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Directions for Social Enterprise from an Efficiency Perspective

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Abstract: Social enterprise is recognized as an alternative for sustainable development, as it balances social aspects with economic prosperity. Evaluating social enterprises is very important for both the enterprises themselves and the government, since grants from the government or institutions highly depend on their performance. While relatively significant attention is paid to the social value that these enterprises create, there is a lack of interest in assessing the operational performance directly linked to the sustainable operation of social enterprises. Therefore, this research analyzes the performance of social enterprises from the efficiency perspective, incorporating both operational (economic) and social performance measures. To this end, we apply data envelopment analysis to assess the performance of social enterprises when considering the dual-role factor—the grants. To facilitate clarity for readers, a dataset of Korean social enterprises is used. Through this analysis, we show that the grants can be used for performance evaluation in different ways for each enterprise. Furthermore, an industry-specific analysis provides more realistic and feasible benchmarking information to which inefficient social enterprises should refer. We expect that these findings will complement existing methods of social enterprise evaluation.

Keywords: social enterprises; performance evaluation; efficiency; data envelopment analysis

1. Introduction

Many business organizations now recognize social responsibility as key to a sustainable business environment and society. Although there is still a debate and argumentation on whether it is appropriate for corporations to expand their value creation beyond shareholders, many companies have actively committed to greater social challenges [1]. For more than half a century, many academic researchers and practitioners have studied the issues concerning corporate social responsibility to cope with these challenges. With a growing awareness of the social economy, recently, social enterprise has become more glaring as a new business model. Undoubtedly, it is recognized as an alternative for sustainable development, as it balances social aspects with economic prosperity.

Although there is no universal definition of social enterprise, there are various definitions from researchers and state institutions [2–10]. Therefore, clarifying the definition is an important research topic, but it is not the main purpose of this study, so it is not to be introduced further. However, most scholars and practitioners agree that social enterprise is an organization or venture that combines a social purpose with the pursuit of financial success in the private marketplace [11]. Thus, although somewhat less specific, here, we define social enterprise as an organization that tries to achieve its social purpose in a financially sustainable way. In addition, social purpose refers to the social contribution that provides the activities for a wide array of marginalized and disadvantaged people, such as the disabled, long-term unemployed, ex-offenders, and homeless.

Among the various definitions from other scholars, Grassl [12] stated that social enterprise falls into the space between for-profit and nonprofit organizations. Moreover, Doherty et al. [13] underlined two characteristics of social enterprises—commercial activities to generate revenue and the pursuit of social goals. As the above two studies described, it is worth noting that social enterprise pursues both social value and the economic mission. In this regard, want to emphasize the economic aspects rather than the social value generated by social enterprises. For any social enterprise, it is difficult to survive if financial performance is not guaranteed. Generally, financial performance would result from operational excellence, and economic prosperity should be a prerequisite for further social contribution. Therefore, a social enterprise can reinvest its profits back into the business or directly into the community only if its survival is assured. In other words, the performance of business operations should be evaluated in order to maintain the sustainability of social activities.

Roughly speaking, the efficiency is the concept of how productively resources are being used to achieve organizational goals. Because the goals of an organization, such as social contribution or creation of social value, are often considered abstract, it is difficult to find the concept of efficiency when evaluating organizations that create social value. However, social enterprise is not a nonprofit organization. Thus, social enterprises must secure the operational efficiency for sustainable management. In other words, a social enterprise that operate inefficiently will fail to achieve its ultimate goal of creating social value. Because social enterprises compete with mainstream corporations, they cannot afford to offer better products and services than their competitors, in order to competitively survive. Of course, sometimes they have the right to take advantage of the competition. For example, social enterprises can be considered a priority in public procurement in South Korea. Beyond these exceptional circumstances, social enterprises should closely follow their business models by assuring operational excellence in terms of the efficient use of resources. To highlight economic and financial concern, Bagnoli and Megali [14] suggested a performance measurement system for social enterprises, but their research is limited in that it only presents a framework, without further empirical investigation.

Social enterprises are highly dependent upon the grants, typically provided by the government or institutions. Consequently, it often leads to poor financial independence. In particular, young social enterprises are likely to make efforts to secure grants. On the other hand, enterprises with stabilized operations tend to seek financial independence from the grants. Therefore, the variable of grants must be utilized to measure their efficiency, and researchers should be cautious about how they will use this variable. In this study, we analyze the efficiency by providing a flexible model that considers the grants as a variable that can be selectively served as an input or output role.

The current study analyzes the performance evaluation of social enterprises by using data on Korean social enterprises. Specifically, this research attempts to make three primary contributions to the field of social enterprises. First, it presents a model that can evaluate social enterprises with both operational and social indicators, which can be quantified, and shows that the grants can be used for performance evaluation in different ways for each enterprise. Second, it attempts to examine the differences in efficiency according to industry, and suggests that an industry-specific analysis may be helpful in creating a set of benchmarks that can be realistically achieved. Lastly, it confirms that grants play a different role in evaluating the performance of social enterprises according to their age.

The remainder of the paper is structured as follows. In Section 2, the research background and literature review are presented. In Section 3, the methodology and empirical analysis, including the research design, are presented. In Section 4, we present the results. Finally, in Section 5, the conclusions, limitations, and future research opportunities of this study are discussed.

2. Background and Literature Review

2.1. Performance Evaluation for Social Enterprises

Performance evaluation is critical to any organization in managing operations because it provides a way to improve the operations for business sustainability. While some studies have simultaneously considered financial and non-financial measures (e.g., the Balanced Scorecard), most studies have mainly focused on economic performance evaluation. The selection of evaluation methods depends on the purpose of the business organization. Accordingly, it is very important to clarify the main objectives of the business organization prior to performing the performance assessment. Social enterprises aim to create not only economic value, but also social value, ultimately creating social changes for sustainability. In this sense, measuring such value has become a major challenge for both social entrepreneurs and investors (government and private investors).

Since measuring social value involves subjective judgement, it is far more difficult than measuring economic value, which can be done objectively using financial statements. One of the most prominent techniques to overcome this difficulty is social return on investment (SROI), proposed by the Roberts Enterprise Development Fund [15]. SROI measures the performance of a social enterprise by quantitatively calculating the social performance created in a certain period of time. It is widely used because it offers an advantage, in that it can be flexibly applied by considering the unique characteristics of a social enterprise, including the type of business, social purpose, and context of the management environment. In addition, this technique is based on due diligence, so the result is recognized as highly reliable. However, in order to obtain accurate results, all of the elements related to the organization's social activities need to be logically and carefully examined, which is a time-consuming task; the greater the number of social enterprises to be evaluated, the more time and expenses involved in the evaluation.

This research utilizes a data envelopment analysis (DEA) model to analyze the performance of social enterprises. In contrast to SROI, extra-financial value as social performance is not considered in this study. In other words, only the measurable economic and social measures are taken into account. We believe that it is much more useful to evaluate many social enterprises simultaneously rather than making excessive efforts to convert extra-financial values into monetary values.

The first study to analyze the efficiency of social enterprises using a DEA model was conducted by Jang [16]. In the study, the inputs are the total number of employees and government funds and the output is the service provided. However, this study was difficult to generalize the applicability of the proposed evaluation model, since an empirical analysis was performed on the healthcare service industry in a certain region. In addition, it has been criticized for not dealing with the variables that reflect the characteristics of social enterprises. Lee and Lee [17] attempted to estimate the efficiency score of 158 social enterprises by using a DEA model, and tried to find the factors that exert the greatest influence on the that score. In the study, the input factors were selected as the number of employees, the labor cost, and the total assets, while the output factors were used as the number of services provided, sales, and vulnerable employment. Although it seems to use a well-designed output variable, the vulnerable employment, the types of social enterprises are not considered in this research. Accordingly, the "homogeneity of decision making units" which is the condition of the DEA was not secured. More recently, Natesan et al. [18] provides a DEA-based efficiency evaluation model that takes into account social economic factors. In this study, the social economic impacts were evaluated using employment related variables and funds. But, this study is somewhat weaker in relation to our study in that it evaluates the policy efficiency for the regions in India, while our research is aimed at evaluating the efficiency of social enterprises. Lee et al. [19] suggested an evaluation framework for measuring social enterprises' efficiency, including both the financial performance and social impacts simultaneously. The authors defined the grants as an important input of social enterprise and analyzed its efficiency. Our study also provides a DEA-based model that takes into account the operational and

social aspects for social enterprises. However, the present study does not limit the grants to the input factor in social enterprise evaluation.

2.2. Data Envelopment Analysis

DEA, first proposed by Charnes et al. [20], is a methodology for evaluating the efficiency of a set of decision making units (DMUs), which use multiple inputs to produce multiple outputs. Basically, in DEA, efficiency is defined as the ratio of the weighted sum of outputs to that of inputs. Moreover, DEA does not require the parametric specifications of a particular function nor the predetermined weights to be attached to each input and output. A major advantage of DEA is that it allows the user to evaluate the economic performance of individual DMUs depending on the profitability perspective. Because of this merit, DEA has also been widely applied in various fields, such as air transportation management [21], supply chain management [22], hospitality management [23], research and development [24], environmental management [25], healthcare management [26], and government services [27].

In the conventional application of DEA, the decision maker has to clearly specify the inputs and outputs, given a set of measures available. However, there are some measures that cannot be clearly defined as inputs or outputs, and they are referred to as dual-role factors. For example, research funding was treated as a dual-role factor for evaluating university performance [28,29], and the research and development cost was considered as a dual-role factor in the supplier selection problem [30,31].

In this study, we deal with grants as a performance measure of social enterprises, which can be regarded as a dual-role factor, and analyze the efficiency of social enterprises by using this factor in the DEA model. Furthermore, the benchmarking information resulting from the DEA model allows social enterprises with inefficient operations to set the direction for sustainable business.

2.3. Social Enterprises in South Korea

The concept of social enterprise is attracting increasing interest worldwide, especially in European countries, the United States, South Korea, Japan, Taiwan, and some Latin American countries. In most cases, to be referred to as a social enterprise in a particular country, an organization must be certified by the government. In South Korea, about 10 years ago, the law related to social enterprises—the Social Enterprise Promotion Act—was enacted and went into effect. Under this act, social enterprise is defined as "an organization which is engaged in business activities of producing and selling goods and services while pursuing a social purpose of enhancing the quality of local residents' life by means of providing social services and creating jobs for the disadvantaged". Moreover, to support and promote social enterprises, the Korea Social Enterprise Promotion Agency was established. According to each organization's social purposes, Korean social enterprises are classified into five types: job-creation, social service provision, mixed (job-creation while providing social service), local community contribution, and other. Recently, more than 1700 entities have been recognized as social enterprises. The majority of Korean social enterprises are primarily concerned with job-creation, as presented in Table 1.

Table 1. Current status of Korean social enterprises.

Types	Number of Social Enterprises	Percentage
Job-creation	1229	69.2%
Social service provision	115	6.5%
Mixed	173	9.7%
Local community contribution	76	4.3%
Others	183	10.3%
Total	1776	100.0%

Sources: Korea Social Enterprise Promotion Agency (reported in June 2017).

The main purpose of the job-creation type of social enterprise is to offer jobs to vulnerable social groups. The following two key conditions must be met in order for organizations to be certified as such. (1) The vulnerable employment rate is 30% or more of all workers; (2) the total number of employees must be five or more. Further, the jobs provided to vulnerable groups should be full-time, with at least 20 h of work per week, and the wages paid must be above the minimum wage set by the government.

3. Methodology

In this section, we apply the DEA model to investigate operational and social performance in the efficiency context.

3.1. Job-Creation Social Enterprises

We perform an efficiency evaluation that is mainly focused on the job-creation type of social enterprises. The data are collected from the information disclosure system, managed by the Korea Social Enterprise Promotion Agency. Through this system, social enterprises can report their performance. Since public disclosure of management performance is not mandatory, not all social enterprise data are available through this system. A total of 228 out of 1661 enterprises certified by 2016 voluntarily released their business performance, based on their business operations in 2015. It should be noted that social enterprises might have differences in their business operations, depending on their management purpose. If one ignores the type of goal orientation and evaluates the efficiency, the results would be unrealistic. In other words, it is necessary to analyze, by category, according to the types of goal orientation. From the perspective of DEA theory, in addition, since it assumes the homogeneity of DMUs under evaluation, we need to check that all of the social enterprises perform their activities in a similar manner. Unfortunately, the aforementioned 228 social enterprises do not share the goal for social contributions. Therefore, we believe that it is desirable to analyze the efficiency by categorizing companies into the types defined by the Korea Social Enterprise Promotion Agency, in order to avoid a distortion of the evaluation results. Now, we focus on the job-creation social enterprises, which, as we have mentioned, make up the majority.

3.2. Performance Measures

There is no clear agreement on how to specify the inputs and outputs of social enterprises. It is necessary to apply different performance measurements depending on the characteristics of the evaluation subject, that is, the social-purpose orientation in this study. Reinvestment for social purpose can be an output regardless of the type. Moreover, the rate of social service provision may be one of the critical outputs for the social-service provision type, while the vulnerable employment rate is a key output for evaluating the job-creation type. Regarding the job-creation social enterprises, we specify the inputs and outputs for the performance evaluation, as shown in Table 2.

Table 2. Performance measures.

Categories		Variables
Inputs		Labor, Assets
Outputs	Operational Outputs	Revenue, Operating Profit
	Social Outputs	Vulnerable employment rate, Reinvestment for social purpose
Dual-Role Factor		Grants

A social enterprise is a business unit engaged in the production of one of more economic goods or services. Thus, we set labor and assets as two inputs for the performance evaluation of social enterprises. Labor is considered the most important traditional input in the process of any business unit. The total labor cost is the sum of salaries, incentives, and contributions for benefit plans.

In this study, salaries are computed by multiplying the wage per week by the number of employees. The second input is assets, which are resources that not only present the results of past events, but also allow the companies to look forward to future economic benefits. All the data of assets are collected from the balance sheet as the sum of liabilities and shareholders' equity.

We decompose the outputs into two types—operational and social. Operational outputs consist of revenue and operating profit. Revenue is one of the most frequently used performance measures and is presented on the income statement. Operating profit is a key indicator in that it shows the ability to operate a company that can run independently without government support. Moreover, we present two components of social outputs. The first is the vulnerable employment rate, defined as the proportion of vulnerable employees in total employment. This output would be the most critical factor in assessing social contribution, especially for the job-creation type of social enterprise. The second factor is reinvestment for social purpose. According to the Social Enterprise Promotion Act, at least two-thirds of the profit available for dividends has to be reinvested for social purposes, the scope of which includes community social service, expansion of facilities, additional employment, salary increases, improvement of working conditions, and donations for public interest.

Grants are the most powerful means for supporting social enterprises, and are typically provided by the government or institutions. Grants received by social enterprises take the form of government, corporate, and parent institution grants, as well as general donations. In addition, grants can be viewed as an input to a company's growth engine, but at the same time, they can be seen as an output, in that outstanding operational and social performance may lead to an increase in grants. As introduced in Section 2.2, such types of variables are referred to as dual-role factors in the DEA methodology. To incorporate grants into the DEA model, we consider the framework to deal with the dual-role factors proposed by Cook et al. [32].

3.3. Data Envelopment Analysis Model

In this study, the traditional DEA model is used as the basis for dealing with the dual-role factor. This model implicitly assumes that all DMUs transform inputs to outputs at a constant returns to scale (CRS). Suppose that there are m inputs x_{ik} ($i = 1, 2, \ldots, m$), s outputs y_{rj} ($r = 1, 2, \ldots, s$), and a dual-role factor w for each DMU k ($k = 1, 2, \ldots, K$). An envelopment model for deriving the efficiency of a particular DMU o can be formulated as follows.

If w plays a role of an input,

$$\begin{aligned} &\min \theta_1 \\ &\text{s.t.} \\ &\sum_{k=1}^{K} \lambda_k x_{ik} \leq \theta_1 x_{ik} \\ &\sum_{k=1}^{K} \lambda_k y_{rk} \geq y_{ro} \\ &\sum_{k=1}^{K} \lambda_k w_k \leq w_o \\ &\lambda_k \geq 0 \end{aligned} \tag{1}$$

Model (1) is input-oriented because it considers the possible radial reductions of all inputs when the outputs are maintained at their current levels. θ_1^* is the optimal objective function value of Model (1) and represents the efficiency score of DMU o. If $\theta_1^* = 1$, then the current input levels cannot be proportionally reduced, indicating that DMU o is on the efficient frontier. Otherwise, if $\theta_1^* < 1$, then DMU o is dominated by the frontier.

As Ruggiero [33] asserted, socio-economic factors are not controllable by management, but are important in determining efficiency variations. Thus, in Model (1), we assume, that a dual role factor w is a non-discretionary variable when it is treated as an input. Since, in an input-oriented DEA model, it considers the possible radial reductions of all inputs when the outputs are fixed at their current level [32].

Likewise, if w plays a role of an output, a DEA model can be formulated as follows:

$$\begin{aligned} &\min\theta_2 \\ &\text{s.t.} \\ &\sum_{k=1}^{K} \lambda_k x_{ik} \leq \theta_2 x_{ik} \\ &\sum_{k=1}^{K} \lambda_k y_{rk} \geq y_{ro} \\ &\sum_{k=1}^{K} \lambda_k w_k \geq w_o \\ &\lambda_k \geq 0 \end{aligned} \tag{2}$$

In Model (2), θ_2^* represents the efficiency of DMU o when w is considered an output. Mahdiloo et al. [30] proposed the method for deriving efficiency by comparing two efficiency scores obtained from Models (1) and (2). However, it requires much computational efforts, since $2k$ linear programming models must be solved. Thus, we follow the unified and simplified model proposed by Toloo and Barat [34]. The formulation is presented in Model (3) as follows:

$$\begin{aligned} &\min\theta \\ &\text{s.t.} \\ &\sum_{k=1}^{K} \lambda_k x_{ik} \leq \theta x_{ik} \\ &\sum_{k=1}^{K} \lambda_k y_{rk} \geq y_{ro} \\ &\sum_{k=1}^{K} \lambda_k w_k \leq w_o + M(1-d) \\ &\sum_{k=1}^{K} \lambda_k w_k \geq w_o - Md \\ &d \in \{0,1\} \\ &\lambda_k \geq 0 \end{aligned} \tag{3}$$

In order to reflect the behavior of the dual-role factor, we construct the constraints by setting a binary variable d, where M is a sufficiently large number. If w is considered an input, d is set to 1; then, the third constraint of Model (3) is active, and the fourth one becomes redundant. Therefore, Model (3) is considered a mixed-integer linear program. Though this programming, each DMU verifies the status of a dual-role factor in the most favorable way.

4. Results

As described in Section 3.1, we analyze the job-creation social enterprises in Korea. Since the disclosure of business performance is not necessarily required for social enterprises, available data is limited. Based on their business operations in 2015, 228 social enterprises released their business performance through the official website of Korea Social Enterprise Promotion Agency. From this database, we extracted 167 enterprises that share the common goal of job-creation. Some inappropriate and missing values were found in this web-based dataset. Thus, we supplement the recording and typographical errors through the official financial statements published on the corporate homepages. It is worth noting that a non-homogenous DMU may cause outliers in DEA. Because each enterprise belongs to different industries and operates in different ways, there is concern about the possibility of the occurrence of inherent outliers. In this study, we attempt to reduce the risk of outlier occurrence through the industry specific analysis and secure the homogeneity of DMUs on the premise that it has a common purpose of job-creation. Therefore, all 167 data were used for the analysis. The descriptive statistics for their inputs and outputs as well as the dual-role factor are presented in Table 3.

Table 3. Descriptive statistics of 167 social enterprises.

Variables	Mean	Std. Dev.	Min	Max
Labor (1000 KRW)	61,151	281,770	3666	3,518,760
Assets (1000 KRW)	693,896	1,311,817	14,541	10,989,393
Revenue (1000 KRW)	1,394,634	3,044,868	32,775	32,051,162
OP (1000 KRW)	934,540	158,611	56,318	1,437,694
VER	0.63	0.16	0.29	1.00
RSP (1000 KRW)	73,290	139,915	0	843,793
Grants (1000 KRW)	140,141	159,285	56	948,729

OP: Operating profit, VER: Vulnerable employment rate, RSP: Reinvestment for social purpose.

The correlation matrix of inputs and outputs is analyzed to see if there is a significant relationship between the variables. From the results in Table 4, we can see that there is a positive correlation between input variables. The obtained coefficient of 0.629 shows relatively strong correlation, but it is not large enough to require further manipulation such as variable reduction or dimension reduction techniques (The correlation is unacceptable when the correlation coefficient exceeds 0.9). Also, most of output variables are correlated positively, but the vulnerable employment rate is negatively correlated with other output variables, although it does seem small in magnitude. In general, the correlation between input and output variables should be positive in DEA. However, the results show that the vulnerable employment rate is negatively correlated with the two input variables. Nonetheless, the vulnerable employment rate is considered an output in this application, since the correlation coefficients are not statistically significant at the 0.05 level.

Table 4. Correlation matrix for all variables.

	Labor	Assets	Revenue	OP	VER	RSP	Grants
Labor	1.000						
Assets	0.629 ***	1.000					
Revenue	0.873 ***	0.825 ***	1.000				
OP	0.227 ***	0.097	0.233 **	1.000			
VER	−0.023	−0.061	−0.043	−0.121	1.000		
RSP	0.382 ***	0.502 ***	0.436 ***	0.244 **	0.078	1.000	
Grants	0.372 ***	0.348 ***	0.365 ***	−0.592 ***	0.148	0.338 ***	1.000

OP: Operating profit, VER: Vulnerable employment rate, RSP: Reinvestment for social purpose. * indicate significance level at $p < 0.05$. ** indicate significance level at $p < 0.01$. *** indicate significance level at $p < 0.001$.

Table 5 presents the efficiency scores of 167 social enterprises calculated by Model (3). Among them, 27 social enterprises (DMU 7, 19, 21, 36, 39, 44, 47, 51, 77, 78, 80, 84, 94, 96, 107, 119, 121, 123, 130, 131, 135, 136, 137, 151, 157, 163 and 166) are identified as being efficient with a relative efficiency score of 1. The amount of grants is considered an input in 56 DMUs with $d = 0$, and it is considered an output in 95 DMUs with $d = 1$. Since each DMU evaluates itself by assigning the dual-role factor to either the input or output side in the most favorable way, the 56 DMUs consider that setting the amount of grants as an input is highly valued for their efficiency. Similarly, 95 DMUs perceived that setting it as an output is more favorable for this self-evaluation. Consequently, such DMUs can improve their efficiency if there are decreases or increases in the amount of grants. Moreover, there are 16 social enterprises in which the amount of grants can play the role of both an input and output. This phenomenon typically occurs in efficient DMUs, although not in all cases. In other words, the efficiency scores of 16 DMUs out of the 27 efficient DMUs do not change with respect to the behavior of the dual-role factor. Accordingly, for these DMUs, it is unnecessary to consider the behavior determination on the amount of grants.

Table 5. Results of data envelopment analysis.

DMU	Efficiency	*d*	DMU	Efficiency	*d*	DMU	Efficiency	*d*
1	0.2948	0	58	0.5750	0	115	0.6293	0
2	0.5408	0	59	0.5621	0	116	0.6226	0
3	0.6224	0	60	0.4327	0	117	0.6393	1
4	0.9336	0	61	0.4067	0	118	0.6182	1
5	0.5263	1	62	0.5628	0	119	1.0000	0 or 1
6	0.7797	1	63	0.4526	0	120	0.5735	0
7	1.0000	0 or 1	64	0.5848	0	121	1.0000	0 or 1
8	0.8051	0	65	0.2708	1	122	0.4050	0
9	0.5373	0	66	0.3414	0	123	1.0000	0 or 1
10	0.7620	1	67	0.2818	0	124	0.8855	0
11	0.7086	0	68	0.7210	0	125	0.1812	0
12	0.4131	1	69	0.8270	0	126	0.4107	0
13	0.6737	0	70	0.6717	0	127	0.5397	0
14	0.6433	1	71	0.4971	0	128	0.6545	0
15	0.9093	1	72	0.3585	0	129	0.8622	1
16	0.3000	0	73	0.4097	0	130	1.0000	1
17	0.8200	0	74	0.6737	1	131	1.0000	0 or 1
18	0.5025	0	75	0.4178	1	132	0.8004	0
19	1.0000	0 or 1	76	0.4393	0	133	0.7291	1
20	0.5847	0	77	1.0000	0	134	0.2913	1
21	1.0000	1	78	1.0000	0	135	1.0000	0 or 1
22	0.3145	0	79	0.3836	0	136	1.0000	0 or 1
23	0.5700	1	80	1.0000	0 or 1	137	1.0000	0
24	0.7282	0	81	0.4586	1	138	0.4824	1
25	0.6319	0	82	0.2583	0	139	0.4443	1
26	0.4567	0	83	0.7370	0	140	0.2725	0
27	0.5398	1	84	1.0000	1	141	0.2601	0
28	0.8299	1	85	0.8408	0	142	0.4276	0
29	0.7257	0	86	0.6682	0	143	0.3889	1
30	0.5585	1	87	0.7095	0	144	0.2821	0
31	0.3205	0	88	0.5852	1	145	0.7017	1
32	0.5400	1	89	0.8668	1	146	0.3021	1
33	0.9865	0	90	0.5716	0	147	0.3600	1
34	0.3994	1	91	0.6724	0	148	0.5062	0
35	0.6608	0	92	0.6275	0	149	0.3955	0
36	1.0000	0 or 1	93	0.6861	0	150	0.1764	0
37	0.7468	0	94	1.0000	0 or 1	151	1.0000	0 or 1
38	0.5255	0	95	0.7382	0	152	0.7214	1
39	1.0000	1	96	1.0000	0 or 1	153	0.5024	0
40	0.6170	0	97	0.8159	0	154	0.9751	1
41	0.4196	0	98	0.4785	1	155	0.7876	1
42	0.7172	0	99	0.3332	0	156	0.1599	1
43	0.8778	0	100	0.9841	1	157	1.0000	0 or 1
44	1.0000	1	101	0.3675	0	158	0.4732	1
45	0.1869	1	102	0.4462	0	159	0.4618	0
46	0.2964	1	103	0.2875	0	160	0.6326	1
47	1.0000	0 or 1	104	0.9601	1	161	0.7562	1
48	0.6002	1	105	0.9320	0	162	0.3405	0
49	0.5947	0	106	0.7495	0	163	1.0000	1
50	0.9943	0	107	1.0000	0	164	0.3749	0
51	1.0000	1	108	0.9243	0	165	0.3575	0
52	0.6566	0	109	0.5166	0	166	1.0000	0 or 1
53	0.8287	1	110	0.4397	0	167	0.3513	1
54	0.4207	1	111	0.9166	0			
55	0.5936	1	112	0.6861	0			
56	0.7464	1	113	0.6678	0			
57	0.3017	1	114	0.8738	1			

We perform a non-parametric Kruskal–Wallis test that assumes there is no difference between the efficiency of three groups. We denote the groups as follows: G1 (the amount of grants is considered an input), G2 (the amount of grants is considered an output), and G3 (the amount of grants is considered both an input and output). In this statistical test, the null hypothesis is that there are no differences in the mean ranks of the groups, and the test statistic indicated that at least one of the groups is significantly different from the other two. The results indicated that the null hypothesis is rejected at a significance level of 0.01 (test statistic H = 41.77, degree of freedom = 2, p-value = 8.50×10^{-10}). Accordingly, we conduct Wilcoxon rank-sum tests for pairwise comparisons. The results indicated that the null hypothesis, that is, G1 and G3 had same distribution of efficiency scores, was rejected at a significance level of 0.01 (test statistic W = 840, p-value = 6.99×10^{-8}); therefore G3 outperforms G1. Similarly, Group 3 outperforms Group 1 (test statistic W = 1488, p-value = 9.02×10^{-10}). However, we cannot see a significant difference between G1 and G2 (test statistic W = 3817, p-value = 0.1696).

DEA identifies a reference set as benchmarks for improvement. The inefficient social enterprises can identify their reference units through the DEA results. These reference sets also refer to the benchmarks, which can guide the inefficient DMUs in improving their efficiency by suggesting realistic targets. See the Appendix A for the benchmarking information for the inefficient DMUs. Using this benchmarking information, an inefficient DMU can refer to the efficient DMUs it must follow to improve its efficiency. For example, DMU 7 and 19 represent the benchmarking partners of DMU 2 and 6, respectively, while DMU 1 should be guided by the business strategies of DMU 47, 123, 136, and 157 to improve the efficiency of its business processes.

In this study, to mitigate the impact of heterogeneity, we limit the analysis to social enterprises certified for the primary purpose of job-creation. Strictly speaking, DEA results might be inappropriately interpreted if the homogeneity assumption of the DMUs does not hold. In this regard, all of the samples that we consider may seem to be against this assumption. Yet, we agree with Samoilenko and Osei-Bryson [35] that the "heterogeneity of the DMUs is a matter of a degree". Consequently, we note that the decision on the similarity of the operating systems of DMUs depends on the decision maker's subjective judgement. Therefore, it seems reasonable to suppose that the concept of homogeneity coincides with the purpose orientation of social enterprises.

In addition, if a homogeneous group with high efficiency is discovered after the efficiency assessment, it can be seen that this group is relatively efficient as a social enterprise with the primary purpose of job-creation. As shown in Table 6, among 27 efficient DMUs, 14 were manufacturing firms (51.9%), followed by education (14.8%) and the social service sector (14.8%), which yielded four efficient DMUs. A large proportion of manufacturing and education-service firms shows relatively better performance. These results show that entrepreneurs preparing a new social enterprise are more likely to gain benefits by initiating manufacturing, education, and social-service organizations. Further, this provides policy implication for the government in terms of supporting social enterprises; government agencies should understand the characteristics of each industry and consider these characteristics when evaluating social enterprises.

A total of 167 social enterprises with the primary purpose of job-creation belong to different industries, such as manufacturing, agriculture, construction, social service, food and beverage, education, and welfare (see Table 6). In relation to the issue of homogeneity, the DEA results may be problematic when an inefficient DMU tries to resemble the benchmarks for efficiency improvement. For example, DMU 25 is a graphic design company, categorized in the culture and arts industry. Its efficiency score is 0.6319 and its identified benchmarks are DMU 36, 94, 135, 136, 137, and 157. Among the six benchmarks, only four DMUs can be considered to operate similar business activities because they are social-service-providing companies. For DMU 25, the λ values corresponding to the benchmarks are 0.1806, 0.1782, 0.3650, 0.0019, 0.0513, and 0.2508. These values provide information on the importance of each benchmark for a specific inefficient social enterprise. Therefore, the entrepreneur of DMU 25 can try to catch up or resemble DMU 135 and 157, corresponding to relatively larger λ values. However, this interpretation may be difficult to apply when the entrepreneur does not agree that the

operating activities of the graphic design company are similar to those of the benchmarks. In fact, DMU 157, with the second largest λ value, is a wholesale distributor of agricultural products.

Table 6. Proportion of efficient decision making units.

Industry	DMUs		Efficient DMUs		Efficient DMUs/DMUs
	No.	Percentage	No.	Percentage	Percentage
Manufacturing	64	38.3	14	51.9	21.9
Agriculture	4	2.4	1	3.7	25.1
Distribution	12	7.2	1	3.7	8.3
Construction	8	4.8	1	3.7	12.5
Social service	33	19.8	4	14.8	12.1
Culture & Arts	11	6.6	0	0	0
Food & Beverage	5	3.0	0	0	0
Education	9	5.4	4	14.8	44.4
Welfare	5	3.0	0	0	0
The others (IT, Transportation, Publication, Broadcasting, Eco, etc.)	14	8.4	2	7.4	14.3
Mixed					
Manufacturing, distribution, and publication service	1	0.6	0	0	0
Manufacturing, construction, and social service	1	0.6	0	0	0
Total	167	100.0	27	100.0	

Sometimes, researchers overlook checking the homogeneity of DMUs beforehand. When DMUs with different technologies are evaluated by referring to the homogenous frontier, the difference in technologies is ignored. Dyson et al. [36] highlighted the heterogeneity of DMUs as a pitfall of DEA applications, and suggested several protocols to guide the applications. One of the protocols is to cluster the DMUs into homogeneous sets. Following this guideline, we perform an additional analysis for an industry-specific assessment with a focus on the manufacturing sector, with a set of 64 social enterprises.

Table 7 presents a comparison of the results. The efficiency scores in the third column are larger than or equal to those in the second column because the data of the non-manufacturing sector is excluded. Twenty-three manufacturing social enterprises are derived as efficient DMUs, nine of which were classified as inefficient DMUs in the evaluation that did not consider the characteristics of each industry. For example, a manufacturing social enterprise, DMU 17, is inefficient, with an efficiency score of 0.82, and its benchmarks are DMU 123 (λ = 0.6104) and 135 (λ = 0.4489); DMU 123 is a manufacturing firm, while DMU 135 is a social-service provider. In such situations, DMU 17 may think that it is very difficult or almost impossible to follow the way in which DMU 135 operates if the organizational structures of the two enterprises fall apart. Therefore, an industry-specific analysis may be desirable to provide references with an achievable performance level for social enterprises, in order to practically improve their performance.

As seen in the fourth column of Table 7, the amount of grants is used as an input for 32 DMUs and as an output for 16 DMUs. In addition, 16 DMUs consider it either an input or output. We conduct an additional analysis to confirm that perceptions of grants may vary according to the age of the social enterprises. The average age of 64 manufacturing social enterprises is 4.2 years and the median is 3 years. Thus, we classify them into two groups based on the age of the enterprises: Group 1 (<4 years) and Group 2 ($\geq$4 years). Social enterprises in Group 2 are more likely to rate grants as an input than are those in Group 1. Specifically, 15 out of the 36 enterprises in Group 1 and 17 out of the 28 in Group 2 are manufacturing social enterprises that perceive the grants as an input. It can be seen that relatively old companies that are certified as social enterprises want to increase their independence by minimizing grants. On the other hand, the start-up social enterprises tend to regard the securing of grants as the output of enterprises.

Table 7. Comparisons of results.

DMU	DMUs under Evaluation		Grants
	Total 167 SEs	64 Manufacturing SEs	
2	0.5408	0.6079	Input
4	0.9336	**1.0000**	Input
7	1.0000	1.0000	Input or Output
8	0.8051	**1.0000**	Input or Output
16	0.3000	0.4106	Input
17	0.8200	**1.0000**	Input or Output
19	1.0000	1.0000	Input or Output
20	0.5847	0.7025	Input
21	1.0000	1.0000	Output
24	0.7282	0.9974	Output
32	0.5400	0.6720	Output
33	0.9865	**1.0000**	Input or Output
35	0.6608	0.9423	Output
40	0.6170	0.9573	Output
43	0.8778	**1.0000**	Input or Output
44	1.0000	1.0000	Output
52	0.6566	0.8331	Output
59	0.5621	0.5997	Input
61	0.4067	0.5569	Input
63	0.4526	0.5794	Input
64	0.5848	0.6796	Output
66	0.3414	0.4323	Input
68	0.7210	0.7307	Input
69	0.8270	**1.0000**	Input
71	0.4971	0.6883	Input
75	0.4178	0.4216	Output
76	0.4393	0.4542	Input
78	1.0000	1.0000	Input or Output
80	1.0000	1.0000	Input or Output
82	0.2583	0.3772	Input
83	0.7370	0.7772	Input
84	1.0000	1.0000	Input or Output
85	0.8408	**1.0000**	Input or Output
87	0.7095	0.8882	Input
88	0.5852	0.6247	Output
97	0.8159	0.8250	Input
101	0.3675	0.4434	Input
102	0.4462	0.5280	Output
106	0.7495	0.9534	Input
107	1.0000	1.0000	Input
108	0.9243	**1.0000**	Input
110	0.4397	0.4414	Input
113	0.6678	0.7525	Input
117	0.6393	0.8357	Output
120	0.5735	0.7355	Input
121	1.0000	1.0000	Input or Output
123	1.0000	1.0000	Input or Output
127	0.5397	0.7231	Input
128	0.6545	0.7076	Input
130	1.0000	1.0000	Input or Output
132	0.8004	0.8013	Input
136	1.0000	1.0000	Input or Output
140	0.2725	0.3136	Input
148	0.5062	0.5837	Output
149	0.3955	0.6718	Input
151	1.0000	1.0000	Input or Output
153	0.5024	0.6384	Output
159	0.4618	0.6243	Input
160	0.6326	0.7928	Output
161	0.7562	**1.0000**	Output
162	0.3405	0.3706	Input
164	0.3749	0.3913	Input
165	0.3575	0.3602	Input
166	1.0000	1.0000	Input or Output

5. Conclusions

Social enterprise pursues both social and economic goals. Economic performance should be emphasized in the operation of a company to achieve social goals. Nonetheless, there is less interest in operational excellence than social values in the evaluation of social enterprises. Therefore, in this study, the efficiency of social enterprise was analyzed by applying a social-enterprise evaluation model that simultaneously considers economic and social measures. In this study, since the enterprises to be evaluated have a similar operating system, we focus on analyzing the social enterprises that share a common purpose. Based on the classification system of the Korea Social Enterprise Promotion Agency, we analyzed social enterprises with the primary purpose of job-creation.

The contribution of this research can be summarized in four dimensions. First, it presents a social enterprise evaluation model that takes into account both the economic and social measures that can be quantified. Measuring the social value created by social enterprises is very difficult and time-consuming. Therefore, when evaluating a large number of social enterprises, it is necessary to objectively use a measurable index and develop an evaluation model that is simple to use. Moreover, a DEA application for responding to such a demand is as meaningful as the model itself, and it can be very helpful if it is used prior to a detailed analysis using qualitative factors like SROI. Second, this research provides clues as to how each social enterprise perceives the amount of grants. If a social enterprise perceives the grants as a financial resource, it will try to improve its efficiency in the direction of increasing independence by minimizing the grants. On the contrary, the grants could be used as a measure of output, since it is possible that a large amount of grants are provided to social enterprises with high social value-creation. In this study, we analyzed efficiency by setting grants as a dual-role factor, and showed that they can be used for performance evaluation in different ways for each enterprise. Third, the industry-specific analysis provides a realistic way for the inefficient manufacturing social enterprises to improve their efficiency with benchmarks in the same industry sector. Methodologically, this enhances the reliability of the study by securing a reasonable degree of homogeneity of the DMUs. Lastly, this research confirms that grants play a different role in evaluating the performance of social enterprises according to the age of such enterprises. From the results, it can be interpreted that older companies operate their businesses to reduce grants for their sustainable business. On the other hand, younger social enterprises tend to perceive grants as an output that has to be increased. Thus, this study shows that it may be helpful to use different variable settings depending on the age of the social enterprises.

However, this study does have some limitations. First, it has been applied to Korean social enterprises only. Because each country has a different social enterprise classification system, it is difficult to say that the model applied to social enterprises in Korea may be applied to those in other countries. Yet, any classification system might be based on the similarity of the entities being classified. Therefore, this evaluation model is applicable to a system where the classification is made according to the homogeneity assumption of DEA. We leave it to future research to investigate the performance of social enterprises in different countries. Second, we performed an industry-specific assessment with only focus on the manufacturing sector. Although the application in the manufacturing sector is intended to provide an example of how to apply the proposed evaluation model, there is a limitation in that only one technology is considered. Therefore, we expect that future work should perform an analysis for suggesting the detailed and realistic improving directions in different industry sectors, by applying different technologies. Third, the qualitative factors are not reflected in the evaluation model, although they are very important in measuring the level of social contribution. Quantifying the qualitative elements of social contribution is very difficult and time-consuming. This study does not suggest, though, that only measurable factors should be incorporated in the performance evaluation; we feel that the evaluation of qualitative factors, such as SROI, is essential. However, it is worth emphasizing the importance of assessment using quantitative factors, as a preliminary investigation prior to such an investigation. Nevertheless, the evaluation model presented in this

study is meaningful in terms of its simplicity and efficiency. We believe that the advanced DEA model considering qualitative factors is very beneficial for evaluating the social value of social enterprises.

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Appendix A. Benchmarking Information

Table A1. Benchmarking information.

DMU	Grants	No. of Benchmarks	DMU	Grants	No. of Benchmarks	DMU	Grants	No. of Benchmarks
1	Output	4	61	Output	4	121	I/O	-
2	Output	3	62	Output	4	122	Output	5
3	Output	5	63	Output	4	123	I/O	-
4	Output	3	64	Output	5	124	Output	4
5	Input	3	65	Input	3	125	Output	5
6	Input	3	66	Output	5	126	Output	4
7	I/O	-	67	Output	4	127	Output	4
8	Output	5	68	Output	3	128	Output	4
9	Output	5	69	Output	4	129	Input	4
10	Input	3	70	Output	5	130	Input	-
11	Output	5	71	Output	4	131	I/O	-
12	Input	3	72	Output	5	132	Output	3
13	Output	4	73	Output	4	133	Input	4
14	Input	2	74	Input	5	134	Input	4
15	Input	3	75	Input	5	135	I/O	-
16	Output	4	76	Output	4	136	I/O	-
17	Output	3	77	Output	-	137	Output	-
18	Output	4	78	Output	-	138	Input	4
19	I/O	-	79	Output	5	139	Input	4
20	Output	4	80	I/O	-	140	Output	4
21	Input	-	81	Input	4	141	Output	3
22	Output	5	82	Output	5	142	Output	4
23	Input	3	83	Output	5	143	Input	3
24	Output	4	84	Input	-	144	Output	4
25	Output	6	85	Output	4	145	Input	5
26	Output	5	86	Output	4	146	Input	4
27	Input	3	87	Output	4	147	Input	3
28	Input	2	88	Input	4	148	Output	4
29	Output	5	89	Input	3	149	Output	3
30	Input	3	90	Output	6	150	Output	5
31	Output	4	91	Output	5	151	I/O	-
32	Input	2	92	Output	4	152	Input	3
33	Output	4	93	Output	4	153	Output	4
34	Input	3	94	I/O	-	154	Input	3
35	Output	4	95	Output	5	155	Input	3
36	I/O	-	96	I/O	-	156	Input	4
37	Output	4	97	Output	4	157	I/O	-
38	Output	5	98	Input	4	158	Input	3
39	Input		99	Output	5	159	Output	4
40	Output	5	100	Input	3	160	Input	4
41	Output	5	101	Output	4	161	Input	4
42	Output	5	102	Output	6	162	Output	4
43	Output	6	103	Output	5	163	Input	-
44	Input	-	104	Input	3	164	Output	4
45	Input	4	105	Output	4	165	Output	5
46	Input	3	106	Output	3	166	I/O	-
47	I/O	-	107	Output	-	167	Input	6
48	Input	2	108	Output	4			
49	Output	4	109	Output	4			
50	Output	3	110	Output	3			
51	Input	-	111	Output	4			
52	Output	4	112	Output	4			
53	Input	4	113	Output	6			
54	Input	4	114	Input	5			
55	Input	4	115	Output	3			
56	Input	3	116	Output	5			
57	Input	3	117	Input	4			
58	Output	3	118	Input	5			
59	Output	4	119	I/O				
60	Output	4	120	Output	3			

I/O: Input or output.

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