete design (design project)
	16	Precise time of design completion (design project) known
Information Resources	17	Knowhow for collecting information acquired (increased suppliers, deepened understanding)
	18	Knowhow (methodology) related to analyses (needs, market, points of disputes, etc.) acquired
	19	Knowhow related to development (design development) acquired
	20	Knowhow related to deployment (increased uses, adapting to changes in environment)
	21	Knowhow related to new areas (new business, new technology) acquired
	22	Advantageous position regarding rights (licensee) and business standards
	23	Relationship with partners (joint development, outside experts, industry leaders) improved (advantageous)
Other resources	24	Environmental change for existing clients and stakeholders restrained
	25	Usefulness of existing clients and stakeholders increases
	26	Relation with prospective clients and existing clients enforced
	27	Risks avoidable

Method [9] by evaluating the relationship, "when Item i is achieved, Item j is achieved" in four stages of "Strong influence = 3, Intermediate influence = 2, Weak influence = 1, No influence = 0".

As shown in Fig. 2, we succeeded in clarifying the mutual relationship of 27 items. Degree of Relevance L (D+R) is plotted along X and Degree of Influence (D-R) along Y, influencing items are connected by arrows, and intensities of influence shown by bold solid lines (strong), solid lines (intermediate) and broken lines (weak). The items closer to "entrance (cause)" are shown toward the top of figure, and those closer to "exit (result)" toward the bottom, those with more relevance with others toward right, and those with comparative independence toward left.

This indicates that the items such as "1. Support from top management available" (human resources) and "10. Patent used effectively" (material resources) are the starters for bringing about effectiveness of a design project. On the other hand, we found that those items placed toward the bottom such as "27. Risks avoidable" (other resources), "5. Business (including market segment) expansion" and "8. Economicalness (efficiency) of a product enhanced" (material resources) and "14. Economicalness (efficiency) enhanced" were the final effects of a design project.

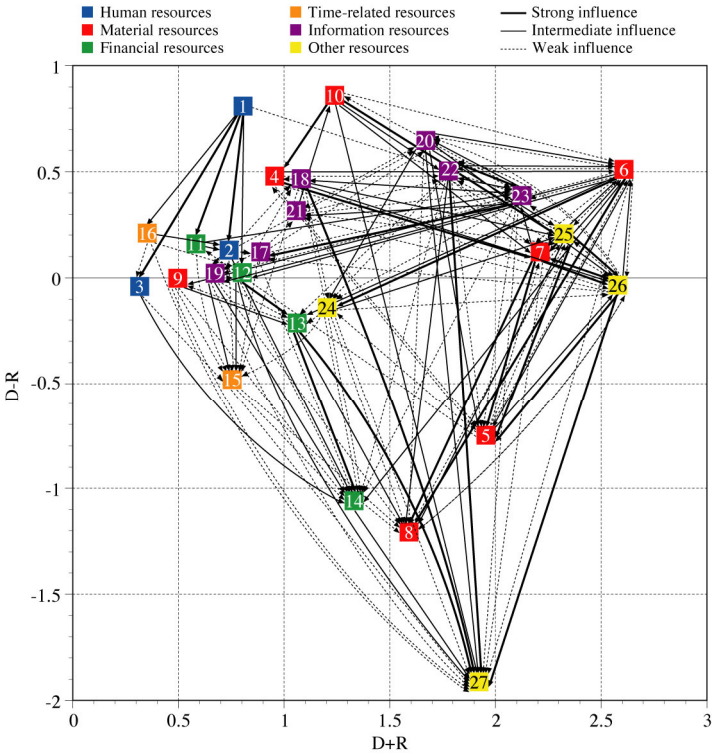

Fig. 2: Mutual Relationship of Items for Effectiveness Forecast

As discussed, understanding of the relationship of these items facilitated understanding of effectiveness of a result by achieving priority item(s) by achieving which of the 27 items. This facilitates strategic implementation of a design project.

6. Conclusion

We were able to extract a total of 41 viewpoints for SWOT analysis, or 27 items related to Strengths and Weaknesses and 14 items related to Opportunities and Threats. We also selected 27 items for effectiveness forecast based on the viewpoints related to Strengths and Weaknesses. By understanding the causal relationship of these items, we could determine the items that would achieve the final effects and those that should be achieved with the utmost priority.

Further study is warranted for refining the items by examining examples of various design projects such as information design, examining the evaluation method by considering the SWOT Analysis and effectiveness forecast, and studying the concrete method of implementation for a design project.

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