

Article

Evaluating the Service Operating Efficiency and Its Determinants in Global Consulting Firms: A Metafrontier Analysis

Gowangwoo Park ¹, Seok-Kee Lee ^{2,*} and Kanghwa Choi ³ 

¹ Department of Smart Convergence Consulting, Hansung University, Seoul 02876, Korea; dreamx1225@hansung.ac.kr

² Department of Computer Engineering, Hansung University, Seoul 02876, Korea

³ Department of Business, Hansung University, Seoul 02876, Korea; khchoi@hansung.ac.kr

* Correspondence: seelee@hansung.ac.kr; Tel.: +82-2-760-8011

Abstract: Knowledge consulting services are one of the fastest growing fields in the knowledge service industry since the 2010s and have been emerging as a core area of the knowledge economy. Accordingly, consulting services are actively sought and provided in various fields, including business strategy and management, accounting, and ICT, and global consulting firms have experienced rapid growth. However, previous research evaluating the performance or service quality of knowledge consulting services is relatively scarce. In particular, there are barely any studies that apply the data envelopment analysis (DEA) model to measure the relative operating efficiencies of consulting firms in the global consulting service field. This study measured the operating efficiency of 27 global consulting firms using DEA. As global consulting firms are managed differently depending on the characteristics of the country in which they operate, the 27 global consulting firms were classified into three groups by region (USA, Europe, Asia) to measure their meta-efficiency (ME), group efficiency (GE), and technology gap ratio (TGR) and identify the causes of inefficiency at global consulting firms. The contextual variables within consulting firms that affect efficiency were analyzed using Tobit regression. Based on the analysis results, this study suggests strategies for enhancing the operating efficiency and realizing sustainable growth in global consulting firms.

Keywords: consulting service; metafrontier; technology gap ratio; Tobit regression



Citation: Park, G.; Lee, S.-K.; Choi, K. Evaluating the Service Operating Efficiency and Its Determinants in Global Consulting Firms: A Metafrontier Analysis. *Sustainability* **2021**, *13*, 10352. <https://doi.org/10.3390/su131810352>

Academic Editor: Carla Maria Marques Curado

Received: 20 August 2021

Accepted: 13 September 2021

Published: 16 September 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Deepening globalization, revolutions in information and communication technologies and the advancement of the service industry, and higher income levels of consumers resulting in the sophistication and diversification of demand in the 21st century have all led to the arrival of knowledge-based economies. Unlike past economies, which were centered on labor and capital for creating added value, information and knowledge form the core of competitiveness in a knowledge-based economy. In this sense, consulting services, which use a relatively higher input of knowledge to augment existing industrial expertise and provide innovative and new knowledge and information to various firms, have been recognized as a “knowledge-intensive business service (KIBS)” among the many businesses and services that have gained greater attention with the emergence of knowledge-based economies (OECD, 2007).

The demand for business consulting services across various fields—customer experience, M&A and divestitures, change management, performance improvement practices, and sustainability—has been rising over the recent years as firms seek to strengthen their global competitiveness and maximize corporate value amid rapid changes in the business environment. Along with the continuous growth of global companies, firms that provide consulting services have also undergone enormous changes both in quantity and quality.

As of 2020, the size of the global consulting market has reached approximately 132 billion USD, and the number of business consultants in the US has grown to about 734,000 persons (www.statista.com, accessed on 25 April 2021).

On the other hand, despite the rapid growth of consulting services, relatively few studies have been conducted on consulting service firms. As a principle, most consulting firms keep the information on their internal finances, personnel, and consulting projects confidential. This is mainly because their major customers are firms that have requested consulting services, who usually require the contents of the services they are provided to be kept strictly confidential since those services deal with internal company information. Therefore, little information on consulting firms and their corporate clients, who are respectively the providers and subjects of consulting services, is publicly disclosed. Even in the case of well-known and well-reputed consulting firms, such as *McKinsey & Company* and *Bain & Company*, little is known about their clients and projects [1].

This lack of information has created a gap in the analysis of the services provided by consulting firms or the competitiveness of individual consulting firms. For consulting firms to strengthen their core competencies and operate successfully in the fast-growing consulting market, it is necessary to measure and analyze their relative service operating efficiencies [2]. In this regard, a data envelopment analysis (DEA) on the efficiencies and performances of consulting firms is essential for understanding the market positions of consulting firms and enabling the firms to realize more efficient operation by comparing their current competitiveness and performance. Existing studies have mainly dealt with the factors affecting consulting service quality or client satisfaction [3–8], and few have attempted to analyze the competitiveness or relative efficiencies of multiple consulting firms. Therefore, assuming that the evaluation of consulting firms' relative efficiencies could improve the efficiency of individual consulting firms and contribute to maintaining the sustainable growth of the consulting market as a whole, this study measured the relative efficiencies of 27 global consulting firms that provided consulting services as of 2020. This analysis is expected to provide knowledge service businesses with guidelines on more efficiently allocating and coordinating internal resources, and help them to establish operation plans and achieve long-term strategic goals [9,10].

Consulting firms are technically homogenous in that they all provide professional knowledge services, such as advising and suggesting solutions on business strategy, management, IT, human resources, accounting, etc. Nonetheless, the geographical differences in their service operations create heterogeneity in their production technologies, such as the methods of operation or the levels of consulting service technology [9,11,12]. For example, 'ghSMART' in the US and 'YCP Solidiance' in Asia both provide consulting services to clients in their regions, but their service operation strategies or levels of organization vary due to geographical differences. In particular, the political, legal, social, commercial, and linguistic characteristics of the countries in which consulting firms operate lead to differences in consultation processes and the way consulting projects are organized. Due to this characteristic of consulting services (i.e., technically homogeneous as a service type but heterogeneous in terms of regional operation policies), setting the 27 global consulting firms as decision making units (DMUs) of a single population in the DEA could likely lead to inaccuracies and analytical errors [13,14]. Classifying the firms into different DMU groups based on their operational characteristics could not only provide more accurate benchmarking information but also suggest better strategies for efficiently allocating and managing the firms' resources.

Accordingly, this study broadly classified the 27 consulting firms into groups by region as follows, based on considerations of geographical specificities and regional differences in consulting service operations: Asia-Pacific (*McKinsey & Company_Asia-Pacific*, *Bain & Company_Asia*, *Oliver Wyman_Asia-Pacific*, *Alvarez & Marsal_Asia*, *Kearney_Asia-Pacific*, *Roland Berger_Asia*, *YCP Solidiance*, *Arthur D. Little_Asia*); Europe (*McKinsey & Company_Europe*, *Bain & Company_Europe*, *Oliver Wyman_Europe*, *Alvarez & Marsal_Europe*, *Kearney_Europe*, *Roland Berger_Europe*, *OC&C Strategy Consultants_Europe*, *Strategy & PwC*

network_Europe, Whiteshield Partners EMEA); and USA (*McKinsey & Company_USA, Bain & Company_USA, The Keystone Group, The Bridgespan Group, Boston Consulting Group, Putnam Associates, ClearView Healthcare Partners, ghSMART, Insight Sourcing Group, OC&C Strategy Consultants_USA*). Based on this classification, a metafrontier DEA was performed to enable comparison between the efficiencies of groups operating under different technical conditions. Metafrontier DEA allows the analysis of individual group frontiers and the metafrontiers enveloping these group frontiers [2,15,16] as well as the technology gap ratio (TGR), which is the difference between the group frontier and metafrontier of each DMU [17,18]. Furthermore, the Kruskal–Wallis test was also performed based on the metafrontier analysis results to examine the differences in the efficiencies of the different DMU groups. Additionally, this study employed a two-stage DEA model using Tobit regression to identify the contextual factors within the consulting environment affecting the efficiency of global consulting firms, which are key to improving the firms' operating efficiencies, and to suggest appropriate strategies.

The research questions dealt by this study are as follows.

(RQ 1) What are the main reasons for the observed inefficiencies (e.g., pure technical inefficiency or scale inefficiency) in global consulting firms?

(RQ 2) Are there any differences among the efficiencies of global consulting firms?

(RQ 3) What are the internal determinants affecting the operating efficiencies of global consulting firms?

The practical implications of this study's metafrontier DEA results could be summarized as follows.

- This study is the first to attempt to measure the efficiencies of global consulting firms. Unlike most previous studies on consulting firms that have examined the quality of consulting services, this study measured the meta-efficiency (ME) of global consulting firms.
- The meta-efficiency (ME), group efficiency (GE), and technology gap ratio (TGR) were analyzed by classifying the global consulting firms into regional groups (USA, Europe, and Asia-Pacific) that reflect their varied operational methods due to geographic specificities. Notably, the USA group showed higher efficiency than the other groups, but many of the firms in the USA group were located in the DRS area, pointing to the necessity to reduce their sizes to improve efficiency.
- The Tobit regression analysis to identify the firms' internal environmental factors affecting the ME of global consulting firms revealed the negative impact of firms' leadership on ME. On the other hand, promotion policies were found to have a positive effect on ME. Therefore, global consulting firms need to manage their internal resources strategically to improve their efficiency.

The remainder of this paper is structured as follows. A literature review on business consulting services is presented in Section 2. Section 3 explains the research methodology, and Section 4 lays out the research model and empirical data used in this study. Section 5 presents the empirical metafrontier DEA results and compares the efficiencies of the global consulting firms by region to identify the causes and degrees of inefficiency and suggest guidelines for improvement. Section 6 investigates the contextual/environmental variables affecting ME. Lastly, Section 7 discusses the findings and presents the study's conclusions, limitations, and research opportunities.

2. Literature Review on Company Efficiency

Consulting services refer to the consultations on business management provided by consulting firms to other client firms in various industries. Consulting firms analyze and diagnose ways to improve the corporate client's situation by having experts in business management find solutions to the client's management problems and support its overall operation from a multifaceted and objective perspective based on professional knowledge and expertise. As such, consulting firms provide a type of professional knowledge service

involving the analysis of successful cases in various industries and the application of best business practices.

Generally, a consulting firm uses the diverse human and material resources within the firm to carry out successful consulting projects and seeks to improve the quality of its consulting services with the goal to increase client satisfaction and project performance. There has been some research conducted on client satisfaction with consulting firms' service quality and service performance [3,19–22]. For example, Momparler et al. [3] analyzed the relationship between consulting fee, consulting service quality attributes, and client satisfaction and argued that consulting firms need to build service practices that meet the expectations and preferences of their clients and make efforts to improve customer satisfaction and efficiency. Aldhizer et al. [19] examined the determinants of consulting service quality in relation to accounting and nonaccounting service providers using the SERVQUAL model. Soriano [20] measured consulting service quality, including project cost, project knowledge, and consultant evaluation, among Spanish companies and investigated the effect of consulting service quality on client satisfaction.

These prior studies are meaningful in that they provide measures to determine the quality of intangible services and analyze client satisfaction in the field of consulting. However, due to the non-disclosure agreements between consulting firms and their clients and the resultant lack of information, the research on consulting services has not been extended further. The novelty of our research lies in the measurement and analysis of consulting firms' efficiencies using objective data from public indices and quantitative indicators based on existing literature. This study also has practical value in that it derives operational variables affecting efficiency and suggests strategic ways to utilize those variables. Human resources in the knowledge service industry generally play a critical role in the generation and accumulation of knowledge [23] and have a positive effect on service quality and customer satisfaction [24]. In managing personnel, compensation affects the quality of service provided by employees and serves as a tool for enhancing employee behavior and increasing organizational efficiency [25]. Incentives are designed to increase employee productivity through motivation [26], and performance-based employee compensation plans not only increase organizational productivity but also motivate employees to continuously improve their productivity [27,28]. In this way, compensation affects employee and organizational productivity, which are directly related to organizational performance. In other words, compensating employees, who are a vital component of knowledge consulting services, influences the firm's productivity, which ultimately affects its performance.

Most consulting services are project-based, and consulting firms assign teams to these non-standardized projects [29]. The teams assigned to a project are part of the consulting firm, and the relationships among team members affect their satisfaction with the firm [30,31]. Communication, mutual support, and solidarity among team members are also associated with the quality of teamwork, and in turn, the quality of teamwork has a statistically significant effect on project performance [32]. Moreover, it has been reported that team characteristics significantly impact customer satisfaction and that good teamwork with supervisors increases profits and improves organizational performance, resulting in a competitive advantage [32,33]. On the other hand, supervisors' ability to empathize motivates team members to make more effort and cooperate with each other, leading to a high correlation with continuous commitment and work performance, while team members' commitment positively affects teamwork quality and team performance [34,35]. The individual abilities of team members are important, but so is improving teamwork quality by building a smooth relationship between the team leader and members as this can help the team project become successful in improving the organizational performance, including profitability, competitive advantage, and client satisfaction.

All consulting projects involve new external tasks at various levels, and clients expect customized solutions to their problems [29]. However, many consulting firms try to accumulate knowledge and create standardized solutions that could be provided to their clients. The internal tasks of consulting firms include differentiating their services,

designing organizational structures for each situation, and managing client-tailored knowledge services [36]. Among these, managing knowledge services, which includes balancing internal and external knowledge exchange, is a critical task [37]. Consulting firms share and utilize the knowledge accumulated within the firm to carry out consulting projects successfully and to create new knowledge that could be sold or provided to clients. Thus, it is crucial for consulting firms to implement effective strategies for knowledge and internal task management.

3. Research Methodology: Metafrontier DEA Model

Conventionally, it is assumed that the DMUs of DEA models belong to a homogenous group, share the same production technology, and face single piecewise linear surfaces [38]. In reality, the DMUs may have different environmental characteristics (e.g., use different production technologies) or even belong to heterogeneous groups [10]. For example, consulting firms, who are the target of analysis in this study, may be heterogeneous depending on the unique characteristics of the group to which they belong.

The metafrontier DEA model was introduced by O'Donnell et al. [10], Battese et al. [39] and Battese and Rao [2] to resolve the potential bias arising from heterogeneous DMUs when measuring efficiency. The metafrontier technique assesses heterogeneous frontiers for relatively homogenous subgroups to estimate the technology gaps between the subgroups and their efficiency levels, as shown in Figure 1 [10,40]. The metafrontier (T^*) is obtained by enveloping the group-specific frontier (e.g., T^1 and T^2) estimated through another frontier, which is referred to as meta-technology. Metafrontier DEA has been utilized to measure operating efficiency in various industries [9,14,18,41–43].

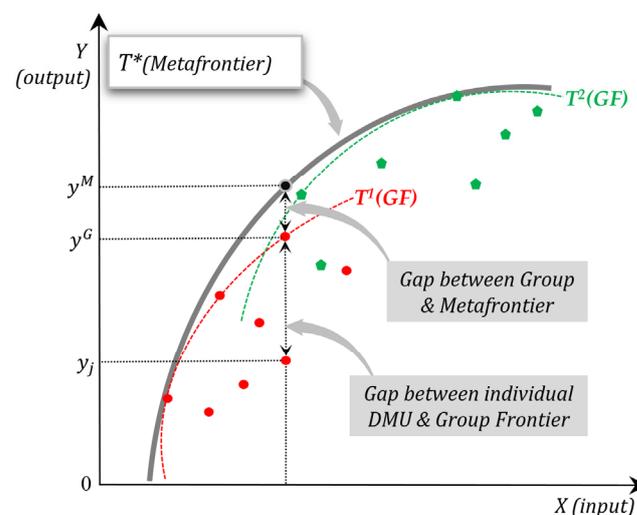


Figure 1. Basic framework of metafrontier DEA.

To explain metafrontier DEA using consulting firms as an example, suppose that there are J number of consulting firms ($j = 1, \dots, J$) and that each of these firms use inputs x_{sj} ($s = 1, \dots, S$) to produce outputs y_{mj} ($m = 1, \dots, M$). Reflecting the heterogeneity of consulting firms, the consulting firms can be divided into K groups based on the operating technologies they employ, which could be expressed as T^k ($k = 1, \dots, K$). The sample size of the K th group is J^k and is subject to $\sum_{k=1}^K J^k = J$.

To formulate the linear programming problem for DEA, we must include non-negative intensity variables λ_j and μ_j for the group frontier and metafrontier technologies. These variables represent the extent to which consulting firms perform as a reference set, which means achieving best practices and efficiency for the particular DMU under evaluation, as shown in Equations (1) and (2) [40]. The production technology of the K th group frontier can be defined as follows:

$$T^k = \left\{ (x, y) : \sum_{j \in J^k} \lambda_j y_{mj} \geq y_m, \sum_{j \in J^k} \lambda_j x_{sj} \geq x_s, \lambda_j \geq 0, m = 1, \dots, M, s = 1, \dots, S, j = 1, \dots, J^k \right\} \quad (1)$$

The output-oriented model for estimating the GE of consulting firm i of the K th group, θ_i^G , can be calculated based on the K th group frontier technology by solving the following fractional program:

$$\begin{aligned} \{D_i^G(x_s, y_m)\}^{-1} &= \max \theta_i^G \\ \text{s.t. } \sum_{j \in J^k} \lambda_j \cdot y_{mj} &\geq \theta_i^G \cdot y_{mi}, m = 1, \dots, M \\ \sum_{j \in J^k} \lambda_j \cdot x_{sj} &\leq x_{si}, s = 1, \dots, S \\ \lambda_j &\geq 0, j = 1, \dots, J^k \end{aligned} \quad (2)$$

The objective function of this optimization problem requires the maximization of the output improvement potential θ_i^G across all outputs. If $\theta_i^G = 1$, then consulting firm i operates on the K th group frontier (T^k). If $\theta_i^G > 1$, then the reciprocal $1/\theta_i^G$ is bounded by an interval of 0–1, and consulting firm i operates inside the K th group frontier, indicating that consulting firm i is inefficient in its group. For example, $\theta_i^G = 0.7$ represents 70% of the maximum output that could be produced by a consulting firm i using the input vector, x_s , and group- k technology.

Meanwhile, we need to ensure that the metatechnology, T^* , satisfies all the necessary technology axioms. If the metatechnology is defined using a finite number of groups, and if all the group technologies satisfy all the technology axioms, then it is easy to prove that T^* also satisfies all the production axioms except the convexity axiom [44]. A metatechnology constructs a single production set from the observations throughout the whole set of observations across all groups. Hence, the metatechnology can be defined as follows:

$$\begin{aligned} T^* &= \text{Convex Hull} \{T^1 \cup \dots \cup T^K\} \\ &= \left\{ (x, y) : \sum_{k=1}^K \sum_{j \in J^k} \mu_j^k \cdot y_{mj} \geq y_m, \sum_{k=1}^K \sum_{j \in J^k} \mu_j^k \cdot x_{sj} \geq x_s, \mu_j^k \geq 0, m = 1, \dots, M, s = 1, \dots, S, k = 1, \dots, K, j = 1, \dots, J^k \right\} \end{aligned} \quad (3)$$

Based on the concept of the metafrontier, the model for estimating the ME of consulting firm i , θ_i^M , can be expressed as follows:

$$\begin{aligned} \{D^*(x_s, y_m)\}^{-1} &= \max \theta_i^M \\ \text{s.t. } \sum_{k=1}^K \sum_{j \in J^k} \mu_j^k \cdot y_{mj} &\geq \theta_i^M \cdot y_{mi}, m = 1, \dots, M \\ \sum_{k=1}^K \sum_{j \in J^k} \mu_j^k \cdot x_{sj} &\leq x_{si}, s = 1, \dots, S \\ \mu_j^k &\geq 0, k = 1, \dots, K, j = 1, \dots, J^k \end{aligned} \quad (4)$$

In Equations (2) and (4), θ_i^G and θ_i^M indicate the specific technologies of the group frontier and meta-frontier, respectively, as the benchmarks for comparison [40]. If $\theta_i^M = 1$, then consulting firm i operates on the metafrontier. If $\theta_i^M > 1$, then consulting firm i operates inside the metafrontier and is inefficient in its frontier. For instance, $\theta_i^M = 0.6$ indicates that the output vector, y_m , is 60% of the maximum output that could be produced by consulting firm i using the vector x_s .

θ_i^{G*} and θ_i^{M*} denote the optimal objective values of GE and ME, respectively. It is also possible to measure the distance between a group-specific frontier and the metafrontier

by looking at the relationship between the output distance functions with respect to the metafrontier and group frontiers [10,39]. The TGR of consulting firm i is obtained by dividing the efficiency score obtained under the metafrontier, θ_i^{M*} , by the efficiency score obtained under the group frontier, θ_i^{G*} , as follows:

$$TGR_i = \frac{\theta_i^{M*}}{\theta_i^{G*}} \quad (5)$$

The metafrontier envelopes the group- K frontiers; therefore, $TGR_i \leq 1$. As this is simply the ratio of metafrontier technical efficiency to K th group technical efficiency, an increase (decrease) in the TGR implies a decrease (increase) in the gap between the K th group frontier and the metafrontier. Thus, technical efficiency measured with respect to the metafrontier can be decomposed into the product of technical efficiency under the K th group frontier, which represents the existing state of knowledge and economic environment characterizing group- K , and the TGR, which is the distance between the K th group frontier and the metafrontier. Therefore, as noted by O'Donnell et al. [10], the decomposition of ME into GE and TGR can be expressed as follows:

$$\theta_i^{M*} = TGR_i \times \theta_i^{G*} \quad (6)$$

4. Research Model and Data

This study measured the operating efficiencies of consulting firms providing business consulting services and provided benchmarks for individual consulting firms. A total of 27 global consulting companies that provide consulting services in the USA, Europe, and Asia-Pacific regions were set as the DMUs for the metafrontier DEA. The research model of this study is presented in Figure 2.

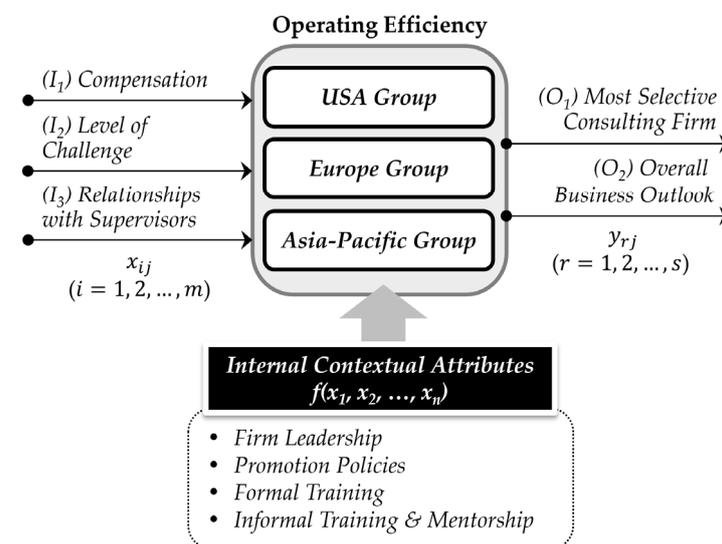


Figure 2. Research model for the metafrontier DEA on global consulting firms.

One of the core strategic resources in consulting services is the consultants' knowledge capacity and competence. Consultants' ability to provide suitable consultation could effectively enhance the competitiveness of the consulting firm as the factor exerting the largest influence on the firm's productivity and performance. Therefore, it is crucial for consulting firms to secure highly qualified consultants, and a primary method to ensure this is through compensation. Consulting firms attract excellent consultants through various compensation systems consisting of base salary, performance bonuses, housing allowance, relocation packages, retirement benefits, and special bonuses. Therefore, the various types

of compensation for consultants were used as input variables for measuring the efficiency of consulting firms [25–27,45].

As mentioned earlier, consulting services are requested and provided on a project-by-project basis, and each project brings new challenges [29]. Consulting projects consist of various levels of tasks, such as competition analysis, service differentiation, strategic thinking, and new organizational design [36,37], thus the firm's capability to handle these various tasks determines the success of the consulting project and the consulting firm's productivity and profitability. Thus, the level of challenge was a very important input variable for measuring the performance and achievements of consulting firms. Another input variable was relationships with supervisors, which is a necessary component for efficient work performance. This is particularly true for consulting firms whose services are project-based, which makes trust and cooperation among the various members within the project team extremely important for high work efficiency [10,18,30–35]. For consulting projects to be successful, it is paramount that the project team members have empathy, the ability to work as a team, commitment, and communication skills.

Most selective consulting firms and *overall business outlook* were set as the output variables. *Most selective consulting firms* measures the number of projects or clients acquired by the consulting firm, the firm's reputation, and the market share the firm occupies in the industry, and *overall business outlook* refers to the sales revenue and operating profit of the consulting firm.

- (I₁) Compensation (COM): Base salary, performance bonuses, housing allowance, relocation package, retirement benefits, special bonuses
- (I₂) Level of Challenge (LV): Competition analysis, service differentiation, strategic thinking, new organizational design, knowledge-sharing
- (I₃) Relationships with Supervisors (RS): Empathy, teamwork, commitment, communication skills
- (O₁) Most Selective Consulting Firms (MC): Number of projects, number of clients, reputation, and market share
- (O₂) Overall Business Outlook (OB): Sales revenue, operating profit

Additionally, this study performed a Tobit regression analysis to measure the contextual/environmental variables within consulting firms that affect the meta-efficiency (ME). The internal contextual attributes set in this study were firm leadership, promotion policies, formal training, and informal training & mentorship.

The data for the input/output variables and the contextual/environmental factors were acquired from Vault (www.vault.com, accessed on 27 April 2021), which provides information on the influence and ranking of consulting firms, for the year 2020. The data from Vault consisted of values for various indices related to the input/output variables of this study, gained through a survey conducted on thousands of full-time experts and interns at consulting firms. Table 1 below lists the descriptive statistics of the variables and the Pearson correlation coefficients between the input and output variables used in this study. All correlations between input and output variables were found to be significant at the 1% level.

Table 1. Input/output variables of global consulting firms in 2020.

Variables	Min.	Max.	Ave.	S.D.	Pearson Correlation Coefficient					
					COM	LV	RS	MC	OB	
Input	COM	6.71	9.65	8.44	0.71	1				
	LV	8.07	9.79	8.97	0.44	0.864 **	1			
	RS	8.1	9.78	9.1	0.47	0.850 **	0.918 **	1		
Output	MC	7.22	9.93	9.02	0.69	0.874 **	0.925 **	0.911 **	1	
	OB	7.63	9.93	9.02	0.59	0.795 **	0.819 **	0.869 **	0.828 **	1

** Correlation is significant at the 0.01 level (2-tailed).

This study used metafrontier DEA in order to reflect the variations in global consulting firms' operations arising from their geographic locations, despite their provision of homogeneous consulting services. Since professional business consulting services diagnose a company's overall operation to provide solutions, all consulting firms have similar levels of technology. On the other hand, global consulting firms run different operations in terms of geographical location, operating strategies, and management of the consulting services they provide. For example, due to regional particularities, consulting firms operating in the USA and those operating in Europe and Asia-Pacific differ in the way they run their organizations and provide consulting services. The effectiveness of consulting services depends on the circumstances of the country in which they operate, thus consulting firms should consider the country's legal and commercial regulations, economic and social environment surrounding the companies [46]. The globalization of the service industry does not mean that regional differences (e.g., cultural, political, legal, economic) have completely disappeared, and as such, appropriate regional strategies could create more value than a single global strategy [47]. Moreover, personnel development and operation strategies, which are key to consulting services, must reflect regional and local circumstances, and the laws and regulations, such as commercial and corporate laws, that dictate the operations of consulting firms differ by country. Therefore, analyzing consulting companies operating in different geographical locations as a homogeneous group is not recommended due to the possibility of errors in applying DEA [23]. For this reason, metafrontier DEA was applied to measure the GE and ME of each DMU group and derive the TGR between ME and GE [9,11].

In general, consulting services allocate highly qualified human resources to develop relevant expertise, provide solutions to problems faced by corporate clients, and help companies realize sustainable growth [10,18,48]. In other words, consulting firms invest consulting-related resources to undertake consulting projects, through which they maximize their sales or operating profits. Therefore, this study applied an output-oriented DEA model. MaxDEA Ultra (8.20 ver., Beijing Realworld Software Company Ltd., Beijing, China) software, which is an easy-to-use but powerful and professional DEA software, was used to analyze the DEA model. The software has the most comprehensive range of up-to-date DEA models and all their possible combinations. Moreover, this study employed STATA/MP software (16 ver., StataCorp LLC, TX, USA) to perform the Tobit regression analysis [16,43].

5. Empirical Metafrontier Results

5.1. Metafrontier DEA Results

The metafrontier DEA results showing the GE, ME, and TGR of the individual consulting firms are given in Table 2 below. The following trends were observed in the DEA results. First, in terms of the ME assuming constant returns-to-scale (CRS), the USA group had the highest average ME score (0.991), and the Asia-Pacific group had the lowest average ME score (0.969). Similarly, the ME assuming variable returns-to-scale (VRS) also found the USA group to have the highest average ME score (0.997), followed by the Europe group (0.987) and the Asia-Pacific group (0.987). That is, the efficiency of the USA group was higher overall than the Europe and Asia-Pacific groups regardless of the assumptions on returns-to-scale, so it could be said that consulting firms in the U.S. were more efficiently operated than those in other regions.

Second, the average TGRs of the USA, Europe, and Asia-Pacific groups were 0.994, 0.995, and 0.982, respectively. TGR refers to the distance between the group frontier and the metafrontier, which represents the ratio between the optimal group frontier and the optimal metafrontier for the particular DMU. The closer this ratio is to 1, the closer the optimal group frontier is to the optimal metafrontier. The results show that consulting firms in the USA and Europe groups sat closer to the metafrontier, while the firms in the Asia-Pacific group showed a relatively smaller value.

Third, in terms of returns-to-scale, 30% of the DMUs in the USA group were located in the area of CRS, 10% in the area of increasing returns-to-scale (IRS), and 60% in the area of decreasing returns-to-scale (DRS). The consulting firms in the DRS region need to increase their efficiency by reducing their company size. Firms in the DRS area are those whose rate of increase of output factors is smaller than that of input factors, implying that the increase in the scale of production results in management inefficiency. Therefore, the DMUs located in the DRS area could improve their efficiency by reducing their sizes. On the other hand, in the case of the Europe group, 5 out of 9 DMUs (55.6%) were located in the IRS area, and in the case of the Asia-Pacific group, 62.5% of the DMUs were located in the IRS area. Consulting firms in the IRS area could improve their efficiency by expanding their sizes. In other words, a significant number of consulting firms in Europe and the Asia-Pacific may require strategic measures to increase their sizes for higher efficiency.

Table 2. Measurement results of ME, GE, and TGR.

Cluster	DUM	CCR (CRS-Based)			BCC (VRS-Based)			SE	RTS	Main Cause of Inefficiency	
		ME (TE)	GE	TGR	ME (PTE)	GE	TGR			PTE	SE
USA	McKinsey & Company_USA	0.996	0.999	0.998	1	1	1	0.996	DRS		✓
	Bain & Company_USA	0.996	0.996	1	1	1	1	0.996	DRS		✓
	The Keystone Group	0.987	0.998	0.989	0.992	1	0.992	0.996	DRS	✓	
	The Bridgespan Group	1	1	1	1	1	1	1		CRS	
	Boston Consulting Group	1	1	1	1	1	1	1		CRS	
	Putnam Associates	0.977	0.992	0.984	0.986	0.992	0.994	0.990	DRS	✓	
	ClearView Healthcare Partners	0.982	1	0.982	1	1	1	0.982	DRS		✓
	ghSMART	0.980	0.980	0.999	0.999	0.999	1	0.981	DRS		✓
	Insight Sourcing Group	0.991	1	0.991	0.992	1	0.992	0.999	IRS	✓	
	OC&C Strategy Consultants_USA	1	1	1	1	1	1	1		CRS	
	Average	0.991	0.997	0.994	0.997	0.999	0.998	0.994			
Europe	McKinsey & Company_Europe	0.993	1	0.993	1	1	1	0.993	DRS		✓
	Bain & Company_Europe	1	1	1	1	1	1	1		CRS	
	Oliver Wyman_Europe	0.971	0.977	0.994	0.978	1	0.978	0.993	IRS	✓	
	Alvarez & Marsal_Europe	1	1	1	1	1	1	1		CRS	
	Kearney_Europe	0.981	0.981	1	0.994	1	0.994	0.987	IRS		✓
	Roland Berger_Europe	0.945	0.961	0.984	0.955	0.974	0.980	0.990	IRS	✓	
	OC&C Strategy Consultants_Europe	0.973	0.98	0.993	0.979	0.981	0.998	0.994	DRS	✓	
	Strategy & PwC network_Europe	0.976	0.983	0.992	1	1	1	0.976	IRS		✓
	Whiteshield Partners EMEA	0.971	0.973	0.998	0.975	0.984	0.991	0.996	IRS	✓	
	Average	0.979	0.984	0.995	0.987	0.993	0.993	0.992			
Asia-Pacific	McKinsey & Company_Asia-Pacific	0.981	1	0.981	1	1	1	0.981	DRS		✓
	Bain & Company_Asia	0.972	1	0.972	0.973	1	0.973	0.998	DRS	✓	
	Oliver Wyman_Asia-Pacific	0.949	0.975	0.974	0.995	0.995	1	0.954	IRS		✓
	Alvarez & Marsal_Asia	1	1	1	1	1	1	1		CRS	
	Kearney_Asia-Pacific	0.986	1	0.986	1	1	1	0.986	IRS		✓
	Roland Berger_Asia	0.949	0.972	0.976	0.951	0.975	0.975	0.998	IRS	✓	
	YCP Solidiance	0.937	0.942	0.995	1	1	1	0.937	IRS		✓
	Arthur D. Little_Asia	0.975	0.999	0.976	0.977	0.999	0.978	0.998	IRS	✓	
	Average	0.969	0.986	0.982	0.987	0.996	0.991	0.982			

Different reasons could be attributed to the DMUs' inefficiencies when assuming CRS or VRS. In the USA group, the main cause of inefficiency at *McKinsey & Company*, *Bain & Company*, *ClearView Healthcare Partners*, and *ghSMART* was their scale ($PTE > SE$), while the inefficiencies of *the Keystone Group*, *Putnam Associates*, and *Insight Sourcing Groups* were primarily caused by pure technology ($PTE < SE$). In the case of the Europe group, *Kearney_Europe*, *McKinsey & Company_Europe*, *Strategy & PwC network Europe* were inefficient due to their scale ($PTE > SE$), and *OC&C Strategy Consultants_Europe*, *Oliver Wyman_Europe*, *Roland Berger_Europe*, *Whiteshield Partners EMEA* were inefficient primarily due to pure technology ($PTE < SE$). In the Asia-Pacific group, the consulting firms whose inefficiencies were due to their scale ($PTE > SE$) were *YCP Solidiance*, *Kearney_Asia-Pacific*, *Oliver Wyman_Asia-Pacific*, *McKinsey & Company_Asia-Pacific*, and those whose inefficiencies were due to pure technology ($PTE < SE$) were *Roland Berger_Asia*, *Bain & Company_Asia*, and *Arthur D. Little_Asia*.

For example, *McKinsey*, which was founded in 1926, maintained the company with its own workforce without depending on partnerships with local firms, based on the one-firm principle [49]. However, the firm grew into a huge organization with about 30,000 employees as a result of its continued growth and success in the consulting services market. Managing human resources internally without local partners or external outsourcing could strengthen the firm's competitiveness in providing consulting services and improve service quality, so the firm rarely experienced inefficiencies from pure consulting technology. However, as the size of the firm continued to grow due to inflexible personnel management policies that exclude collaboration or external outsourcing, scale inefficiency resulted. On the other hand, the *Keystone group* was established in 1991 and had about 1000 employees, which is a relatively small size. Firms in the M&A consulting field managed their internal personnel and organization efficiently, so few experienced inefficiencies arising from the size of the firm. However, firms with relatively short histories had less experience in handling projects, knowledge sharing, building network reputation [50], and transmitting strong, positive signals to potential clients [51]. This lack of experience led to pure technology inefficiency in providing consulting services.

A comparison of the individual DMUs' efficiency values revealed the following aspects. As of 2020, in the USA group, *The Bridgespan Group*, *Boston Consulting Group*, and *OC&C Strategy* consulting firms showed efficiencies of 1 regardless of CRS and VRS. In the Europe group, *Alvarez & Marsal_Europe*, *Bain & Company_Europe* showed efficiencies of 1, as seen in Table 2. In the Asia-Pacific group, only *Alvarez & Marsal_Asia* had an efficiency value of 1 for both CRS and VRS. On the other hand, CCR-based efficiency was found to be lowest for *Putnam Associates* in the USA group, *Roland Berger_Europe* in the Europe group, and *YCP Solidiance* in the Asia-Pacific group.

In the cases of *ClearView Healthcare Partners* (USA), *Insight Sourcing Group* (USA), *McKinsey & Company_Europe*, *Kearney_Asia-Pacific*, and *Bain & Company_Asia*, their group efficiency scores were 1, but their ME scores were relatively low, suggesting the need for a strategic operation plan to reduce the technology gap. These consulting firms may need to increase their efficiency by improving their internal operational strategies, including developing an employee compensation system, promoting better communication within the company, and improving the level of challenge.

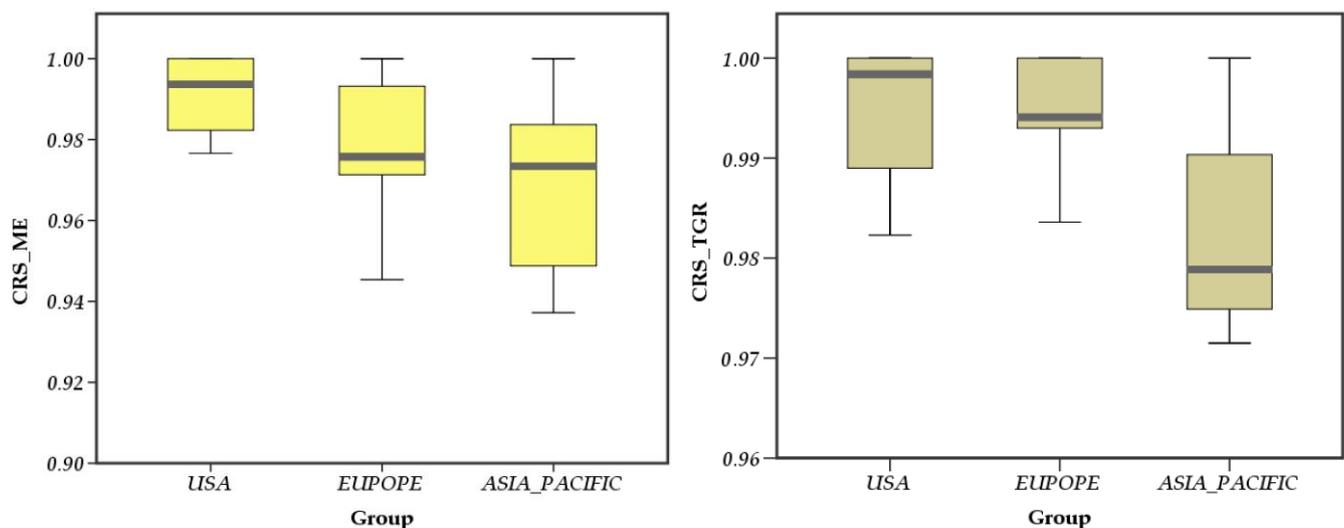
5.2. Comparison among the Typologies of Global Consulting Firms

The Kruskal–Wallis test was performed to analyze whether there were statistically significant differences among the average ME and TGR scores of the global consulting firms by region [52]. The test results are presented as Table 3 and Figure 3.

Table 3. Analysis of the differences in ME and TGR by region of consulting firms.

Division	(I) Group—(J) Group	Test Statistics	Std. Error	Std. Test Statistics	Sig.	Adj. Sig.
Metafrontier	Asia_Pacific—Europe	2.750	3.834	0.717	0.473	1.000
	Asia_Pacific—USA	9.000	3.472	2.405	0.160	0.049 **
	Europe—USA	6.205	3.625	1.724	0.085	0.254
Technology gap ratio	Asia_Pacific—Europe	8.562	3.714	2.305	0.021	0.063 *
	Asia_Pacific—USA	8.674	3.805	2.280	0.023	0.068 *
	Europe—USA	−0.111	3.598	−0.031	0.975	1.000

* Asymptotic significant (2-sided tests) are displayed. The significant level is 0.10 (*) and 0.05 (**).

**Figure 3.** CRS-based metafrontier (left) and CRS-based technology gap ratio (right).

The difference in ME among the DMU groups was found to be $\chi^2 - test = 6.71$, *Asymp. Sig.* = 0.043 < 0.05, which was statistically significant and indicated that the average MEs of the global consulting firms differed by region. A pairwise comparison was performed further to verify the differences between the consulting firms by region, and the results are given in Table 3. The ME scores of the Asia-Pacific and USA groups showed a statistically significant difference at the 5% level ($p = 0.049 < 0.05$), but there were no significant differences between the ME scores of the Asia-Pacific and Europe groups and those of the Europe and USA groups. In addition, the difference in the TGRs of the DMU groups was $\chi^2 - test = 6.816$, *Asymp. Sig.* = 0.033 < 0.05, which was statistically significant and indicated that there existed differences among the TGRs of the consulting firms by region. Notably, the TGRs of the Asia-Pacific and Europe groups and the Asia-Pacific and USA groups showed significant differences at the 10% significance level, but there was no significant difference between the TGRs of the Europe and USA groups.

6. Determinants of Meta-Efficiency (ME)

In general, DEA using global consulting firms as DMUs could measure the relative efficiencies of individual DMUs, but it was insufficient for identifying the attributes that affected the DMUs' efficiencies [53]. As DEA calculation results are censored discrete distribution values between 0 (minimum) and 1 (maximum), if the ordinary least square (OLS) method is applied in second-stage DEA efficiency analyses, the parameter estimation values are biased and inconsistent. Therefore, we adopted a Tobit regression of maximum likelihood estimation for a limited dependent variable to determine the relationship between the efficiency score and relevant contextual factors [54]. In general, Tobit regression and ordinary least squares are the most common methods for the parametric methods in estimation of the impact of contextual/environmental variables on efficiency. Some

scholars have also proposed double bootstrap and partial frontiers methods. Although there is no consensus about the best second stage approach to date, the censored regression, also known as Tobit regression, is the most commonly employed model in practical work [55,56].

The standard framework of the Tobit model can be defined as follows: $y^* = \beta x_i + \varepsilon_i$, with $y = y^*$ if $y^* > 0$, and $y = 0$ otherwise. y is the observed dependent variable of interest, y^* is the latent variable, x_i is the vector of contextual variables, β is the vector of estimable coefficients, and $\varepsilon_i \sim N(0, \sigma^2)$. The presented formulation is a general Tobit model that applies temporal and spatial scales data simultaneously. The expected effect of x_i on y^* is monotonic, and β^T and σ^2 are consistent by the maximum likelihood estimation under the assumption of homoscedastic normal disturbances [57,58]. Using the two-stage estimation method suggested by Ozcan [59], ME was measured using metafrontier DEA in the first stage, after which a Tobit regression was performed in the second stage using the ME scores from the first step as the dependent variables and context/environmental variables as the independent variables.

The efficiency scores derived through a DEA usually take the form of truncated or censored data located between 0 and 1, so there is a limit to performing a general regression analysis based on the ordinary least square (OLS). Therefore, the efficiency scores (θ) measured through the metafrontier DEA was converted to left-censored dependent variables, $\theta^* = \frac{1}{\theta} - 1$ (i.e., the lower censoring limit at zero), so that the θ^* value could range from 0 to infinity. The converted θ^* values were used as the dependent variable in the Tobit regression. The Tobit regression equation used in this study is as follows:

$$\theta_i^* = \beta_0 + \beta_1 FL_i + \beta_2 Pro_i + \beta_3 FT_i + \beta_4 ITM_i + \varepsilon_i \tag{7}$$

where,

θ_i^* = the left-censored ME* score of individual consulting firm i

FL_i = firm leadership

Pro_i = promotion policies

FT_i = formal training

ITM_i = informal training and mentorship

ε_i = the error term (statistical noise)

β_0 is a constant term, $\beta_1 \dots \beta_4$ are Tobit coefficients of TE* determinants in global consulting firms. The Tobit regression was performed using STATA/MP software, and the results are tabulated in Table 4. The LR χ^2 test statistics ($LR \chi^2(4) = 18.99, Prob > \chi^2 = 0.0008$) rejected the null hypothesis, finding that the parameters in the regression equation were jointly equal to zero. The four explanatory attributes were found to have the following effects on the ME of global consulting firms.

Table 4. Tobit regression: the effect of global consulting firms’ contextual/environmental attributes on the metafrontier scores, based on CRS.

Environmental Variables	Coefficient	Std. Error	t	p > t	[95% Confidence Interval]	
					Lower	Upper
Firm Leadership	−0.0558801 ***	0.0141994	−3.94	0.001	−0.0857119	−0.0260484
Promotion Policies	0.0365931 ***	0.0120441	3.04	0.007	0.0112895	0.0618968
Formal Training	−0.0064659	0.0097754	−0.66	0.517	−0.0270033	0.0140715
Informal Training & Mentorship	0.0080744	0.0090839	0.89	0.386	−0.0110102	0.027159
cons	0.1892039 ***	0.0572212	3.31	0.004	0.0689866	0.3094211
sigma	0.0149643	0.0025426			0.0096225	0.0203061
LR $\chi^2(4) = 18.99, Prob > \chi^2 = 0.0008, Log Likelihood = 47.7030, Pseudo R^2 = -0.2485$						

*** Correlation is significant at the 0.01 level (2-tailed).

First, firm leadership had a statistically significant negative effect on CRS-based ME (*Coefficient* = -0.0558801 , *p-value* = 0.001). Leadership can be defined as an individual's ability to lead and direct people to achieve specific goals [60] and plays a significant role in the success or failure of an organization [61]. Generally, in the case of firms in traditional industries, such as hotels, IT companies, and manufacturing companies, strong and effective leadership of the management has a positive effect on the company's performance [61,62]. However, for firms in the knowledge service industry, including consulting firms, the company's performance is largely dependent on the experience and knowledge of the consultants at the company and their effective teamwork [10,18]. Thus, unilateral and top-down leadership could have a negative effect on performance in these firms [63]. The results of our analysis show that strong leadership at a consulting firm actually lowered the firm's efficiency. In other words, the stronger the leadership at the company, the greater the negative effect leadership had on the consulting firm's performance. Therefore, consulting firms should identify the negative impacts of strong, top-down leadership and reorganize the firm's policies and systems to alleviate these impacts to improve their internal efficiency and performance. In addition, to prevent leadership from becoming too forceful, consulting firms should transfer the authority of executives to teams in the field as necessary and restructure and adjust the organizational structure to a more horizontal and function-oriented one.

Second, promotion policies had a significant positive effect on CRS-based ME (*Coefficient* = 0.0365931 , *p-value* = 0.007). Sales promotion is a plan carried out by an organization to promote the sale, use, or increase in sales of a product or service [64]. In general, effective public relations and marketing policies of a firm positively impact the firm's performance and growth [64,65]. The Tobit regression results corroborated this relationship by showing the positive effect of effective promotion policies on the efficiency of consulting firms. In other words, consulting firms acquired consulting projects through promotional activities, and this ultimately had a positive effect on the firm's performance. To elaborate, there exist uncertainties in the consulting market, which make experience-based network reputation very important for consulting firms [50], and reputation through word of mouth also affects the profitability of the firm [8]. In addition, consulting services are credence goods whose qualities are difficult to ascertain; to solve this problem, it is very important for consulting firms to send positive signals to the market through effective and appropriate marketing and public relations strategies. In other words, consulting firms can enhance the recognition and reputation of their brand by strengthening its network reputation in the consulting market and sending strong signals that they are effectively and successfully operating organizations, which, in turn, positively affects the company's performance by bringing in consulting projects and increasing revenue.

Our finding confirms that global consulting firms could increase their ME by consistently strengthening their promotional activities. A consulting firm, which provides knowledge services, could increase its efficiency by spending on public relations and marketing strategies that reflect the needs of consulting firms and by creating efficient means of operation and strengthening management strategies. Therefore, global consulting firms need strategic guidance to strengthen their capabilities for sustainable growth.

Third, formal training and informal training and mentorship did not have significant influences on CRS-based ME. In general, companies must provide appropriate training and support to improve their sales and efficiency [66]. Education is reported to be positively associated with personnel and organizational performances [67], but it has also been argued from the profit standpoint that short-term training programs have a negative effect on profitability [36]. Regular and irregular training and mentorship programs within the firm are established for the purpose of strengthening employees' capabilities and improving business performance, but the statistical results revealed that training programs at consulting firms were unrelated to the firm's efficiency.

7. Discussion and Conclusion

7.1. Implications for Theoretical and Operating Practice

The knowledge service industry, which includes consulting services, has been fast-growing in recent years with the development of ICT technology [23]. Nevertheless, there is a relative lack of studies on consulting firms, which are the most representative knowledge service providers, particularly in terms of measuring the relative efficiencies of consulting firms. This study measured the relative efficiencies of 27 global consulting firms through a metafrontier analysis and provided benchmarking information on how those consulting firms could improve their efficiencies. Additionally, this study used Tobit regression in a two-stage analysis on factors influencing efficiency to examine the strategic operational variables affecting ME in global consulting firms [53]. The findings of this study have the following three academic and practical implications.

First, this study makes a novel academic contribution to existing literature by being, to the best of our knowledge, the first research analyzing the efficiency of consulting firms, which are the representative providers of knowledge services. Studies on consulting firms are rare, and studies that measure the relative efficiency of consulting firms are even more scarce. Against this background, this study conducted a metafrontier analysis on 27 global consulting firms in the US, Europe, and Asia-Pacific to measure their ME, GE, and TGR and provide insights on their economies of scale and the causes of their inefficiency.

Second, this study grouped the 27 global consulting firms into three regions (USA, Europe, and Asia-Pacific) to reflect the regional specificity of their operations and performed the Kruskal–Wallis test to analyze whether there were differences in the consulting firms' efficiencies across regions. Our test results revealed a statistically significant difference between the ME scores of the USA and Asia-Pacific groups and found that the ME scores of the USA group were relatively higher overall. These findings suggest that consulting firms operating in the Asia-Pacific region require more strategic operation plans to improve their efficiencies.

Third, this study analyzed the correlation between the ME of global consulting firms and their internal operating policies [52,68] and derived important internal operating variables that influence the fluctuations in ME. Based on findings, we suggested strategies on how consulting firms could utilize these internal operating variables to their advantage. These are as follows:

- A significant number of consulting firms in the US were located in the DRS area, suggesting the need to improve their efficiency through downsizing. On the other hand, quite a few consulting firms in Europe and the Asia-Pacific were located in the IRS area, making it necessary for them to improve efficiency by expanding their sizes [16,23].
- There were differences in the efficiencies of global consulting firms depending on the characteristics of the region in which they mainly operated. Strategies reflecting differences due to geographical characteristics are necessary to achieve optimal returns to scale. In addition, global consulting firms should allocate and adjust their resources efficiently in relation to internal operating variables that positively or negatively affect ME to realize sustainable growth.

7.2. Limitations and Future Research

This study provides useful practical implications for consulting firms by measuring the efficiencies of consulting firms and analyzing the contextual/environmental variables that affect efficiency. However, this research had the following limitations. First, it measured ME using three input variables and two output variables. Firm leadership, promotion policies, formal training, and informal training and mentorship were set as the contextual/environmental variables affecting efficiency. However, at the practical level, there are other important data beyond the variables set in this study, such as client satisfaction, degree of innovation, and level of firm–client interaction, etc. This study was unable to incorporate these important variables due to lack of access to the relevant data. As such,

future research should consider adding these variables to the research model for a more meaningful measurement of efficiency. Second, this study measured the efficiencies of consulting firms based on data for 2020 alone. A longitudinal analysis based on accumulated data would enable the investigation of fluctuations in firms' efficiencies and the causes of such fluctuations, which would provide further insights. Thus, as a follow-up study, we intend to collect additional data for measuring the changes in efficiency over time.

Author Contributions: Conceptualization, G.P. and S.-K.L.; methodology, G.P. and K.C.; validation, S.-K.L. and K.C.; writing, G.P. and S.-K.L.; suggestion, S.-K.L. and K.C.; data gathering, G.P. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: This research was financially supported by Hansung University.

Conflicts of Interest: The authors declare no conflict of interest.

Abbreviations

DEA	Data Envelopment Analysis
GE	Group Efficiency
DMU	Decision Making Unit
VRS	Variable Returns-to-Scale
DRS	decreasing Returns-to-Scale
SE	Scale Efficiency
ME	Meta-efficiency
TGR	Technology Gap Ratio
CRS	Constant Returns-to-Scale
IRS	Increasing Returns-to-Scale
PTE	Pure Technology Efficiency
ICT	Information and Communication Technology

References

- McDonald, D. *The Firm: The Story of McKinsey and Its Secret Influence on American Business*; Simon and Schuster: New York, NY, USA, 2013.
- Battese, G.E.; Rao, D.S.P. Technology Gap, Efficiency and a Stochastic Metafrontier Function. *Int. J. Bus. Econ.* **2002**, *1*, 87.
- Momparler, A.; Carmona, P.; Lassala, C. Quality of Consulting Services and Consulting Fees. *J. Bus. Res.* **2015**, *68*, 1458–1462. [[CrossRef](#)]
- Woo, K.S.; Ennew, C.T. Measuring Business-to-Business Professional Service Quality and Its Consequences. *J. Bus. Res.* **2005**, *58*, 1178–1185. [[CrossRef](#)]
- Navarro, S.; Llinares, C.; Garzon, D. Exploring the Relationship between Co-creation and Satisfaction using QCA. *J. Bus. Res.* **2016**, *69*, 1336–1339. [[CrossRef](#)]
- Park, J.; Lee, J.; Lee, H.; Truex, D. Exploring the Impact of Communication Effectiveness on Service Quality, Trust and Relationship Commitment in IT Services. *Int. J. Inf. Manag.* **2012**, *32*, 459–468. [[CrossRef](#)]
- Chen, C.X.; Martin, M.; Merchant, K.A. The Effect of Measurement Timing on the Information Content of Customer Satisfaction Measures. *Manag. Account. Res.* **2014**, *25*, 187–205. [[CrossRef](#)]
- McLachlin, R. Service Quality in Consulting: What is Engagement Success? *Manag. Serv. Qual. Int. J.* **2000**, *10*, 239–247. [[CrossRef](#)]
- Lee, Y.L.; Kuo, S.H.; Jiang, M.Y.; Li, Y. Evaluating the Performances of Taiwan's International Tourist Hotels: Applying the Directional Distance Function and Meta-frontier Approach. *Sustainability* **2019**, *11*, 5773. [[CrossRef](#)]
- O'Donnell, C.J.; Rao, D.P.; Battese, G.E. Metafrontier Frameworks for the Study of Firm-level Efficiencies and Technology Ratios. *Empir. Econ.* **2008**, *34*, 231–255. [[CrossRef](#)]
- Prinsloo, Y. Establishing a Competitive Intelligence Culture in a Multinational Consulting Engineering Company: A Case Study. *Mousaion* **2016**, *34*, 81–107. [[CrossRef](#)]
- Pérez-Nordtvedt, L.; Kedia, B.L.; Datta, D.K.; Rasheed, A.A. Effectiveness and Efficiency of Cross-border Knowledge Transfer: An Empirical Examination. *J. Manag. Stud.* **2008**, *45*, 714–744. [[CrossRef](#)]

13. Assaf, A. Accounting for Size in Efficiency Comparisons of Airports. *J. Air Transp. Manag.* **2009**, *15*, 256–258. [[CrossRef](#)]
14. Zhang, H.; You, J.; Haiyirete, X.; Zhang, T. Measuring Logistics Efficiency in China Considering Technology Heterogeneity and Carbon Emission through a Meta-Frontier Model. *Sustainability* **2020**, *12*, 8157. [[CrossRef](#)]
15. Hoff, A. Second Stage DEA: Comparison of Approaches for Modelling the DEA Score. *Eur. J. Oper. Res.* **2007**, *181*, 425–435. [[CrossRef](#)]
16. Fritsch, M.; Slavtchev, V. How Does Industry Specialization Affect the Efficiency of Regional Innovation Systems? *Ann. Reg. Sci.* **2010**, *45*, 87–108. [[CrossRef](#)]
17. Lambert, E.G.; Hogan, N.L.; Barton-Bellessa, S.M.; Jiang, S. Examining the Relationship between Supervisor and Management Trust and Job Burnout among Correctional Staff. *Crim. Justice Behav.* **2012**, *39*, 938–957. [[CrossRef](#)]
18. Chiu, Y.H.; Lee, J.H.; Lu, C.C.; Shyu, M.K.; Luo, Z. The Technology Gap and Efficiency Measure in WEC Countries: Application of the Hybrid Meta Frontier Model. *Energy Policy* **2012**, *51*, 349–357. [[CrossRef](#)]
19. Aldhizer III, G.R.; Turner, L.D.; Shank, M.D. Determinants of Consulting Service Quality for Accounting and Nonaccounting Service Providers. *J. Inf. Syst.* **2002**, *16*, 61–74. [[CrossRef](#)]
20. Soriano, D.R. Quality in the Consulting Service—evaluation and Impact: A Survey in Spanish Firms. *Manag. Serv. Qual. Int. J.* **2001**, *11*, 40–48. [[CrossRef](#)]
21. Buttle, F. SERVQUAL: Review, Critique, Research Agenda. *Eur. J. Mark.* **1996**, *30*, 8–32. [[CrossRef](#)]
22. Van Dyke, T.P.; Kappelman, L.A.; Prybutok, V.R. Measuring Information Systems Service Quality: Concerns on the Use of the SERVQUAL Questionnaire. *MIS Q.* **1997**, *21*, 195–208. [[CrossRef](#)]
23. Park, S.O. *Knowledge-Based Industry and Regional Growth*; IWSG: Frankfurt am Main, Germany, 2000.
24. Hays, J.M.; Hill, A.V. A Preliminary Investigation of the Relationships between Employee Motivation/Vision, Service Learning, and Perceived Service Quality. *J. Oper. Manag.* **2001**, *19*, 335–349. [[CrossRef](#)]
25. Gupta, N.; Shaw, J.D. Employee Compensation: The Neglected Area of HRM Research. *Hum. Resour. Manag. Rev.* **2014**, *24*, 1–4. [[CrossRef](#)]
26. Samnani, A.K.; Singh, P. Performance-enhancing Compensation Practices and Employee Productivity: The Role of Workplace Bullying. *Hum. Resour. Manag. Rev.* **2014**, *24*, 5–16. [[CrossRef](#)]
27. Banker, R.D.; Lee, S.Y.; Potter, G.; Srinivasan, D. An Empirical Analysis of Continuing Improvements Following the Implementation of a Performance-based Compensation Plan. *J. Account. Econ.* **2000**, *30*, 315–350. [[CrossRef](#)]
28. Grönroos, C.; Ojasalo, K. Service productivity: Towards a Conceptualization of the Transformation of Inputs into Economic Results in Services. *J. Bus. Res.* **2004**, *57*, 414–423. [[CrossRef](#)]
29. Ambos, T.C.; Schlegelmilch, B.B. Managing Knowledge in International Consulting Firms. *J. Knowl. Manag.* **2009**, *13*, 491–508. [[CrossRef](#)]
30. Cameran, M.; Moizer, P.; Pettinicchio, A. Customer Satisfaction, Corporate Image, and Service Quality in Professional Services. *Serv. Ind. J.* **2010**, *30*, 421–435. [[CrossRef](#)]
31. Hoegl, M.; Proserpio, L. Team Member Proximity and Teamwork in Innovative Projects. *Res. Policy* **2004**, *33*, 1153–1165. [[CrossRef](#)]
32. Yang, L.R.; Huang, C.F.; Wu, K.S. The Association among Project Manager’s Leadership Style, Teamwork and Project Success. *Int. J. Proj. Manag.* **2011**, *29*, 258–267. [[CrossRef](#)]
33. Montes, F.J.L.; Moreno, A.R.; Morales, V.G. Influence of Support Leadership and Teamwork Cohesion on Organizational Learning, Innovation and Performance: An Empirical Examination. *Technovation* **2005**, *25*, 1159–1172. [[CrossRef](#)]
34. Kellett, J.B.; Humphrey, R.H.; Sleeth, R.G. Empathy and the Emergence of Task and Relations Leaders. *Leadersh. Q.* **2006**, *17*, 146–162. [[CrossRef](#)]
35. Sirin, Y.; Bilir, P.; Karademir, T. The Effect of Organizational Commitment on Job Performance: The Case of the Kahramanmaraş Provincial Directorate of Youth Services and Sports. *Int. J. Acad. Res.* **2013**, *5*, 65–71. [[CrossRef](#)]
36. Srinivasan, R. The Management Consulting Industry: Growth of Consulting Services in India: Panel Discussion. *IIMB Manag. Rev.* **2014**, *26*, 257–270. [[CrossRef](#)]
37. Von Krogh, G.; Roos, J. *Managing Knowledge: Perspectives on Cooperation and Competition*; Sage: Newbury Park, CA, USA, 1996.
38. Yu, M.M.; Chen, L.H. A Meta-Frontier Network Data Envelopment Analysis Approach for the Measurement of Technological Bias with Network Production Structure. *Ann. Oper. Res.* **2020**, *287*, 495–514. [[CrossRef](#)]
39. Battese, G.E.; Rao, D.P.; O’donnell, C.J. A Metafrontier Production Function for Estimation of Technical Efficiencies and Technology Gaps for Firms Operating under Different Technologies. *J. Product. Anal.* **2004**, *21*, 91–103. [[CrossRef](#)]
40. Yu, M.M.; Chen, L.H. Evaluation of Efficiency and Technological Bias of Tourist Hotels by a Meta-Frontier DEA Model. *J. Oper. Res. Soc.* **2020**, *71*, 718–732. [[CrossRef](#)]
41. Park, D.Y.; Choi, K.; Kang, D.H. Measuring the Meta Efficiency and Its Determinants on Efficiency in the Korean Coffee Shop Franchise. *Sustainability* **2020**, *12*, 2398. [[CrossRef](#)]
42. Abdullah, M.A.; Satar, N.M. Efficiency of Global Airlines: An Application of the Metafrontier DEA Model. *Int. J. Bus. Soc.* **2019**, *20*, 1178–1197.
43. Wang, N.; Chen, J.; Yao, S.; Chang, Y.C. A Meta-frontier DEA Approach to Efficiency Comparison of Carbon Reduction Technologies on Project Level. *Renew. Sustain. Energy Rev.* **2018**, *82*, 2606–2612. [[CrossRef](#)]
44. Wang, Q.; Zhao, Z.; Zhou, P.; Zhou, D. Energy Efficiency and Production Technology Heterogeneity in China: A Meta-Frontier DEA Approach. *Econ. Model.* **2013**, *35*, 283–289. [[CrossRef](#)]

45. Creplet, F.; Dupouet, O.; Kern, F.; Mehmanpazir, B.; Munier, F. Consultants and Experts in Management Consulting Firms. *Res. Policy* **2001**, *30*, 1517–1535. [[CrossRef](#)]
46. Back, Y.; Parboteeah, K.P.; Nam, D.I. Innovation in Emerging Markets: The Role of Management Consulting Firms. *J. Int. Manag.* **2014**, *20*, 390–405. [[CrossRef](#)]
47. Ghemawat, P. Regional Strategies for Global Leadership. *Harv. Bus. Rev.* **2005**, *83*, 98–108.
48. Chang, C.W.; Wu, K.S.; Chang, B.G.; Lou, K.R. Measuring Technical Efficiency and Returns to Scale in Taiwan's Baking Industry—A Case Study of the 85 °C Company. *Sustainability* **2019**, *11*, 1268. [[CrossRef](#)]
49. Bhidé, A. *Building the Professional Firm: McKinsey and Co.: 1939–1968*; HBS Working Paper 95-010; Harvard Business School: Boston, MA, USA, 1995.
50. Glückler, J.; Armbrüster, T. Bridging Uncertainty in Management Consulting: The Mechanisms of Trust and Networked Reputation. *Organ. Stud.* **2003**, *24*, 269–297. [[CrossRef](#)]
51. Bloom, P.N.; Reve, T. Transmitting Signals to Consumers for Competitive Advantage. *Bus. Horiz.* **1990**, *33*, 58–66. [[CrossRef](#)]
52. Vargha, A.; Delaney, H.D. The Kruskal-Wallis Test and Stochastic Homogeneity. *J. Educ. Behav. Stat.* **1998**, *23*, 170–192. [[CrossRef](#)]
53. Reynolds, D. An Exploratory Investigation of Multiunit Restaurant Productivity Assessment Using Data Envelopment Analysis. *J. Travel Tour. Mark.* **2004**, *16*, 19–26. [[CrossRef](#)]
54. McDonald, J. Using Least Squares and Tobit in Second Stage DEA Efficiency Analyses. *Eur. J. Oper. Res.* **2009**, *197*, 792–798. [[CrossRef](#)]
55. He, Y.; Song, W.; Yang, F. Research on the Supply Efficiency of Marine Ecological Products in the Yangtze River Delta Coastal Urban Agglomerations Based on DEA-Tobit Model. *Sustainability* **2021**, *13*, 6840. [[CrossRef](#)]
56. Shin, D.J.; Cha, B.S.; Kim, B.H.S. Efficient Expenditure Allocation for Sustainable Public Services?—Comparative Cases of Korea and OECD Countries. *Sustainability* **2020**, *12*, 9501. [[CrossRef](#)]
57. Fang, S.; Xue, X.; Yin, G.; Fang, H.; Li, J.; Zhang, Y. Evaluation and Improvement of Technological Innovation Efficiency of New Energy Vehicle Enterprises in China Based on DEA-Tobit Model. *Sustainability* **2020**, *12*, 7509. [[CrossRef](#)]
58. Radovanov, B.; Dudic, B.; Gregus, M.; Marcic Horvat, A.; Karovic, V. Using a Two-Stage DEA Model to Measure Tourism Potentials of EU Countries and Western Balkan Countries: An Approach to Sustainable Development. *Sustainability* **2020**, *12*, 4903. [[CrossRef](#)]
59. Ozcan, Y.A. Performance Measurement using Data Envelopment Analysis (DEA). In *Health Care Benchmarking and Performance Evaluation*; Springer: Boston, MA, USA, 2014.
60. Rowe, G.; Nejad, M.H. Strategic Leadership: Short-term Stability and Long-term Viability. *Ivey Bus. J.* **2009**, *73*, 6–11.
61. Samuel, H.; Siagian, H.; Octavia, S. The Effect of Leadership and Innovation on Differentiation Strategy and Company Performance. *Procedia-Soc. Behav. Sci.* **2017**, *237*, 1152–1159.
62. Mohd Sam, M.F.; Tahir, M.N.H.; Abu Bakar, K. Owner-managers of SMEs in IT Sector: Leadership and Company Performance. *Int. J. Bus. Soc. Sci.* **2012**, *3*, 195–205.
63. Euwema, M.C.; Wendt, H.; Van Emmerik, H. Leadership Styles and Group Organizational Citizenship Behavior across Cultures. *J. Organ. Behav.* **2007**, *28*, 1035–1057. [[CrossRef](#)]
64. Ajagbe, M.A.; Long, C.S.; Solomon, O. The Impact of Sales Promotion and Product Branding on Company Performance: A Case Study of AIICO Insurance Nigerian PLC. *Procedia-Soc. Behav. Sci.* **2014**, *129*, 164–171. [[CrossRef](#)]
65. Odunlami, I.B.; Ogunsiji, A. Effect of Sales Promotion as a Tool on Organizational Performance: A Case Study of Sunshine Plastic Company. *J. Emerg. Trends Econ. Manag. Sci.* **2011**, *2*, 9–13.
66. Ahearne, M.; Jelinek, R.; Rapp, A. Moving Beyond the Direct Effect of SFA Adoption on Salesperson Performance: Training and Support as Key Moderating Factors. *Ind. Mark. Manag.* **2005**, *34*, 379–388. [[CrossRef](#)]
67. Tharenou, P.; Saks, A.M.; Moore, C. A Review and Critique of Research on Training and Organizational-level Outcomes. *Hum. Resour. Manag. Rev.* **2007**, *17*, 251–273. [[CrossRef](#)]
68. Barros, C.P.; Perrigot, R. Franchised Network Efficiency: A DEA Application to US Networks. In *Economics and Management of Networks*; Cliquet, G., Tuunanen, M., Hendrikse, G., Windsperger, J., Eds.; Contributions to Management Science; Physica-Verlag HD: Heidelberg, Germany, 2007.