

Article

Organizational Resource and Innovativeness to Sustainable Design Outsourcing Service

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Abstract: Design firms have been changing to become innovation consulting agencies, while business companies are improving their use of design innovation capacity for innovative problem-solving approaches. This study aims to identify how the organizational resource components of design firms affect the competitiveness of design outsourcing through the medium of absorptive capacity, innovation capacity, and design innovativeness. To do this, a total of 389 surveys from employees of design firms of seven regions in Korea were collected and analyzed. The analysis results show that tangible and human resource have a significant impact on absorptive capacity and innovation capacity, and intangible resource do the same on absorptive capacity. It was found that intangible resource would not have a significant impact on innovation capacity. This indicates that design firms should also prioritize fostering creative talent and strengthening financial and physical support for organizational activities. In addition, this study confirmed that enhanced absorptive capacity within the organization has a positive effect on the design innovativeness, and that the resource and capacity management of design firms are important to improve design innovativeness and outsourcing competitiveness.

Keywords: design outsourcing service; design firm; organizational resource; design innovativeness; sustainable competitiveness

1. Introduction

Since the design paradigm changed due to the spread of integrated and balanced thinking in the 21st century, design has evolved into an activity that creates experiences and leads to strategic innovation in enterprises. In the case of design firms, their business form has moved away from the design styling service-oriented work of creating and providing design drafts, according to client needs in the past, into a form of innovative consulting that establishes design strategies and supports client companies' innovation [1]. As the form of the design business expands away from design development-oriented tasks to overall management activities covering planning, research, development, and distribution, the capabilities of design firms are required to apply knowledge and methodologies in various fields and to strengthen their design innovativeness capacity to solve innovative problems [2].

For client companies, strengthening their innovation strategies has become an essential management activity. Innovativeness is the willingness to go beyond the best of current conditions and the pursuit of new opportunities, such as introducing new ideas from established practices and trying to do more than businesses currently in place, with design creativity acting as differentiated innovativeness for companies that are required to innovate [3]. Moreover, design competitiveness is an important factor in a company's strategy to develop innovative products to meet new market needs and develop new products that are ahead of the trend as the development of consumer-tailored products is expanded through a variety of small-volume production systems triggered by the Fourth Industrial

Revolution [4]. From the perspective of design firms, innovativeness can be defined as developing new designs reflecting new ideas or the needs of customers in design development; in particular, companies are expanding their competitiveness by developing innovative designs or services through outsourcing design firms' services. In general, most companies that do not have independent design departments carry out design development through outsourcing channels [5], but even companies with an independent design department are also increasing their rate of collaboration with design firms to develop products or explore new markets that can lead innovative ideas and trends [6]. In these backgrounds, design firms need to improve their innovative capability for the business success and sustainability.

The traditional view of using design is in the process of developing a product's services. However, today, using design capacity is to apply design capacity to the production, marketing, and innovation parts to leverage innovative design thinking skills or to improve problems through creative design processes [7]. Design firms, to perform these outsourcing services, must be able to use human and material resources and to seek the improvement of differentiated design innovation capacity to carry out corporate innovation strategies beyond the enhancing design development capacity, such as the imagination and expression of designers or the human resources in the past [8,9].

There is a lack of empirical studies on the service innovation or outsourcing management of design firms in Korea. To overcome these limitations, this study purposes to analyze how the organizational resource components of design firms affect their design outsourcing competitiveness, and to figure out empirically how the organizational resource components of design firms mediate their absorptive capacity, innovation capacity, and design innovativeness. Accordingly, this research reviewed the previous literatures about outsourcing management, design business, design outsourcing, and design innovation. The research model and hypothesis were developed on the precedent research and analyzed by survey data from Korean designers in design firms. In the end, this study presents the findings and solutions for strengthening the design firm's innovation capacity and enhancing the competitiveness of outsourcing by investigating the relations between design firms' ability to secure competitiveness in outsourcing and their organizational resource components.

2. Theoretical Background and Hypothesis Development

2.1. Organizational Resource Components of Design Firm

Bharadwaj [10] argued that the appropriate harmonization of the resources held by the companies should be made in order for them to derive the core competencies to gain a competitive advantage over their competitors. Organizational resource refers to tangible and intangible assets used by a company to establish and implement strategies to improve production efficiency or marketing effectiveness for target customers [11]. A resource is defined as a concept that encompasses all kinds of assets, including capabilities, organizational processes, corporate characteristics, information, and knowledge, as held by a company. Only companies with valuable, rare, hard to emulate, and irreplaceable resources can maintain above-average performance [12]. Organizational resources have characteristics that once they are immersed in their organization, they spare no strenuous efforts with a strong belief in the value and goals of the organization, and have a strong desire to remain a member of the organization [13]. Further, there is an inter-enterprise resource heterogeneity that arises because these resources cannot be moved completely between companies. In other words, the combination of these resources shows that it is economically valuable, relatively rare, difficult to emulate, and unable to move between businesses [14].

Looking at the prior studies on the components of organizational resource, Araya et al. [15] classified resources into physical resource, financial resource, human resource, technical resource, and organizational resource, whereas Barney [16] defined resources as organizational capital element and then classified organizational resources for forming competitive advantage into physical capital, human capital, and organizational capital. Grant [17] analyzed human resource and material

resource after subdividing them into tangible resource and intangible resource according to design firms' characteristics.

As such, organizational resources can be classified into various approaches. This study, however, classified organizational resources into three categories, such as tangible resource including physical resource and financial resource, human resource based on personal capability of organization members, and intangible resource like ideas, information and knowledge, and organizational culture. First of all, the tangible resource of a design firm means financial resource and physical assets [18,19]. In order to create design innovativeness and maximize design capacity, the financial and physical resources of design firms should be well-utilized in terms of organization beyond individual efforts.

The meaning of human resource generally includes the knowledge, expertise, talent, and creativity of company employees [20]. It can refer to the staff of the support department that makes up the design organization, and the designers. Klett [21] said that the expansion of designers' authority and autonomy improves the creativity and experimental spirit of the members, which in turn, increases the innovativeness of the company. Additionally, developing innovative designs in terms of the intangible resource of design firms requires organizational reinforcement activities of intangible resource, such as the creation of an organizational cultural environment, the structuralizing of design development processes, and the activation of communication [22]. After all, design firms need to enhance design innovativeness to provide innovative design services to their customer companies. To achieve this, they need to strengthen organizational-side corporate resources rather than simply rely on the creative capacity of individual designers, leading to design innovativeness and improved outsourcing competitiveness based on them. Thus, a systematic and managed approach to tangible resources, human resources, and intangible resources of design firms may be required.

Organizational competence means a company's ability or capability to develop and accumulate resources through organizational processes and utilize them in combination with other resources to achieve the goals it wants [23]. Therefore, the improvement of organizational competence can be understood as a result of a combination of tangible and intangible resource held by a company, which in this respect, defines organizational competence as a potential conversion activity of the resources [24]. As can be seen from these prior studies of business resource-based perspectives by Davenport [21], Klett [22], Rachman et al. [23], and Lau and Lo [24], the absorptive capacity and innovation capacity for improving an organization's innovative competence are also affected by the organizational resources and, depending on its ability to utilize and combine resources, the strength and results of capabilities within the organization may vary [25,26]. This study, therefore, looked at the impact of the tangible resource, human resource, and intangible resource factors of design firms, focusing on the absorptive capacity and innovation capacity needed in terms of strengthening design innovation.

2.2. Organizational Resources, Absorptive Capacity, and Innovation Capacity

Absorptive capacity can be defined as "a routine and ongoing strategic process to create new value" from a knowledge management process perspective. Potential absorptive capacity refers to the acquisition and absorption of knowledge, while realized absorptive capacity refers to the internalization and utilization of knowledge absorbed from the outside. Four stages were also presented as follows: acquisition, assimilation, transformation, and utilization of knowledge by composing absorptive capacity [27]. The ability to obtain, assimilate, and use external information for business purposes can be defined as absorptive capacity [28]. It is treated as an important capability in a company's innovation activities because it devises new ideas, organizes resources differently, and determines companies' ability to develop innovative strategies and effective products [29].

Looking at previous studies, increased absorptive capacity increases operational efficiency [30] and has a positive effect on organizational and corporate performance [31]. As organizations with higher absorptive capacity have a positive impact on the success of innovative product development, it is an important factor in enhancing corporate innovation [32]. Companies create innovative products to increase their chances of capturing new market opportunities. Organizations that do not have

sufficient absorptive capacity to improve the company's performance in product innovation through close cooperation with customers, however, find it difficult to integrate potential customers' needs into new product development [33]. In this respect, absorptive capacity is an important capability in identifying customer needs and developing new products. Particularly, design absorptive capacity leads to the creation of high added value based on effective and emotional values in innovative activities, as design absorptive capacity serves to enhance customer friendliness and acceptance by reprocessing limitations on complex or difficult innovative technologies from a human engineering perspective and an aesthetic perspective [34]. After all, from these perspectives, tangible resources, human resources, and intangible resources within the organization affect the absorptive capacity of design activities to create innovations as the following hypotheses state:

Hypothesis 1 (H1). *Among the organizational resources of a design firm, tangible resources will have a positive effect on absorptive capacity.*

Hypothesis 2 (H2). *Among the organizational resources of a design firm, human resources will have a positive effect on absorptive capacity.*

Hypothesis 3 (H3). *Among the organizational resources of a design firm, intangible resources will have a positive effect on absorptive capacity.*

Innovation capacity leads to transform knowledge and ideas into new products and process systems. It can be divided into details such as R&D capabilities, resource allocation capabilities, production capabilities, marketing capabilities, learning capabilities, strategic planning capabilities, and organizational capabilities [35]. Burns and Stalker [36] defined innovation capacity as organizational capabilities to successfully introduce and apply new ideas, processes, and products. It can be understood as the necessary functions and knowledge to create new technologies through effective absorption, mastering, and improvement of existing technologies [37]. Innovation capacity today is also the ability of companies to manage continuous change, and it is a key factor to survive in a rapidly changing environment.

Design innovation capacity is defined as services or products being accepted as new by potential prospective consumers or by inducing behavioral changes in the target markets [38]. As product functions satisfy practical needs, but innovation design capacity through form satisfies emotional and symbolic needs, Verganti [39] interpreted design innovation as semantic innovation. Design innovation capacity allows companies to create economic wealth through successful commercialization by creatively interpreting and applying efficient functions in use and aesthetic design elements in appearance to products. It can also be understood as a creative activity that ultimately creates social and cultural value by making the quality of human life beautiful and beneficial [40].

From this perspective, the innovation capacity of design firms is correspondingly affected by not just human resources but both tangible and intangible resources directly involved in design development within the organization. From this point of view, it is assumed that the organizational resources of a design firm will have a positive impact on its innovation capacity as the following hypotheses state:

Hypothesis 4 (H4). *Among the organizational resources of a design firm, tangible resources will have a positive effect on innovation capacity.*

Hypothesis 5 (H5). *Among the organizational resources of a design firm, human resources will have a positive effect on innovation capacity.*

Hypothesis 6 (H6). *Among the organizational resources of a design firm, intangible resources will have a positive effect on innovation capacity.*

2.3. Absorptive Capacity, Innovation Capacity, and Design Innovativeness

Minbaeva and Michailova [41] have mentioned that the development of absorptive capacity, in which members want to pursue new values, has a positive effect on strengthening the organization's innovation activities. Absorptive capacity is the ability to recognize the value of new information, assimilate it, and apply it to commercial purposes. It can increase the probability of capturing new market opportunities by creating innovative products and services [42]. As companies' innovation processes become increasingly complex, successful innovation requires absorptive capacity directly related to the product's competitiveness, such as technology and market analysis [43]. As design development is further understood from the perspective of encompassing forms and functions that meet consumer needs beyond aesthetic activities [44], or the absorptive capacity based on organizational value creation, understanding and knowledge-related activities based on new information can have a direct impact on enhancing design innovation capacity. As Lim and Kim [33] argued, design absorptive capacity can improve innovation capacity by presenting companies with ideas for new market opportunities, technology development, and existing causal relation. Based on these perspectives, the following hypothesis was established:

Hypothesis 7 (H7). *Absorptive capacity of a design firm will have a positive effect on innovation capacity.*

Absorptive capacity and innovation capacity can be discussed within the impact of design innovativeness. Rubera and Kirca [45] classify innovation into two categories: technological innovation and design innovation. Technological innovation means improving the function of the product, whereas design innovation means improving the stylistic aspect of the product. In addition to technology-centered innovation that improves functionality, there have been a growing number of studies in recent years in which design-centered and innovative problem-solving techniques that create sociocultural meanings through changes in forms are presented as important means of innovation [46]. Design innovation can be largely divided into two viewpoints: a form-oriented viewpoint in which a product's shape is the focus of the design, and a form-and-function viewpoint that makes up the product. With the growing interest in value perceived by customers, value creation through design has begun to emerge in the realm of innovation, thereby strengthening its importance [47].

Design innovation activities are divided into aesthetic innovation, use innovation, semantic innovation, and typological innovation activities [48]. Design innovativeness, namely the quality to create new things through design, is defined as creative, openness, and service innovativeness [49]. The design development process is not a simple intuitive activity, but an activity that goes through the collection and analysis of information, trends, and consumer opinion reflection stages. Organizational innovation capacity will have a significant impact on design development. Therefore, absorptive capacity and innovation capacity work until design firms leverage their resources to demonstrate design innovation [50]. The following hypotheses were set up in these assertions:

Hypothesis 8 (H8). *Absorptive capacity of a design firm will have a positive effect on design innovativeness.*

Hypothesis 9 (H9). *Innovation capacity of a design firm will have a positive effect on design innovativeness.*

2.4. Design Innovativeness and Outsourcing Service Competitiveness

Design outsourcing means the service activities of a design firm which provides design-related services that an enterprise needs [51]. Design firms must meet client needs through high levels of design service quality, and gain market competitiveness based on differentiated design services and innovativeness for business growth and sustainability [52]. In particular, design innovativeness is emphasized today because it has recently become an important purpose for companies to seek design outsourcing services.

Currently, design is playing a role as an active integrator that consolidates marketing, engineering, and styling [53]. Design innovativeness has become an important requirement in design outsourcing services as design activities leading corporate innovation projects are emphasized beyond product development strategies [54]. In addition, design as a value creator has the potential to help enterprises overcome their difficulties at a position of an explorer for the continued growth of the business and to create new economic and cultural values [55]. This is why companies are approaching design outsourcing strategies as strategic partners, and innovation managers in the decision-making process can leverage this innovative role of design to plan the future of the enterprise [56]. Unlike in the past, therefore, design firms should play a role as strategic partners in providing innovative strategy consulting services that focus on design [57]. It should also continue to strengthen the creation of organizational design innovativeness in order to form a mutually advanced and further enhanced relationship with client companies.

The outsourcing management of companies today is required to provide services that can support an aggressive innovation strategy in a firm's defensive innovation strategy [58]. Design outsourcing companies likewise need to consider strengthening their design innovativeness to support their client companies' innovation capacity [59]. The level of innovativeness increases as the corporate competitive environment is further strengthened. As Terwiesch and Ulrich noted, providing the appropriate level of innovation required by companies today needs not just upgrading technology or capital operations but innovative management appropriate for internal and external situations [60]. After all, the competitiveness of design outsourcing services in line with the needs of outsourcing service markets can result from design innovativeness [61]. In this study, the hypothesis that improving design innovativeness would ultimately increase client companies' outsourcing service satisfaction, which in turn, would have a positive impact on improving the outsourcing competitiveness of design firms, were stated as follows:

Hypothesis 10 (H10). *Design innovativeness of a design firm will have a positive effect on outsourcing competitiveness of design service.*

3. Research Methods

3.1. Research Model

The research model of this study identifies three components of the organizational resources of the design firms into tangible resource, human resource, and intangible resource, and analyzes empirical relationships between how these resources affect the absorptive capacity and innovation capacity of an enterprise and how, through them, design innovation and outsourcing competitiveness are affected. Based on previous studies associated with this, hypotheses were derived and, finally, the research model shown in Figure 1 was designed. As independent variables, three factors such as tangible resources, human resources, and intangible resources were set up, which are the components of the organizational resources of a design firm. As parameters, the absorptive capacity and innovation capacity of resources and design innovativeness were set up. Finally, as a dependent variable, the competitiveness of the design outsourcing service was set up, and the model was verified through confirmatory factor analysis and path analysis based on the structural equation.

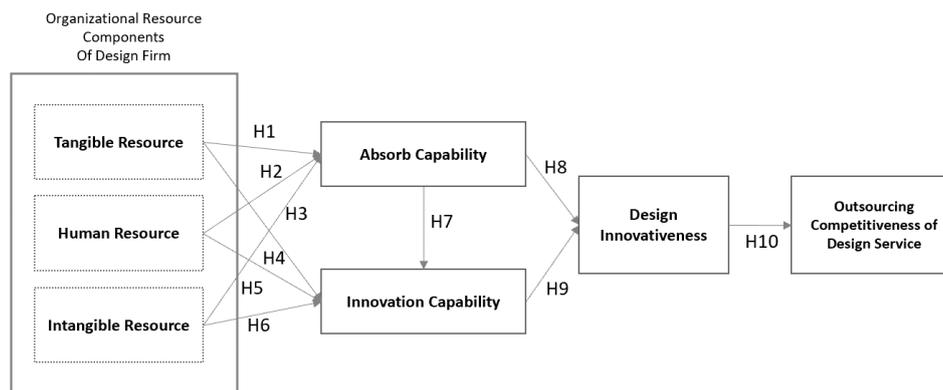


Figure 1. Research concept model.

3.2. Measurement Variable

For ‘tangible resource’ based on the research by Hill and Jones [19] and Zahra and Nielsen [62], four items such as financial support, environmental infrastructure support, technical support for the development of design technology, and activities in purchasing design-related equipment were applied. In the case of ‘human resources’ based on the prior research of Grant [17] and Davenport [20], four items were used on whether companies have internal human resources, such as whether employees have expertise, whether employees have talent suitable for design development, whether employees have creative talent, and whether employees are diversely talented. For ‘intangible resource’ based on Lawson and Danny [42], Sen and Egelhoff [63], and prior studies, four items such as design rights encouragement culture, culture of creative content production, possession of creative development process, and utilization of innovative technology were used. In the case of ‘design innovativeness’ based on the researches by Talk et al. [64] and Townsend and Shud [65], three items were used as follows: creativity, openness, and service innovativeness that appear in the design development process of a design firm. Finally, for the dependent variable ‘outsourcing competitiveness’ of design service, three categories of level of design satisfaction, level of service satisfaction, and continuous relationship maintaining, were used based on prior studies such as one by Voss [66] and Covin et al. [67]. However, the technical capacity components were excluded from this study as the results of the analyses of the measurement model reliability and concentration validity showed that it was not significant. As a result of the factorial analysis, design rights encouragement culture and possession of creative development process of intangible resources were rejected and not used in this study (see Table 1).

3.3. Data Collection and Demographic Information

This study selected 30 design firms from the seven regions (Seoul, Gyeonggi, Chungcheong, Jeolla, Gyeongsang, Gangwon, and Jeju) in Korea. To select the companies, this research used the list of registered design companies on ‘Korea Institute of Design Promotion’ and sorted the firms by high income ranking and organizational size as having over 10 designers in each region. The survey was carried out on designers who are working at design firms. The survey has announced the Statistics Act 33 (protection duty of personal data) and 34 (duty of statistical writer) provision based on the Korean law to specify the information security of response data.

Each answer is evaluated by measuring the Likert 5 port scale (1=strongly disagree, 2=disagree, 3=no opinion, 4=disagree, 5=strongly agree). The questions in this questionnaire are built and tested to suit the conditions of the Korean design industry. The survey was collected for 36 days from August 16 to September 20, 2019, and a total of 405 questionnaires were collected by face to face survey. Finally, a total of 389 surveys were analyzed, except for 16 unsuccessfully answered ones.

Table 1. Question items.

Variables	Question Items	References
Tangible Resource (TR)	<ol style="list-style-type: none"> 1. My company provides good financial support for design development. 2. My company is well-equipped with the environmental infrastructure for design development. 3. My company has good technical support for design development. 4. My company is active in purchasing the latest equipment and materials related to design development. 	Hill and Jones [19] Zahra and Nielsen [62]
Human Resource (HR)	<ol style="list-style-type: none"> 1. My company has enough talented employees with expertise in design development. 2. My company has talented employees for design development. 3. My company has creative talented employees for design development. 4. My company has talented employees available for collaboration in various sectors. 	Grant [17] Davenport [20]
Intangible Resource (IR)	<ol style="list-style-type: none"> 1. My company encourages design rights (patents, utility models, and trademarks). 2. My company has a corporate culture for creative content production. 3. My company has its own creative design development process. 4. My company utilizes innovative technology for design development. 	Lawson and Danny [42] Sen and Egelhoff [63]
Absorptive Capacity (AC)	<ol style="list-style-type: none"> 1. My company quickly analyzes the availability of new knowledge or information. 2. My company makes an effort to utilize new information or trends. 	Zahra and George [27]
Innovation Capacity (IC)	<ol style="list-style-type: none"> 1. My company's level of idea creation for a new design is high. 2. The level of design results developed by my company is high. 	Zahra and Nielsen [62]
Design Innovativeness (DI)	<ol style="list-style-type: none"> 1. My company prefers creative design. 2. My company aims to produce innovative design results which lead trends. 	Talke et al. [64] Townsend and Shu [65]
Outsourcing Competitiveness (OC)	<ol style="list-style-type: none"> 1. We provide high quality design outsourcing service in the industry. 2. My company has good reputation in the market. 3. Our design service offers innovative solutions to client companies. 4. My company's total of obtained project orders and sales are on a steady rise. 	Voss [66] Covin et al. [67]

The demographic analysis of the survey respondents showed that 55.3% were men and 44.7% were women; 16.2% were individuals under 30 years old, 42.7% were between 30 and 40 years old (presenting the greatest number), 28.8% were between 40 and 50, and 11.6% were between 50 and 60 years old. In the case of work period, 31.1% had less than 5 years of work rendered and 27.2% had less than 10 years. In subsectors of design, product design registered 32.9%, visual design 33.7%, and service design 15.4%. In the case of education, 64.5% were college graduates and 25.2% were master's degree holders. As regards to the sizes of the company sales, 32.4% had more than KRW 1 billion and 25.4% had between KRW 0.5 and 1 billion (see Table 2).

Table 2. Demographics of survey participants.

	Item	Frequency	%
Gender	Male	215	55.3
	Female	174	44.7
	Total	389	100.0
Age	Under 30	63	16.2
	30 - under 40	166	42.7
	40 - under 50	112	28.8
	50 - under 60	45	11.6
	60 and older	3	0.8
	Total	389	100.0
Work Period	Under 5 years	121	31.1
	5 - under 10 years	106	27.2
	10 - under 15 years	76	19.5
	15 - under 20 years	58	14.9
	20 and more	28	7.2
	Total	389	100.0
Sector	Visual design	131	33.7
	Product design	128	32.9
	Environment design	30	7.7
	Multimedia design	29	7.5
	Service design	60	15.4
	Others	11	2.8
	Total	389	100.0
Level of Education	High-school graduates	13	3.3
	College graduates	251	64.5
	Master's degree	98	25.2
	Ph.D.	27	6.9
	Total	389	100.0

4. Results

4.1. Analysis of Reliability and Validity

In order to analyze the reliability and validity of the structural equation measurement model, it can be said that the internal consistency reliability was obtained when the composite reliability index was 0.7 or higher [68]. The convergent validity was assessed by factor loading, Cronbach α , and composite reliability index. If factor loading was 0.4 or higher, Cronbach α was 0.6 or higher, and if there was statistical significance, it can be said that the convergent validity was obtained [69]. In line with these criteria, all factor loadings were 0.631–0.808, all of which were above 0.6, while internal reliability obtained significance at a composite reliability of 0.730–0.888. Since all t-values were 6.0 or more, it was confirmed that the results were statistically significant. Significance was obtained as AVE values ranging from 0.575 to 0.752, with the Cronbach α value ranging from 0.738 to 0.858. As a result of analyzing the goodness of fit of the measurement model, $\chi^2(p)$ was 283.26 and $\chi^2/\text{the degree of freedom}$ was 1.901. The configuration values of the goodness of fit of the measurement model were as follows: GFI (goodness of fit index) was 0.934, AGFI (adjusted goodness of fit index) was 0.907,

NFI (normal fit index) was 0.932, and RMSEA (root mean square error of approximation) was 0.048 (see Table 3).

Table 3. Analysis of the measurement model reliability and concentration validity.

Variables	Measurement Item	Standard Loading Values	Standard Error	t-Value(p)	CR	AVE	Cronbach α
Tangible Resource (TR)	TR1	0.78			0.880	0.647	0.858
	TR2	0.785	0.06	15.844 ***			
	TR3	0.801	0.063	16.19 ***			
	TR4	0.75	0.072	15.048 ***			
Human Resource (HR)	HR1	0.721			0.870	0.626	0.825
	HR2	0.783	0.077	14.129 ***			
	HR3	0.778	0.077	14.054 ***			
	HR4	0.669	0.08	12.186 ***			
Intangible Resource (IR)	IR2	0.808	-	-	0.730	0.575	0.749
	IR4	0.741	0.083	11.306 ***			
Absorptive Capacity (AC)	AC1	0.76	-	-	0.818	0.692	0.738
	AC1	0.769	0.071	13.849 ***			
Innovation Capacity (IC)	IC1	0.8	-	-	0.858	0.752	0.776
	IC2	0.793	0.06	16.204 ***			
Design Innovativeness (DI)	DI1	0.743	-	-	0.817	0.691	0.751
	DI2	0.808	0.079	13.695 ***			
Outsourcing Competitiveness (OC)	OC1	0.744	-	-	0.888	0.665	0.824
	OC2	0.771	0.062	14.661 ***			
	OC3	0.8	0.062	15.204 ***			
	OC4	0.631	0.066	11.914 ***			

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In the case of correlation analysis, it can be said that discriminant validity was obtained between each latent variable if the square root of AVE obtained from each latent variable, according to the criteria Fornell and Larcker [70] suggested, was larger than the correlation coefficient of each latent variable. As analyzing the AVE values and correlation coefficients among the latent variables using this criterion, the AVE square root value of each latent variable was larger than the correlation coefficients among the latent variables as shown in Table 4, and the correlation coefficient values were 0.7 or higher. It is confirmed that the discriminant validity was obtained.

4.2. Analysis of Structural Model

Table shows the structural equation fitness, $\chi^2(p)$ was 327.141 and $\chi^2/\text{the degree of freedom}$ was 2.084. The GFI values were 0.924, namely greater than 0.9, the AGFI was 0.899, the NFI was 0.921, and the RMSEA was 0.053. These showed appropriate configuration values of the goodness of fit, indicating that the model's goodness of fit was significant. The CFI, which was not affected by the sample but represented the explanatory power of the model, was 0.957, and the TLI, which judged the explanatory power of the structural model, was 0.948. They were all above 0.9 and shows that the analysis from this means that the basic model was highly suitable.

Table 4. Discriminant validity.

Variables	AVE	TR	HR	IT	AC	IC	DI	OC
Tangible Resource (TR)	0.647	0.804						
Human Resource (HR)	0.626	0.587	0.791					
Intangible Resource (IR)	0.575	0.503	0.406	0.758				
Absorptive Capacity (AC)	0.692	0.558	0.592	0.456	0.832			
Innovation Capacity (IC)	0.752	0.585	0.63	0.44	0.612	0.867		
Design Innovativeness (DI)	0.691	0.538	0.483	0.423	0.581	0.601	0.831	
Outsourcing Competitiveness (OC)	0.665	0.581	0.572	0.506	0.582	0.668	0.593	0.816

Note: The dark diagonal part is the square root value of AVE.

The tangible resource was found to have a positive effect on absorptive capacity with a t-value of 3.015 ($p < 0.05$), while the human resource had a positive effect on absorptive capacity with a t-value of 5.607 ($p < 0.001$). It was also found that the t-value of the intangible resource was 3.103 ($p < 0.05$) and that it had a positive effect on absorptive capacity. The t-value of the tangible resource was 2.361 ($p < 0.05$) and the t-value of the human resource (HR) was 3.693 ($p < 0.001$) with both having a positive effect on the innovation capacity. For the intangible resource, the hypothesis was rejected with a path coefficient of 0.081, indicating that the innovation capacity was not affected. The absorptive capacity was found to have a t-value of 3.47 ($p < 0.001$) and it had a positive effect on the innovation capacity. The t-value of the absorptive capacity was 5.474 ($p < 0.001$) and the t-value of the innovation capacity was 2.922 ($p < 0.05$) with both having a positive effect on the design innovativeness. The t-value of the design innovativeness was 11.636 ($p < 0.001$) and it affected the outsourcing competitiveness (see Table 5).

Table 5. Verification of hypotheses.

Hypothesis (Path)	Path Coefficient	t-Value (p)	Support	R ²
H1 Tangible Resource → Absorptive Capacity	0.260	3.015 **	Adopted	0.670
H2 Human Resource → Absorptive Capacity	0.449	5.607 ***	Adopted	
H3 Intangible Resource → Absorptive Capacity	0.233	3.103 **	Adopted	
H4 Tangible Resource → Innovation Capacity	0.190	2.361 **	Adopted	0.753
H5 Human Resource → Innovation Capacity	0.322	3.693 ***	Adopted	
H6 Intangible Resource → Innovation Capacity	0.081	1.133	Rejected	
H7 Absorptive Capacity → Innovation Capacity	0.384	3.47 ***	Adopted	0.880
H8 Absorptive Capacity → Design Innovativeness	0.332	2.922 **	Adopted	
H9 Innovation Capacity → Design Innovativeness	0.649	5.474 ***	Adopted	
H10 Design Innovativeness → Outsourcing Competitiveness	0.886	11.636 ***	Adopted	0.785

Structural Equation Fitness: χ^2 (df) 327.141, χ^2 /degree of freedom 2.084, GFI (goodness of fit index) 0.924, AGFI (adjusted goodness of fit index) 0.899, NFI (normal fit index) 0.921, TLI (Tucker-Lewis index) 0.948, CFI (comparative fit index) 0.957, RMSEA (root means square error of approximation) 0.053.

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5. Discussion and Conclusions

This research empirically analyzed the impact of an organization's design tangible resource, human resource, and intangible resource on the competitiveness of design outsourcing services through the medium of absorptive capacity, innovation capacity, and design innovativeness. The analysis by Korean design firms showed that the tangible resource, human resource, and intangible resource of design firms all affected absorptive capacity and, among the organizational resource components, the tangible

and human resource affected the innovation capacity, while the intangible resource did not affect it. In addition, the absorptive capacity affects the outsourcing service competitiveness by mediating design innovativeness, while it does not directly affect the outsourcing service competitiveness.

The intangible assets of design firms did not have a direct effect on improving organizational innovativeness. This was different from previous studies [71,72] that generally argued that innovative designs required a high level of understanding among companies on the creative culture or atmosphere, the importance of intellectual property, and technological factors. Although they affected the creation of knowledge and value in terms of the organization's absorptive capacity, the human resources were the most important factor in strengthening innovation capacity directly, while tangible resources such as financial support and infrastructure technology support were also essential. Rather than focusing on creative organizational culture or idea production, therefore, it is necessary for design firms to consider, as top priorities, fostering creatively talented employees and strengthening physical support for organizational activities first.

Similar to previous studies on the innovativeness and absorptive capacity of companies [73–75], it was confirmed that as the absorptive capacity of the organizational resources in design firms is strengthened, the innovation capacity or design innovativeness of an organization can be strengthened consequently. Even though resources directly affect enhancing innovativeness within an organization, greater effects can be generated when mediating the process of value creation or intellectualization through their organizational internalization. For the design service activities, it was also confirmed that strengthening the absorptive capacity of resources were a positive innovation strategy exercise process.

Resource management and capacity management of design firms are secure companies' design innovativeness, as well as obtaining competitiveness in design outsourcing services. Generally, design firms have been perceived as artistic activity organizations based on designers' creativity or artwork due to traditional customs, so that the importance of organizational and managerial management factors has not been emphasized [76,77]. As this study shows, design firms need to explore systematic management strategies for developing resources, capacity and innovativeness as professional service organizations that provide design outsourcing services. This management expertise can be the foundation for corporate growth and continuous advancement through securing competitiveness in the market beyond the success of design services.

Eventually, the results of this study suggest the significant insight for the organizational operation of design firms through resource management to design service innovation. The strategic operation of design firms for discovery of innovation is one of the aggressive management methods to overcoming pending problematic situations in the operation of organizations. Design firms need to instruct on how to apply their design outsourcing service to increase the likelihood of success in design innovation. Most of all, human resource as a designer's individual capability is an important to innovative design service. The design firms should be able to suggest successful designer's alternatives, not by performing subjective aesthetic process, but by objective and scientific design development process through market-oriented information seeking, scientific design development and effective design management. Design firms also should be considered to cultivate design business mind, maximizing profit by various sources such as royalty, operation process, and design technology through participating distribution process and outsourcing tasks.

In addition, design outsourcing agencies should be managed by the relations with clients, and business competences are much more important to design innovation than firm routines and culture. Design innovation requires the combination of a wide range of different type of knowledge. The design firm itself ought to emerge from interactions between different sites that synthesize and recombine knowledge to produce innovative effect and new design. Furthermore, it should devote more research to exploring the distinctive logics of innovation in creative, knowledge-intensive business service industries.

This study is conducted on Korean design firms to collect the survey data. Future study should be to expand the continent and countries, and comparative studies for each country can be carried out to

indicate the differences of design business environment by country culture. Additionally, design firms have differences depending on the size and industry sector. In this issue, future study can compare the resource management and design innovation by firm size and design area. Furthermore, it is necessary to develop resources and capacity factors considering design firms, and to design an outsourcing service environment to reach an essential depth of research.

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