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A Study on the KSF Evaluations of Design Management for Korean Small and Medium Companies

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Abstract

Objectives: This study aims to explore the key success factors (KSF) measurements of design management for Korean small & medium companies. **Methods/Statistical Analysis:** The proposed model explores 10 key success factors based upon the extant study and case studies with experts' evaluation. The data was retrieved from samples of five small & medium companies which had excellent reputation in the design area in Korea, and three KSF evaluation methods was performed using average value method, diagramming by energy value method, and genetic algorithm method. **Findings:** The results of the analysis show that the KSF measurement methods are useful to examine KSF by factors. A genetic algorithm method is a better way to evaluate KSF evaluation than average value method and energy value method. Therefore a design company should attempt to establish sustainable KSFs, which are produced by design management, through various means of competitive strategies. **Application/Improvements:** The shortening product life cycles have caused design companies to recognize the importance of design management. We have entered an age where the design management rooted in key success factors is a necessity.

Keywords: Design Management, Evaluations, Genetic Algorithm Method, Key Success Factors, Korean Small & Medium Companies

1. Introduction

Today because product life cycles of design have been shortened rapidly and standardized products are common, design has become the major tools of differentiating products from those of competitors. In addition, it has built a unique brand image, and created additional perceived value for customers¹.

Design management consist the lasting design processes and strategies that create innovated and effectively designed brands and products which improve a company's performance. There have been increased researches on design management in these days because design companies have recognized as a sustainable competitive strategy and adopted multidimensional approaches for design innovation.

Although the importance of design management, extant studies with KSF performance measurements have been limited. Only a few extant study related design management of small & medium companies with design functions in Korea²⁻⁴.

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Particularly most of Korea's small & medium companies are limited to apply design management and needed to apply to measure KSF performance⁵. As small & medium companies lack capability, they have difficulty implementing design management strategies. Particularly recognizing the importance of design helps consumers understand more about a company's design, and it has led to the reality that companies need to accept consumers' demand for design management.

Based upon the above issues, this study discusses the key success factors and strategic management of design management activities. In addition, three KSF measurement methods are used to test performance using KSF factors: Average value method, energy value method, and genetic algorithm method⁶. Also based upon a suggested DMS model this study discusses the impact of the DMS model of Korean small & medium companies on key success factors of design management.

Design Management

In our 21th information age with a short time of product life cycles and standardization of products, the area of design in a firm has become a major weapon to differentiate products. In addition, design crates additional knowledgeable value for customers and builds an outstanding brand image. Thus, design has become a central business functions in many organizations, and the design management has evolved into a scientific domain in its own right7.8.

Recently more companies have been regarding design management as important to business strategies. Design management implies the design processes, decision making of business functions, and strategies for innovative and effective designed products, services, and brands that enhance organizational performance. Design management innovatively coordinates design technology with management to serve customer satisfaction and to provide sustainable competitive advantages across design functions with economic, social, and environmental factors. The scope of design management rages from the day-to-day management of corporate design functions and design operations, to the strategic approaches of design. It also includes the use of design thinking1.

References^{1,7-9} define design management as the extent to which a knowledge system uses design management resources and factors for creating customer values and corporate values using design management system with effective integration of design and management to achieve organizational objectives.

Therefore, this study seeks to explore key success factors for Korean small & medium design companies by analyzing the relationship between key success factors of design management and their performance. The possibility of the development of a design management that can induce sustainable competitive advantages can be anticipated.

Key Success Factors

The key success factors (KSFs) can be defined as the limited number of factors ensures an organization's success in a particular industry. That is, KSFs are the key business areas that are critical for an organization's success. In a keen competitive market, a firm should focus limited resources and skills to develop sustainable competitive advantages from the resource-based view¹⁰.

The search of key success factors of design management has paid attention to many researchers and practitioners¹¹. In the extant studies, efforts were made to find out the key success factors for various types of researches such as digital games¹¹, manufacturing⁹, oil and gas project¹², TISM analysis¹³, and urban project^{14,15}.

From the extant studies, we determine the key success factors for design management^{7,9,16}. In general, most of the studies adopted research approaches with extracting key success factors based upon the reviews of relevant studies, and then validating them. However, due to lack of enough accumulation of research results on key success factors of design management, we used the brainstorming method to identify the key success factors of design management and Delphi method to confirm the identified key success factors. 4.

The process of design management consists of design planning, design organization, design leading, and design controlling which are critically important for effective, efficient, and cooperative management for design management. Thus to identify the KSFs, it is necessary to understand the key functional features of the design management.

Based upon this framework, six researchers including the authors conducted a brainstorming method and selected a list of 10 items as potential KSFs. We then performed a Delphi technique to confirm the validity of these factors. The Delphi process in this research was initially planned to include three rounds of surveys by questionnaires. In each round, 32 experts with more than five-year related work experiences were asked to score the suggested factors using 5-point Likert scales (1=strongly insignificant, 5=strongly significant). In the second and third surveys, the respondents were asked to score the factors referring to the mean value of scores calculated from the preceding round. In conclusion, the 10 initially listed factors were selected as the KSFs of design management, and no further round of survey was conducted.

10 KSFs of design management are induced: CEO design mind, design human resources, design organization, design policy and strategy, design environment, design evaluation, design facility, design investment, design development process, and design management system.

2. Methodology

2.1 Sample

To test key success factors the sample was drawn from the following criteria: small & medium companies receiving Korean Design Management Grand Prize which was awarded annually by Korean Ministry of Trade, Industry and Energy and Korean Institute of Design Promotion, and representative companies from Design Management Excellent Case Report. Consequently 5 small & medium design companies were chosen: ACE, CJ, ArtBox, Romanson, and Fursys.

2.2 Data Collection

To test key success factors the sample was drawn from 3 experts in design management and 5 small & medium companies in Korea were chosen: ACE, CJ, ArtBox, Romanson, and Fursys.

Six experts of design management were performed an evaluation process to calculate 10 key success factors' importance for 5 samples. After raters were asked to learn rating directions, they scored ten times for one month. If raters do not induce similar results, they discussed their problems and rescored. Reliability was calculated agreement coding numbers by total coding numbers among raters. Holsti reliability coefficients were included within a satisfactory level (90.6% agreement). Based upon the results of evaluation each key success factor was categorized to H (very suitable, 3 point), M (suitable, 2 point), L (average, 1 point).

3. Analysis

KSF performance for design management is examined by three methods such as average value method, diagramming by energy value method, and genetic algorithm method. Average value method results of performance analysis as seen in Figure 1 and Table 1. Fursys shows highest average score, but Romanson shows relatively low score in terms of average value.

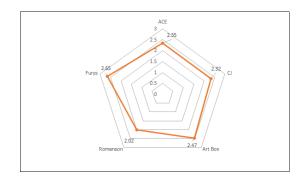


Figure 1. Performance analysis by average value method.

Table 1. Average values by five sample companies

Factors	ACE	CJ	ArtBox	Romanson	Fursys	
F1	2.83	2.8	2.83	2.3	2.87	
F2	2.57	2.46	2.58	1.97	2.76	
F3	2.36	2.36	2.56	1.92	2.5	
F4	2.36	2.68	2.46	1.78	2.8	
F5	1.65	1.6	1.98	1.63	2.48	
F6	2	1.9	2.67	1.77	2.6	
F7	1.98	2.08	1.73	1.6	1.93	
F8	2.52	2.14	2.5	2.28	2.88	
F9	2.5	2.46	2.76	2.88	2.84	
F10	2.7	2.75	2.58	2.03	2.85	
평균	2.35	2.32	2.47	2.02	2.65	

Note: F1: CEO design mind, F2: design human resources, F3: design organization

F4: design policy and strategy, F5: design environment, F6: design evaluation

F7: design facility, F8: design investment, F9: design development process

F10: design management system

The results of diagram by energy value are shown in Figure 2 and Table 2. To analyze energy value for each firm we used energy values of each success factor to show the performance of each firm (formula 1). Energy value of each firm using average value of each factor (formula 2) is induced to calculate business performance of each firm.

$$\mathbf{E} = \sum_{M=1}^{5} \sum_{N=1}^{10} E\mathbf{1} \tag{1}$$

$$\mathbf{E1} = (\mathbf{1} - D_{ma,mi}) \tag{2}$$

Where

E: energy by each firm, E1: energy by each factor, M: number of sample, N: factor of each firm, ma: maximum value, mi: minimum value, D: ma-mi

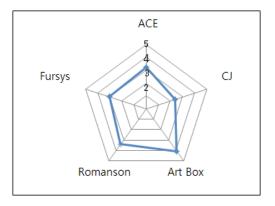


Figure 2. Performance analysis by energy value method.

Table 2. Energy values by five sample companies

Factors	ACE	CJ	ArtBox	Romanson	Fursys
F1	0.9	0.7	0.7	0.3	0.9
F2	0.4	0.3	0.1	0.3	0.2
F3	-0.1	0.2	0.1	0.5	-0.2
F4	0.5	0	0.3	0.5	0.5
F5	-0.4	0	0.5	0.4	0.3
F6	-0.1	0.3	0.5	0.9	0.5
F7	-0.1	0.6	0	0.6	0
F8	0.5	0	0.4	0	0.7
F9	0	0	0.7	0.7	0.7
F10	1	0.5	0.6	0	0.7
Energy value	2.6	2.6	3.9	4.2	4.3

Note: F1: CEO design mind, F2: design human resources, F3: design organization

F4: design policy and strategy, F5: design environment, F6: design evaluation

F7: design facility, F8: design investment, F9: design development process

F10: design management system.

Table 2 shows the results of energy value method to test design performance. Energy values of each firm are

4.3 for Fursys, 4.2 for Romanson, 3.9 for ArtBox, 2.6 for ACE, and 2.6 for CJ. This analysis shows some interesting results. Rather than total average values, energy value performance by each factor shows more meaningful. Thus the characteristics of firm differentiated importance of key success factors.

A genetic algorithm (GA) method was used to solve optimization problems based upon a natural selection process that imitates biological evolution with an algorithm by repeatedly modifying a population of individual solutions. At each step, the genetic algorithm randomly selects individuals from the current population and uses them as parents to produce the children for the next generation. Over successive generating stages, the population evolves toward an optimal solution^{17,18}. We used GA to analyze design management KSFs for five case companies. We analyzed KSFs of design management through crossover and mutation operations with ten key success factors as population data. Figure 3 shows the results of genetic algorithm method.

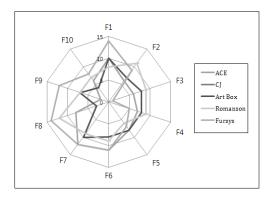


Figure 3. Performance analysis by energy value method.

Note: F1: CEO design mind, F2: design human resources, F3: design organization

F4: design policy and strategy, F5: design environment, F6: design evaluation

F7: design facility, F8: design investment, F9: design development process

F10: design management system

This analysis shows that particular factors influence more than that of total factors. For example, CEO design mind, design human resources and design environment influence more to design management.

4. Conclusion

This study explored the effect of key success factors on design management for five design companies. Design management is the principle of design area based upon sustainable competitive advantages. These findings suggest that there is necessary to explore key success factors that have an effect on the design management of Korea's small & medium companies.

This study suggests DMS model which is a system through customer value innovation to apply well design as a management resource (Figure 4).

The proposed model suggests that design is an important area and contributes innovation and value creation. Thus it builds core capability of a firm. To apply as a strategic weapon companies should build continually ten key success factors with a proposed DMS model. It also indicated that CEO design mind with design human resource, design facility, and design evaluation consists of major factors for the DMS model.

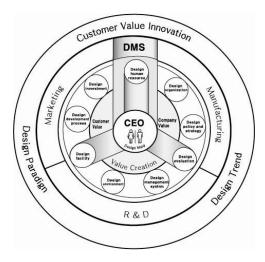


Figure 4. Proposed DMS model.

The study results have practical implications for a design company that wants to develop a design management strategy regarding consumer's demand of design innovation. Recently more consumers are paying attention to rapidly changing environment for innovative design products beyond the scope of satisfying desires of consumption. With the rapid development of ICT consumers can share more information on a product design and a company more quickly, therefore companies cannot help but consider this situation in their management.

Therefore, a design company should understand that it is an important management strategy which gains consumer satisfaction and convinces consumers of the key success factors of its design management. It can be a model of design management for more design companies that seek sustainable competitive advantages.

This study has some limitations, such as the same source of evaluation on the measurement of key success factors of design management and common method variance. Thus a various data collection method would be needed. Further research needs to be examined more on the KSF measurement methods.

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