

Iwamoto, Hiroki; Suzuki, Hideo

## Article

An empirical study on the relationship of corporate financial performance and human capital concerning corporate social responsibility: Pplying SEM and Bayesian SEM

Cogent Business & Management

## Provided in Cooperation with:

Taylor & Francis Group

*Suggested Citation:* Iwamoto, Hiroki; Suzuki, Hideo (2019) : An empirical study on the relationship of corporate financial performance and human capital concerning corporate social responsibility: Pplying SEM and Bayesian SEM, Cogent Business & Management, ISSN 2331-1975, Taylor & Francis, Abingdon, Vol. 6, pp. 1-21,  
<https://doi.org/10.1080/23311975.2019.1656443>

This Version is available at:

<https://hdl.handle.net/10419/206229>

### Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

### Terms of use:

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<https://creativecommons.org/licenses/by/4.0/>



Received: 24 June 2019  
Accepted: 12 August 2019  
First Published: 20 August 2019

\*Corresponding author: Hiroki Iwamoto Faculty of science and technology, Keio University, Japan.  
E-mail: [h.iwamoto@keio.jp](mailto:h.iwamoto@keio.jp)

Reviewing editor:  
Collins G. Ntim, Accounting,  
University of Southampton, UK

Additional information is available at  
the end of the article

## ACCOUNTING, CORPORATE GOVERNANCE & BUSINESS ETHICS | RESEARCH ARTICLE

# An empirical study on the relationship of corporate financial performance and human capital concerning corporate social responsibility: Applying SEM and Bayesian SEM

Hiroki Iwamoto<sup>1\*</sup> and Hideo Suzuki<sup>1</sup>

**Abstract:** The importance of corporate social responsibility (CSR) has increased in corporate strategic management. Thus, this study focuses on three relationships: 1) the relationship between corporate financial performance (CFP) and CSR activities (CSRA), 2) the relationship between CSRA and human capital (HC), and 3) the relationship between HC and CFP. This study uses fact-based data to remove subjective influences as much as possible. Fact-based data include an ordinal scale such as the presence or absence of specific measures. In addition, since it is assumed that the three relationships are mutually affected, this study analyses them simultaneously to consider a mediating effect. In this analysis, structural equation modelling (SEM) and Bayesian SEM (BSEM) are applied to fact-based data collected from 219 listed companies in Japan. The analysis results clarify that CSRA directly impacts CFP and mediates the impact of HC on CFP. In addition, the path

### ABOUT THE AUTHORS

The authors are members of the Suzuki Laboratory, Department of Administration Engineering, Keio University in Japan.

The main purpose of the laboratory is to study applied statistics and management systems.

Hiroki Iwamoto is a doctoral student in Suzuki Laboratory. His research interests include corporate social responsibility, including human capital, among management systems.

### PUBLIC INTEREST STATEMENT

This study focuses on the relationship between human capital (HC), corporate social responsibility activities (CSRA) and corporate financial performance (CFP).

This study uses Bayesian structural equation modeling for listed companies in Japan. In recent years, the rapid decreasing on birth rates and aging populations in developed countries have become serious social issues. To know the changes in the environment surrounding HC in developed countries, it is helpful to analyse HC in Japan, which is rapidly progressing in this social problem.

This study suggests 2 points. (1) increasing HC is effective in increasing CSRA. Therefore, managers who desire to increase CSRA should first enhance HC. The importance of enhancing HC in a low birth rate and aging society is showed. (2) increasing CSRA is effective in increasing CFP. Therefore, managers who are deliberating as to whether or not to engage in CSRA should decide in the affirmative, as CSRA can offer mutual benefits for society and the company's CFP.

value of CSRA to CFP is larger in BSEM than in SEM. Thus, this study shows the merit of using a method that can handle ordinal scale indicators.

**Subjects:** Management Accounting; Corporate Social Responsibility; Human Resource Development

**Keywords:** corporate social responsibility; structural equation modelling; Bayesian structural equation modelling; human resources

## 1. Introduction

In recent years, management policies related to corporate social responsibility (CSR) have become widespread (Mahjoub, 2019). These policies are aligned with the idea that corporations should engage in activities to enhance the satisfaction of diverse stakeholders as well as shareholders. Waddock and Graves (1997) stated that most of the pressure on strategic managers is attributed to concerns of social problems in management and are, therefore, not due to the traditional concerns of strategic management.

Mitchell (1989) asserts that CSR has been discussed since the 1920s (e.g. CSR is described in Sheldon, 1923). However, Carroll (1999) and Kagata (2006) suggest that the origin of present-day CSR comes from the definition by Bowen (1953, p. 6), “Social responsibilities of businessmen refers to the obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society”.

The following two definitions have become widely used (Dahlsrud, 2008; McWilliams, Siegel, & Wright, 2006; Wickert, Scherer, & Spence, 2016). The Commission of the European Communities (2001) defines CSR as a concept whereby companies decide to voluntarily contribute to a better society and a cleaner environment. McWilliams and Siegel (2001) define CSR as actions that appear to further some social good, beyond the interests of the firm and that which is required by law. Originally, CSR used to be a concept in which companies, as a social norm, were expected to not have a negative impact on society. However, in the 21st century, CSR has become an effective concept for business strategy to positively impact society (Okamoto, 2014). For example, Porter and Kramer (2006) advocate for an approach to strategic CSR in which companies distinguish the social issues which should be solved by the company from general social issues and tackle a few mutually beneficial activities. In later studies, strategic CSR is summarized in the concept of Creating Shared Value (CSV) (Porter & Kramer, 2011).

In addition, the concept of Corporate Social Performance (CSP) is proposed (Okamoto, 2009; Orlitzky, Schmidt, & Rynes, 2003; Waddock & Graves, 1997). While CSR represents responsibility to social issues, CSP refers to actual efforts and is further elaborated upon in the following section. The fact that CSP has become well-known suggests that the discussion on CSR has shifted from social norm to theory and demonstration for corporate strategy (Okamoto, 2014).

When CSR changes from norms to corporate strategy, the amount and effect of investment for corporate strategy is regarded as important. Human capital (HC) as input and corporate financial performance (CFP) as effect are used in this study.

This study focuses on issues regarding the lack of clarity in three key relationships: the relationship between Corporate Social Responsibility (CSR) and Corporate Financial Performance (CFP), the relationship between Human Capital (HC) and CSR, and the presence of direct effects between HC and CFP.

There are several studies dealing with HC, CSR, and CFP, either individually or in pairs (Bučiūnienė & Kazlauskaitė, 2012; Okamoto, 2009; Shiu & Yang, 2017; Wright, Gardner, Moynihan, & Allen, 2005). However, few studies deal with the three components at the same time, and then whether

the relationship between HC and CFP is direct should be verified. Therefore, through this paper we seek to analyse the HC, CSR, and CFP simultaneously. This study has other significances (e.g. analysis using CSR as activity and using fact-based data). However, especially, it is important to analyse three components (HC, CSR and CFP) simultaneously. Since it is assumed that the three relationships are mutually affected, this study analyses them simultaneously to consider a mediating effect.

This study uses listed companies in Japan. In recent years, the rapid decreasing on birth rates and aging populations in developed countries have become serious social issues. To know the changes in the environment surrounding HC in developed countries, it is helpful to analyse HC in Japan, which is rapidly progressing in this social problem.

From a more practical standpoint, this research can help business managers in their decision making processes with respect to HC and CSR matters.

The following sections are structured as follows: Section 2 shows a literature about concept of CSR and HC, Section 3 develops the hypotheses from literature review, Section 4 shows the research methods and the sample, Section 5 treats the variables and empirical models, Section 6 presents the empirical analysis results and discussion, and we show the summary and the conclusion in Section 7.

## 2. Literature review for the components

### 2.1. Corporate social performance and CSR activities

Wood (1991) shows that “CSP can be defined as a business organization’s configuration of principles of social responsibility, processes of social responsiveness, policies, programs, and observable outcomes as they relate to the firm’s societal relationships”. Barnett (2007) points out that CSP may be described as a snapshot of the company’s overall social performance at a particular point in time and a summary of the company’s overall social posture. Accordingly, CSP-CFP studies focus on the financial benefits of having achieved a particular socially-responsible posture at a particular point in time.

However, Barnett (2007) suggests that CSP-CFP studies do not directly support managers who make decisions to invest limited resources in socially-responsible activities among confronting competing demands.

On the other hand, CSR activities (CSRA) are said to be the investments that companies make that, over time, aggregate into certain CSP postures (Barnett, 2007). Godfrey, Merrill, and Hansen (2009) suggest that CSRA that meet the following two criteria could be referred to as substantial or noteworthy CSR. First, the activities must be public knowledge, be it through firm self-reporting or the reports and analysis of others. Second, CSR engagement must be substantial enough to create a credible and reasonable declaration of unselfish intention. These collective investments are referred to as CSR activities (Peloza & Shang, 2011). CSP and CSRA have often been used interchangeably, but there are differences as described above (Barnett, 2007). CSP is the result, CSRA is the activity. Thus, Analyzing CSRA can support judgment about the activity that can be decided by the manager. This study uses CSRA.

### 2.2. Human capital

Human capital (HC) is recognized as an important form of capital in companies. Therefore, HC is taken up as a central factor in the fields of human resource theory and intangibles research. Human capital theory asserts that individual skills, knowledge, and abilities are valuable resources which serve as important sources of economic productivity, and that those skills and others can be built through education and experience (Becker, 1964; Garcia Martinez, Zouaghi, & Sanchez Garcia, 2017).

In the intangibles field, HC is defined as follows in the report written by the MEasuRing Intangibles To Understand and improve innovation Management (MERITUM) project by faculty members of six European countries. MERITUM: MEasuRing Intangibles To Understand and improve innovation Management (2002) reports:

*Human capital is defined as the knowledge that employees take with them when they leave the firm. It includes the knowledge, skills, experiences and abilities of people. Some of this knowledge is unique to the individual, some may be generic. Examples are innovation capacity, creativity, know-how and previous experience, teamwork capacity, employee flexibility, tolerance for ambiguity, motivation, satisfaction, learning capacity, loyalty, formal training and education.*

HC is suggested to be one of the most important factors when conducting CSR

#### 2.2.1. Components of HC

There are two classifications of HC, the classification of competence and attitude, and that of employment pattern. In analysing the effect of HPWPs, Huselid (1995) presented skill and motivation factors as components of HC, while a broader body of research has redefined these components, resulting in various categorizations of HC (Boyatzis, 2008; Edvinsson, Malone, & Michael, 1997; Johan, Göran, Nicola, & Leif, 1997; Ploum, Blok, Lans, & Omta, 2018; Robbins, 1997). However, it is common that HC is consistently divided into competence and attitudes, which are defined as follows:

- Competence: the content part of human capital; the knowledge, skills, talents and know-how of employees.
- Attitude: the employees' willingness to use their abilities to the advantage of the company; motivation.

Lepak and Snell (1999) created classifications in terms of differences in employment pattern. Since the difference in employment pattern is caused by the strategic value of each employee at the time of adoption, the strategic value is an axis. However, in order to increase performance, uniqueness is adopted as another axis because tacit knowledge unique to businesses, as well as strategic value, is needed. In this way, different human capitals are classified by a matrix of uniqueness and strategic value.

Both classification models capture the characteristics of HC. This study adopts a competence and attitude model that is appropriate for the application of the fact-based data.

### 3. Empirical literature review and hypotheses development

#### 3.1. CSRA and CFP

Orlitzky et al. (2003) performs meta-analysis on 52 studies (33, 878 observations), and indicates that CSP and CSP reputation index are correlated to CFP. When CSR is recognized as a bona fide corporate strategy, Okamoto (2014) suggests the importance of the nature of results to the company, as generated by the related activities, and although there are various studies on this subject, clear conclusions have not yet been reached.

Okamoto (2014) implies that the number of studies confirming a positive relationship between CSP and CFP have increased. In addition, Okamoto (2014) demonstrates that the CSP-CFP relationship has had positive tendencies over the long term.

CSRA—CFP studies are necessary to support management decisions; however, not enough has been done. As mentioned above, the relationship between CSRA and CFP has not yet been made sufficiently clear, and this is the first issue of concern for our study.

### **3.2. Human capital: intangible resources for CSRA**

Research from Surroca, Tribó, and Waddock (2010) and Spangenberg (2016) suggest that intangible capitals in a broad sense, such as human capital, innovation, culture, reputation, social capital, are important as a foundation when conducting CSRA. Surroca et al. (2010) proposed a model that mutually influences CSRA and intangible resources (human capital, innovation, culture, and reputation). This model is built from the resource-based view and stakeholder theory. In addition, Spangenberg (2016) stated that strengthening human and social capitals is necessary for sustainable management, including CSRA.

HC has been commonly examined as part of the Intangibles- CSRA studies in the research referenced in this section. For example, Nakajima (2005) suggests that HC is an important component for building a society that emphasizes CSR. Through case studies for CSR, Kitazawa and Sarkis (2000) also show that employee empowerment is important. As described above, previous research has been working to clarify the relationship between HC and CSRA from both a qualitative and quantitative perspective. However, there are measurement issues (as described in 4.1), and the lack of clarity with regard to the relationship between HC and CSRA is the origin of the second issue for consideration in this study.

### **3.3. Human capital and CFP**

In the field of business analysis, the relationship between management resources and performance has been verified for the purpose of improving organization performance, and HC, as a management resource, has a direct impact on corporate performance.

In conducting a review of previous studies, Wright et al. (2005) illustrated various aspects of the relationship between HC and CFP, including Huselid (1995) assertion that high-performance work practices (HPWPs) increase CFP. Qualitatively, HPWPs improve the competence and attitude of HC, and competence and attitude raise CFP. It also notes that Delery and Doty (1996) found significant relationships between human resource practices and accounting benefits by measuring human resource practices through a psychometric survey questionnaire to banking institutions. In addition, Youndt, Snell, Dean, and Lepak (1996) discovered that the combination of human resource practices in the manufacturing industry are related to operational performance indicators.

Research has also progressed in this area since Wright et al. (2005) study (e.g. Felício, Couto, & Caiado, 2014; Iwamoto & Takahashi, 2015; Vomberg, Homburg, & Bornemann, 2015). For example, Felício et al. (2014) show that components constituting HC and social capital are interrelated and influence organizational performance; and Vomberg et al. (2015) argue that HC and brand equity are the most important forms of corporate capital, and using a psychometric survey, they confirm that the mutual effects of the two capitals affect corporate value.

Wright et al. (2005) analysed the causal relationship by dividing the data in a time series format and showed that the influence of Human Resource Management (HRM) on CFP becomes limited when controlled by past financial performance. It suggests that great caution should be exercised in interpreting past HR-performance research that implies this relationship. Previous studies can be grouped into those that suggest there is a direct effect (Delery & Doty, 1996; Felício et al., 2014; Huselid, 1995; Youndt et al., 1996) and those that do not (Vomberg et al., 2015; Wright et al., 2005).

In this way, efforts are made to clarify the relationship between HC and CFP, but it is not sufficiently clear whether there is a direct effect. This is the third issue for examination in this study.

### **3.4. Objectives and hypotheses**

In order to verify the three issues, the following hypotheses are proposed based on previous studies:



H1: CSRA has a positive influence on CFP

H2: HC has a positive influence on CSRA

H3: HC has a direct influence on CFP Considering that CSRA is closely related to HC, this study clarifies the relationship between HC and CFP. By doing so, this study confirms the nature of the current relationships and gains insight to improve CSRA and CFP.

In addition, by comparing parametric and semi-parametric models that can use fact-based data and demonstrating how to utilize the semiparametric method, we aim to serve as a resource for future fact-based data studies. From a more practical standpoint, the purpose of this research can help business managers in their decision making processes with respect to HC and CSR matters.

#### **4. Research design and analytical methods**

##### **4.1. Research based on survey form questionnaire based research**

Analysis based on psychometric survey questionnaires is common when examining relationships between multiple components, as in this research. However, this type of approach has several issues (Iwamoto & Suzuki, 2018).

##### **4.2. Who is the respondent?**

Except for in face-to-face interviews, it is not easy to confirm whether the answer is really the opinion of the registrant. In large corporations, even if top management has registered, a different person, a spokesperson for example, often responds. Therefore, it is necessary to analyse answers based on personal recognition with care.

##### **4.3. Recognition discrepancy**

In the case of research on corporate surveys, particularly, it should be noted that the opinions of the individual respondent (especially, if it were an inexperienced employee) may differ from that of the company. In particular, the consciousness of employees often does not align with the opinion of management, and the employees' behaviours may deviate from management expectations.

##### **4.4. Ordinal scale is not interval scale**

The numerical values in the psychometric survey questionnaires are measured according to an ordinal scale. They cannot be analysed as continuous variables. In the psychometric approach, there are Likert type scales using five, seven, or more levels, which rely on the fact that scale generation by human senses on a well-designed questionnaire is close to equidistant, and therefore can be treated as a continuous scale. However, this scale conversion is not always established for metrics beyond psychological ones, and there is a possibility that the analysis result will be biased due to these measurement/analysis problems. Fact-based data analysis is another form of analysis which is based on data other than responses to psychometric survey questionnaires. A set of answers to question items that can be measured objectively is defined as fact-based data. Specifically, the answers that are the presence or absence of a certain system and continuous variables (e.g. number of years, number of people, amount of money, etc.). Fact-based data can obtain the same answer without being influenced by the respondent. Analysis results are not affected by problems where registrants and respondents are different and problems where opinions of companies and individuals diverge. However, fact-based data analysis is unable to solve the scale problem. Analysis with psychological data has great merit in that it can capture psychological components and ambiguous elements. In other words, it is difficult to measure the degree of progress using fact-based data. It is important to demonstrate evidence from both the psychometric base and the fact-based data as much as possible. As discussed in the previous section, CSRA should be treated as the facts of activities according to its definition. Therefore, this study conducts analysis only on fact-based data.

#### 4.5. Analysis methods

This study demonstrates two models. The first is a model using Structural Equation Modelling (SEM), a maximum likelihood (ML) estimation method which is parametric in nature. SEM is commonly used as an analysis method to demonstrate the relationship between latent variables in business disciplines (Hair, Sarstedt, Ringle, & Mena, 2012) (e.g. Babin, Hair, & Boles, 2008; Brannick, 1995; Chen & Chang, 2013; Medsker, 1994; Mendes & Machado, 2015; Shook, Ketchen, Hult, & Kacmar, 2004).

The second model applies Bayesian Structural Equation Modelling (BSEM), which enables semi-parametric modelling. BSEM is a method proposed by Muthén and Asparouhov (2012). BSEM is a powerful extension of SEM and has several advantages (e.g. small sample analysis problems, etc.) (Assaf, Tsionas, & Oh, 2018; Lee & Song, 2014; van de Schoot et al., 2014).

Comparisons of SEM and BSEM have not only been published in the management field (Zyphur & Oswald, 2015), but also in other fields as well, such as tourism (Assaf et al., 2018). However, the previous studies basically suggest that SEM and BSEM give close results for continuous variables or that close results are obtained in a small number of samples. “When the sample size is large and all parameters are normally distributed, the results between ML estimation and Bayesian estimation are not likely to produce numerically different outcomes” (van de Schoot et al., 2014, p. 856). However, in this study, there will be a difference between the results of SEM and BSEM, because our analysis deals with the ordinal scale and the number of samples is over 200.

Assaf et al. (2018) conduct SEM and BSEM analysis on the established brand equity model. The data to be analysed is converted from continuous scale to ordinal scale (Likert scale). When the continuous variable data analysis results in a true value, in small samples (number of samples: 75, 150, 200, 300), Assaf et al. (2018) show that the root mean square error of the Bayesian estimation is smaller than the ML estimation. This supports previous findings from the literature that the Bayesian approach outperforms the traditional covariance-based approach, particularly for small sample sizes (e.g. Assaf et al., 2018; Lee & Song, 2004). This study uses the advantage of BSEM's ability to handle nominal and ordinal scale variables and demonstrates the relationship between HC, CSRA, and CFP by using fact-based data.

In addition, sensitivity analysis to time changes is conducted to confirm the robustness of the model. The same model is applied and validated for 2015 and 2017 corporate data.

#### 4.6. Corporations under investigation

In recent years, the rapid declining birth rates and aging populations in developed countries have become serious social issues. Social issues related to human resources are especially noticed in societies where the labour force is decreasing due to more pronounced levels of these demographic changes. Due to the decrease in the working population, increases in work hours per capita are causing problems in adapting employment structures and giving rise to corporate scandals (e.g. Wall Street Journal, 2017), which further exacerbate the shortage of human labour. Among developed countries, Japan is particularly characterized by its aging society and declining birth rate. With the elderly population exceeding 21% of the total population, Japan is a “super-aged society” and is the country with the highest level of population aging in the world (Japan Cabinet Office, 2016). As for the country's declining birth rate, the population of Japanese citizens under the age of 14 is also the lowest among developed countries (Japan Cabinet Office, 2017).

According to the Ministry of Internal Affairs and Communications (2014) the labour force in Japan continues to decrease, having peaked around 1995. Furthermore, it is also expected to decrease significantly going forward. As a result of the reduction in the labour force, there are movements presently occurring in Japan related to work style reforms and issues of quality control for corporations.



Individual measures are important to solve the above-mentioned problems related to human resources. In addition, it is necessary to clarify the influence of human resources on corporate performance as a structural problem. By clarifying the influence, the knowledge can be utilized even when a new issue occurs (such as social change). Furthermore, it is expected that the relationship between human resources and corporate activities will continue to change due to trends such as the declining labour force, changing population structure, and the evolution of AI. In order to detect the changes in human resources and corporate activities, their current relationship should be understood.

In several countries other than Japan, the importance of the issues related to workers and human resources is also increasing. For example, in China and South Korea, it is suggested that declining birth rates and aging will progress even faster than in Japan in the future (Japan Cabinet Office, 2016). For that reason, it is important to analyse data from Japanese companies that are recognised for being at the forefront of the human resource issues noted above.

#### **4.7. Samples**

The sample consists of data from companies that disclose their CSR-related information in the Japan CSR Data Book 2015 (Toyo-keizai, 2014). CSR Data Book consists of an annual survey conducted by Toyo-Keizai. The 2014 survey is the 10th. The questionnaire is sent to all listed companies and major unlisted companies (total 3580 companies). The answering companies are 1259 listed companies and 134 unlisted companies. Financial data for the companies is based on their financial statements that has end of accounting period in 2014 and 2015. This study uses data from 219 listed companies that disclose necessary information.

In the robustness check, (208 companies are collected by excluding delisted companies and companies that do not disclose CSR information) from the 219 companies (target companies of 2015). CSR information is based on CSR Data Book 2017 (Toyo-keizai, 2016), and financial data is based on their financial statements that has end of accounting period in 2016 and 2017.

### **5. Model construction**

Qualitative study is necessary for both SEM and BSEM model construction. For this reason, the study builds upon previous research to elaborate the relevant model dimensions.

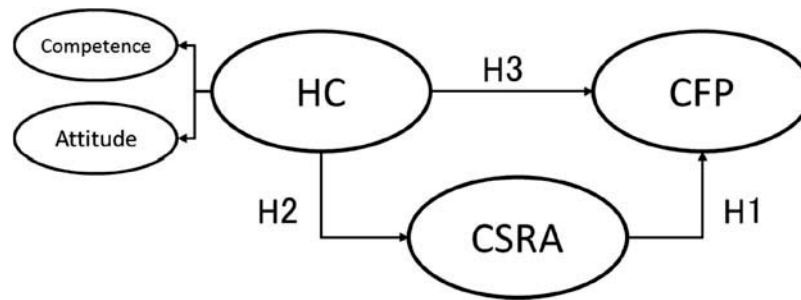
#### **5.1. Components of HC: competence and attitude**

As mentioned above, there are few analyses using fact-based data. For that reason, the determination of which indicator to use to construct HC is somewhat controversial. However, this study has selected indicators that constructs competence and attitude to the highest extent possible (Iwamoto & Suzuki, 2018).

Becker (1964) suggests that personal income distribution is explained the fact that people with higher abilities (competence) are more likely to attract investment in themselves and implies that ability can be defined by income. Colombo and Grilli (2005) examine capacity-based HC in new companies using years of work experience as a measurement. In addition, Kriechel and Pfann (2005) further support the idea that the knowledge established by “learning by doing” can be measured by employees’ work experience. From the above, we consider competence to be composed of salary, average employee age, and length of service to measure industry/company specific abilities.

With respect to attitude, Teruya (2001) shows that employee absence and retirement occur due to low employee motivation and low degree of interaction with colleagues. Huselid (1995) and Jiang, Lepak, Hu, and Baer (2012) demonstrate that employee motivation affects turnover rate, and Kanai (2013) shows that measures to convert nonregular employees into permanent employees are taking place to prevent declining motivation. This study considers attitude as being analogous to motivation, consisting of employee retention and permanent employee rate.

Figure 1. The hypothesis model.



### 5.2. CSR activities

In the Principles for Responsible Investment (PRI) (UN PRI, 2006), endorsed by the United Nations, it was proposed to evaluate and invest in CSRA in accordance with Environmental, Social and Corporate Governance (ESG) principles. PRI suggests that each ESG element has a positive influence on corporate finance. In this research, CSRA are classified as elements of ESG principles.

### 5.3. Corporate financial performance

Based on Okamoto (2009) and Shinohara (2014), indicators of profitability and growth are used as measure of CFP. We use the operating profit on sales as a profitability indicator (Surroca et al., 2010; Waddock & Graves, 1997). This study uses the growth rate of the operating profit on sales and the change of the operating profit on sales as growth indicators. In addition, the study uses sales growth rate as an indicator of the degree to which customers are accepting companies' products and services (Okamoto, 2014; Shinohara, 2014; Youndt et al., 1996).

### 5.4. SEM approach

As previously explained, the HC component is constructed from the human competence and attitude components. The competence component consists of observation variables that are average annual salary, average age of employees, and average years of service. The attitude component consists of the regular employee ratio, employee retention rate, and initial three years' employee retention rate.

Similarly, the CSRA components are created from ESG observation variables. The ESG observation variables are cumulative for a large number of CSRA (1 if engaging in CSRA, 0 if not). From the viewpoint that CSRA are better in terms of better performance, the ESG observation variables are ordinal scale variables. The activity items used for the ESG observation variables are shown in Table A1 of the Appendix.

CFP components are created from the growth rate of sales, the rate of the operating profit on sales, and the change of the operating profit on sales.

Hypotheses 1, 2, and 3 using the HC, CSRA, and CFP components are illustrated in Figure 1. Equations of models are shown which are common to SEM and BSEM in appendix.

### 5.5. BSEM approach

The BSEM analysis is performed using the same model as the SEM analysis described above (Figure 1). There is a prior distribution as a parameter that is important in performing BSEM. Since the distribution of variables cannot be assumed beforehand in this analysis, a uniform distribution is selected according to van de Schoot et al. (2014). One novelty of the model is that it is a corporate performance evaluation model based on fact-based data with HC and CSRA. SEM and BSEM are performed by IBM Amos ver.24.

**Table 1. Industries of the sample**

<b>Mining</b>	<b>1</b>
Construction	21
Manufacturing	134
Transportation & Information	18
Wholesale Trade & Retail	23
Credit & Leasing	6
Real Estate	6
Services	10
Total	219

**Table 2. Basic statistics of the all indicators**

	<b>Average</b>	<b>Median</b>	<b>Standard deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Average annual salary (Yen)	6,546,455	6,509,000	1,194,068	3,494,350	10,911,000
Average age	40.48	40.80	2.67	30.4	46.9
Average length of service	15.24	15.90	3.82	1.80	22.00
Permanent employee rate	0.86	0.91	0.17	0.05	1
Employee retention rate	0.96	0.98	0.06	0.38	1
Employee retention in first 3 years rate	0.87	0.91	0.17	0	1
Environment	13.74	15	5.48	0	21
Social	9.54	10	5.19	0	19
Governance	20.80	21	3.34	7	26
Sales growth rate	1.04	1.03	0.16	0.42	2.37
Operating profit on Sales	0.09	0.04	0.17	-0.37	0.90

## 6. Results and discussion

Before showing the analysis results, industries and basic statistics of all indicators of target companies are shown as background information of analysis (Tables 1 and 2).

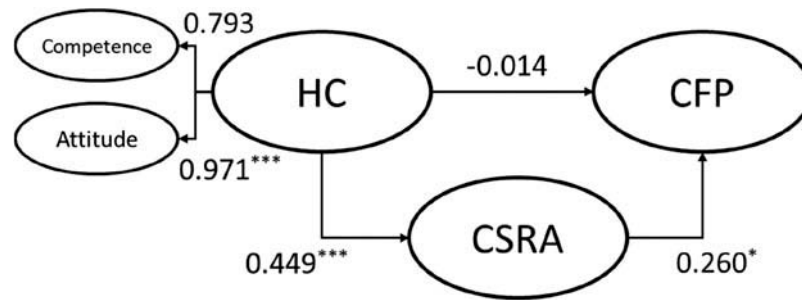
### 6.1. SEM analysis: model fitting

A set of indices is used to review the fit of the model: goodness of fit indicator (GFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). Kline (2011) and Hu and Bentler (1999) suggest that the use of a set of indices is superior to the application of a single index because each index has strengths and weaknesses. For examples, RMSEA is likely to over-reject models at a small sample size. The indices have different rules to determine excellent fit:  $\chi^2/d.f. < 2.0$ , GFI  $> 0.9$ , CFI  $> 0.9$  and RMSEA  $< 0.08$  (Hair, Black, Babin, & Anderson, 2009), and with values of, GFI = 0.941 ( $> 0.9$ ), CFI = 0.938 ( $> 0.9$ ), and RMSEA = 0.077 ( $< 0.08$ ), it was determined that the model fit is acceptable.

### 6.2. SEM analysis: result and discussion

The result of the SEM analysis is shown in Figure 2. Since the path from HC to competence is fixed by the constraint, the significance level is not calculated. As shown in Tables 3 and 4, the path from CSRA to CFP is significant at the 5% level, while the path from HC to CFP is not significant at the 5% level. All the paths (including the path from the latent variable to the observation variable),

**Figure 2. The result of proposed SEM model.**



**Table 3. The result of path values from observed variables to components for SEM**

Components	Indicators	Value	P-Value
HC	Competence	0.793	<0.001
	Attitude	0.971	
Competence	Average annual salary	0.494	<0.001
	Average age	0.799	
	Average length of service	0.731	
Attitude	Permanent employee rate	0.334	<0.001
	Employee retention rate	0.413	
	Employee retention in first 3 years rate	0.645	
CSRA	Environment	0.834	<0.001
	Social	0.887	
	Governance	0.683	
CFP	Sales growth rate	0.773	<0.001
	Operating profit on Sales	0.509	

**Table 4. The result of path value between components for SEM**

Hypotheses	Path			Value	P-Value	Hypotheses Testing
H1	CSRA	→	CFP	0.260	0.013	Support
H2	HC	→	CSRA	0.449	<0.001	Support
H3	HC	→	CFP	-0.014	0.905	Not support

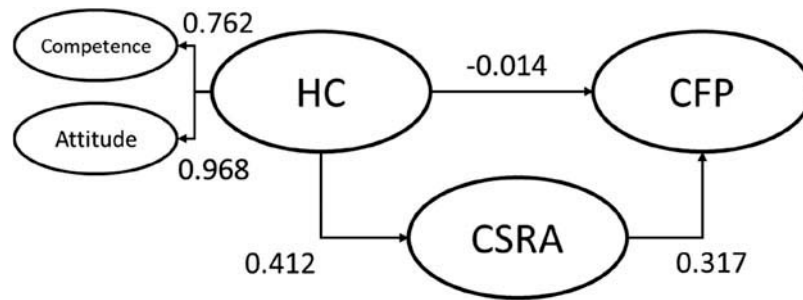
excluding the two paths from CSRA to CFP and from HC to CFP, are significant at the 0.1% level. From these results, the Hypotheses H1 and 2 are supported, but H3 is not.

However, the empirical analysis is conducted using ESG indicators that are not interval measures, and there remain some matters to be discussed. For example, there is a possibility that the path originally has more influence than is reflected in the results of the analysis, and the path may be significant even if it is not effective.

### 6.3. BSEM analysis: model fitting

The model was repeated for more than 27,000 observations with potential scale reduction (PSR) of 1.05 or lower based on findings from prior research (Muthén & Asparouhov, 2012; Zyphur & Oswald, 2015). It should be noted that a PSR threshold value of 1.1 is recommended (Gelman,

**Figure 3. The result of proposed BSEM model.**



**Table 5. The result of path value from observed variables to components for BSEM**

Components	Indicators	−2.5%	$\mu_{\beta}$	2.5%
HC	Competence	0.718	0.762	0.819
	Attitude	0.957	0.968	0.972
Competence	Average annual salary	0.445	0.478	0.499
	Average age	0.759	0.781	0.803
	Average length of service	0.706	0.743	0.762
Attitude	Permanent employee rate	0.285	0.314	0.351
	Employee retention rate	0.340	0.393	0.420
	Employee retention in first 3 years rate	0.609	0.637	0.674
CSRA	Environment	0.822	0.834	0.842
	Social	0.878	0.893	0.908
	Governance	0.651	0.666	0.686
CFP	Sales growth rate	0.768	0.778	0.787
	Operating profit on Sales	0.462	0.490	0.516

Carlin, Stern, Dunson, Vehtari, & Rubin, 2013). The  $\chi^2$  difference values make it possible to compute the posterior predictive p (PPP) values, which reflect the proportion of times that the observed data are more probable than the generated data (Zyphur & Oswald, 2015). The PPP value shows the fitness of the model; the closer to 0.5 the better, and a PPP value of less than 0.05 indicates that the fit of the model is poor (Lynch & Western, 2004; Zyphur & Oswald, 2015). This PPP judgment has three different thresholds (0.01, 0.05 or 0.1). At 0.31, the PPP value of the proposed model exceeds all three possible threshold values (Muthén & Asparouhov, 2012). Therefore, this study considers the proposed model to be acceptable.

#### 6.4. BSEM analysis: result and discussion

The results of the BSEM analysis are shown in Figure 3. All the paths (including the path from the latent variables to the observed variables), excluding the path from HC to CFP, are significant at the 5% level (Zyphur & Oswald, 2015). In the BSEM, in order to evaluate the reliability of the path by the 95% credible interval, we considered the credible intervals and the average of all the paths, as shown in Tables 5 and 6.

The path value between HC and CSRA did not include 0 in the 95% credible intervals. Therefore, H1 was supported. This indicates that various social activities are carried out by employing more skilled and motivated human capital. The path value between CSRA and CFP does not include 0 in the 95% credible interval, and H2 is supported. It can be said that CSRA increase corporate social value, thereby increasing the profit margin of companies. In addition, the absence of CSRA can create negative issues for the company, and there is a possibility that profitability and growth will

**Table 6. The result of path value between components for BSEM**

Hypotheses	Path			-2.5%	$\mu_{\beta}$	2.5%	Hypotheses Testing
H1	CSRA	→	CFP	0.286	0.317	0.346	Support
H2	HC	→	CSRA	0.382	0.412	0.430	Support
H3	HC	→	CFP	-0.044	-0.014	0.026	Not support

decrease sharply. It is expected that this possibility can be mitigated through appropriate CSR efforts.

The path from HC to CFP contains 0 in the 95% credible interval, which implies that H3 is not supported. This shows that the increase in HC has little effect on CFP directly. On the other hand, it shows that there is an indirect effect from HC to CFP via CSRA, which means that increasing HC can raise CFP through CSRA.

### 6.5. Comparison of SEM and BSEM approaches

Both the SEM and the BSEM showed similar results with regards to the hypotheses. That is, H1 and H2 were supported, while H3 was not. For that reason, the ESG index used in this analysis was not an interval scale. However, as the number of items used to construct the indicator was large (approaching 100), it could be regarded as a continuous scale, and thus, suggestions from the analyses were similar.

H3 is not supported. This result supports previous studies that HC has no direct effect (Vomberg et al., 2015; Wright et al., 2005). It is argued that employee behavior mediates the relationships between HC and operational outcomes (Katou, 2017). CSRA is one of the results of employee behaviour. The results suggest that only indirect effects mediated by results of employee behaviour were observed, not direct effects. HC is not directly evaluated and affect CFP, only the employee behavior affects CFP. Since this study is analyzed in the short term, no direct effects from HC is detected. However, it does not deny that a long-term direct effect from HC to CFP.

In general, when all observation variables are continuous variables, the difference between the two estimation results becomes small (van de Schoot et al., 2014). On the other hand, in the SEM and BSEM for this study, there were differences in the coefficients between latent variables, implying that this is because ESG indicators are ordinal scale. By considering the ceiling effect based on the ordinal scale, the path coefficient from CSRA to CFP changed from 0.260 for SEM to 0.317 for BSEM. It implies that BSEM enables us to calculate a value close to the original value.

### 6.6. Robustness check of the models

For robustness check, sensitivity analysis to time change is performed. The model fit of the SEM and BSEM in 2017 data are follows:

SEM: GFI = 0.958(>0.9), CFI = 0.975 (>0.9), and RMSEA = 0.044 (<0.08)

BSEM: PPP = 0.25(>0.05).

Therefore, SEM and BSEM model in 2017 are acceptable.

Tables 7 and 8 show the analysis results related to hypothesis verification in 2017 models, and appendix Tables A2 and A3 show the results of component structures in 2017 models. Both the SEM and the BSEM in 2017 show similar results with regards to the hypotheses. That is, H1 and H2 were supported, while H3 was not. In addition, the path coefficient in 2017 from CSRA to CFP changed from 0.260 for SEM to 0.317 for BSEM. BSEM evaluates CSRA to CFP path more than SEM.



**Table 7. The result of path value between components for SEM in 2017**

Hypotheses	Path			Value	P-Value	Hypotheses Testing
H1	CSRA	→	CFP	0.290	0.017	Support
H2	HC	→	CSRA	0.446	0.003	Support
H3	HC	→	CFP	-0.169	0.216	Not support

**Table 8. The result of path value between components for BSEM in 2017**

Hypotheses	Path			-2.5%	$\mu_{\beta}$	2.5%	Hypotheses Testing
H1	CSRA	→	CFP	0.189	0.337	0.493	Support
H2	HC	→	CSRA	0.255	0.460	0.632	Support
H3	HC	→	CFP	-0.429	-0.207	0.006	Not support

The suggestions of the analysis using 2015 and 2017 data are the same, which indicates that the model is robust for time changes.

## 7. Summary and conclusion

### 7.1. Contribution

The hypothesis that CSRA has a positive influence on CSRA (H1), and the hypothesis that HC has a positive influence on CFP (H2) were supported. On the other hand, the hypothesis that HC has a direct influence on CFP (H3) was not supported. Analysing the three components simultaneously clarified the relationships among them and confirmed that the influence of HC on CFP is indirect in nature. The relationship of HC → CSRA → CFP is supported by fact-based data. It is shown that the relationships are supported even after removing subjectivity on an activity basis, and not on a psychological basis.

Sensitivity analysis to time changes is performed. The model is applied to both 2015 and 2017 data, and it confirmed that the same suggestions are obtained. The model is robust against time changes.

This study utilizes the advantages of BSEM, making it possible to conduct a more detailed analysis on an ordinal scale. The path value from CSR to CFP is larger for BSEM than that for SEM, and this study shows that BSEM can be more accurately measure the influence of CSRA.

### 7.2. Business implications

This study demonstrates the relationship between HC, CSRA, and CFP in Japan, which is necessarily at the forefront of global demographic changes. The analysis result of H1 suggests that increasing HC is effective in increasing CSRA. Therefore, managers who desire to increase CSRA should first enhance HC. HC affects CSRA even if the influence of scale is removed. This research suggests the importance of enhancing HC in a low birth rate and aging society.

The turnover rate has been rising due to the increase in short-tenured workers in Japan (Kambayashi & Kato, 2016). However, this study shows that employee retention rate has a relatively large influence on HC. Therefore, this research suggests that it is important for companies to maintain and improve the retention rate.

The analysis result of H2 suggests that increasing CSRA is also effective in increasing CFP. Therefore, managers who are deliberating as to whether or not to engage in CSRA should decide in the affirmative, as CSRA can offer mutual benefits for society and the company's CFP.

### 7.3. Limitations of research

This study has two primary limitations. The first is that the time lag of the influence from HC to CFP is not considered. Previous research suggests that a time lag occurs while HC affects CFP (Iwamoto & Takahashi, 2015; Lu, Wang, & Lee, 2013; Surroca et al., 2010). This study focuses on constructing models using fact-based data, and time series are not considered. Time series models will be considered in the future research.

Second, the proposed model does not consider other effects of CSR such as insurance, which has been suggested in previous research (Shiu & Yang, 2017; Werther & Chandler, 2005). The insurance-like effect of CSR implies that a negative consequence is reduced when a company experiences a negative event. This focus of this study mainly deals with relationships of direct influence with CSRA, however, in future research, it will be necessary to incorporate other indirect effects into the model.

#### Funding

This work was supported by Grant-in-Aid for Japan Society for the Promotion of Science (JSPS) Fellows [grant number JP31012984].

#### Competing Interests

The authors declare that they have no conflict of interests.

#### Author details

Hiroki Iwamoto<sup>1</sup>  
 E-mail: [h.iwamoto@keio.jp](mailto:h.iwamoto@keio.jp)  
 ORCID ID: <http://orcid.org/0000-0003-2267-6610>  
 Hideo Suzuki<sup>1</sup>  
 E-mail: [hsuzuki@ae.keio.ac.jp](mailto:hsuzuki@ae.keio.ac.jp)

<sup>1</sup> Faculty of Science and Technology, Keio University, 3-14-1 Hiyoshi, Kohoku-ku, Yokohama, Kanagawa 223-8522, Japan.

#### Compliance with Ethical Standards

#### Research involving human participants and/or animals

This article does not contain any studies with human participants or animals performed by the author.

#### Citation information

Cite this article as: An empirical study on the relationship of corporate financial performance and human capital concerning corporate social responsibility: Applying SEM and Bayesian SEM, Hiroki Iwamoto & Hideo Suzuki, *Cogent Business & Management* (2019), 6: 1656443.

#### References

- Assaf, A. G., Tsionas, M., & Oh, H. (2018). The time has come: Toward Bayesian SEM estimation in tourism research. *Tourism Management*, 64, 98–109. doi:10.1016/J.TOURMAN.2017.07.018
- Babin, B. J., Hair, J. F., & Boles, J. S. (2008). Publishing research in marketing journals using structural equation modeling. *Journal of Marketing Theory and Practice*, 16, 279–286. doi:10.2753/MTP1069-6679160401
- Barnett, M. L. (2007). Stakeholder influence capacity and the variability of financial returns to corporate social responsibility. *Academy of Management Review*, 32, 794–816. doi:10.5465/amr.2007.25275520
- Becker, G. S. (1964). *Human capital: a theoretical and empirical analysis, with special reference to education*. New York: National Bureau of Economic Research.
- Bowen, H. R. (1953). *Social responsibilities of the businessman*. New York, NY: Harper & Brothers.
- Boyatzis, R. E. (2008). Competencies in the 21st century. *Journal of Management Development*, 27, 5–12. doi:10.1108/02621710810840730
- Brannick, M. T. (1995). Critical comments on applying covariance structure modeling. *Journal of Organizational Behavior*, 16, 201–213. doi:10.1002/job.4030160303
- Bučinienė, I., & Kazlauskaitė, R. (2012). The linkage between HRM, CSR and performance outcomes. *Baltic Journal of Management*, 7, 5–24. doi:10.1108/17465261211195856
- Carroll, A. B. (1999). Corporate social responsibility: Evolution of a definitional construct. *Business & Society*, 38, 268–295. doi:10.1177/000765039903800303
- Chen, Y.-S., & Chang, C.-H. (2013). Utilize structural equation modeling (SEM) to explore the influence of corporate environmental ethics: the mediation effect of green human capital. *Qual Quant*, 47, 79–95. doi:10.1007/s11135-011-9504-3
- Colombo, M. G., & Grilli, L. (2005). Founders' human capital and the growth of new technology-based firms: A competence-based view. *Research Policy*, 34, 795–816. doi:10.1016/J.RESPOL.2005.03.010
- Commission of the European Communities (2001) Green Paper - Promoting a European framework for Corporate Social Responsibility
- Dahlsrud, A. (2008). How corporate social responsibility is defined: an analysis of 37 definitions. *Corporate Social Responsibility and Environmental Management*, 15, 1–13. doi:10.1002/csr.132
- Delery, J. E., & Doty, D. H. (1996). Modes of theorizing in strategic human resource management: Tests of universalistic, contingency, and configurational performance predictions. *Academy of Management Journal*, 39, 802–835. doi:10.2307/256713
- Edvinsson, L., Malone, M. S., & Michael, S. (1997). *Intellectual capital: realizing your company's true value by finding its hidden brainpower*. New York: Harper Business.
- Felício, J. A., Couto, E., & Caiado, J. (2014). Human capital, social capital and organizational performance. *Management Decision*, 52, 350–364. doi:10.1108/MD-04-2013-0260
- Garcia Martinez, M., Zouaghi, F., & Sanchez Garcia, M. (2017). Capturing value from alliance portfolio diversity: The mediating role of R and D human capital in high and low tech industries. *Technovation*, 59, 55–67. doi:10.1016/j.technovation.2016.06.003
- Gelman, A., Carlin, J. B., Stern, H. S., Dunson, D. B., Vehtari, A., & Rubin, D. B. (2013). *Bayesian data*

- analysis, 3<sup>rd</sup> ed. London, UK: Chapman & Hall/CRC Press..
- Godfrey, P. C., Merrill, C. B., & Hansen, J. M. (2009). The relationship between corporate social responsibility and shareholder value: an empirical test of the risk management hypothesis. *Strategic Management Journal*, 30, 425–445. doi:10.1002/smj.750
- Hair, J., Black, W., Babin, B. J., & Anderson, R. E. (2009). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, 40, 414–433. doi:10.1007/s11747-011-0261-6
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1–55. doi:10.1080/10705519909540118
- Huselid, M. A. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal*, 38, 635–672. doi:10.2307/256741
- Iwamoto, H., & Suzuki, H. (2018) The influence of quality and human capital management : A Bayesian SEM approach. In: Full Papers Book of 16th ANQ Congress 2018 “The future of Quality Leadership in IT-age”. Asian Network for Quality, Almaty, pp 414–422
- Iwamoto, H., & Takahashi, M. (2015). A quantitative approach to human capital management. *Procedia - Social and Behavioral Sciences*, 172, 112–119. doi:10.1016/j.sbspro.2015.01.343
- Japan Cabinet Office (2016) Annual Report on the Aging Society: 2017
- Japan Cabinet Office (2017) A 2017 Declining Birthrate White Paper
- Jiang, K., Lepak, D. P., Hu, J., & Baer, J. C. (2012). How does human resource management influence organizational outcomes? A meta-analytic investigation of mediating mechanisms. *Academy of Management Journal*, 55, 1264–1294. doi:10.5465/amj.2011.0088
- Johan, R., Göran, R., Nicola, C. D., & Leif, E. (1997). *Intellectual capital : Navigating the new business landscape*. Basingstoke, Macmillan Business.
- Kagata, K. (2006). Corporate social responsibility : Its historical development and today's assignment. *KGPS Rev Kwansei Gakuin Policy Stud Rev*, 7, 43–65.
- Kambayashi, R., & Kato, T. (2016) Trends in Long-term Employment since the 1980s in Japan
- Kanai, Y. (2013). Multiplication of the categories for regular workers and its impact on gender equality. *Monthly Journal Japan Institute for Labour Policy*, 55, 63–76.
- Katou, A. A. (2017). How does human resource management influence organisational performance? An integrative approach-based analysis. *International Journal of Productivity and Performance Management*, 66, 797–821. doi:10.1108/IJPPM-01-2016-0004
- Kitazawa, S., & Sarkis, J. (2000). The relationship between ISO 14001 and continuous source reduction programs. *International Journal of Operations & Production Management*, 20, 225–248. doi:10.1108/01443570010304279
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (4th ed.). New York, Guilford publications.
- Kriechel, B., & Pfann, G. A. (2005). The role of specific and general human capital after displacement. *Education Economics*, 13, 223–236. doi:10.1080/09645290500031439
- Lee, S.-Y., & Song, X.-Y. (2004). Evaluation of the Bayesian and maximum likelihood approaches in analyzing structural equation models with small sample sizes. *Multivariate Behavioral Research*, 39, 653–686. doi:10.1207/s15327906mbr3904\_4
- Lee, S.-Y., & Song, X.-Y. (2014). Bayesian structural equation model. *Wiley Interdisciplinary Reviews: Computational Statistics*, 6, 276–287. doi:10.1002/wics.1311
- Lepak, D. P., & Snell, S. A. (1999). The human resource architecture: Toward a theory of human capital allocation and development. *Academy of Management Review*, 24, 31–48. doi:10.5465/amr.1999.1580439
- Lu, W.-M., Wang, W.-K., & Lee, H.-L. (2013). The relationship between corporate social responsibility and corporate performance: evidence from the US semiconductor industry. *International Journal of Production Research*, 51, 5683–5695. doi:10.1080/00207543.2013.776186
- Lynch, S. M., & Western, B. (2004). Bayesian posterior predictive checks for complex models. *Sociological Methods & Research*, 32, 301–335. doi:10.1177/0049124103257303
- Mahjoub, L. B. (2019). Disclosure about corporate social responsibility through ISO 26000 implementation made by Saudi listed companies. *Cogent Bus Manag*, 6, 1609188. doi:10.1080/23311975.2019.1609188
- McWilliams, A., & Siegel, D. (2001). Corporate social responsibility: A theory of the firm perspective. *Academy of Management Review*, 26, 117–127. doi:10.5465/amr.2001.4011987
- McWilliams, A., Siegel, D. S., & Wright, P. M. (2006). Corporate social responsibility: strategic implications. *Journal of Management Studies*, 43, 1–18. doi:10.1111/j.1467-6486.2006.00580.x
- Medsker, G. (1994). A review of current practices for evaluating causal models in organizational behavior and human resources management research. *Journal of Management*, 20, 439–464. doi:10.1016/0149-2063(94)90022-1
- Mendes, L., & Machado, J. (2015). Employees' skills, manufacturing flexibility and performance: a structural equation modelling applied to the automotive industry. *International Journal of Production Research*, 53, 4087–4101. doi:10.1080/00207543.2014.993772
- MERITUM: MEasuRING Intangibles To Understand and improve innovation Management. (2002) Guidelines for Managing and Reporting on Intangibles
- Ministry of Internal Affairs and Communications (2014) White paper: Information and Communications in Japan 2014
- Mitchell, N. J. (1989). *Generous Corporation: A political analysis of economic power*. New Haven: Yale University Press.
- Muthén, B., & Asparouhov, T. (2012). Bayesian structural equation modeling: a more flexible representation of substantive theory. *Psychological Methods*, 17, 313–335. doi:10.1037/a0026802
- Nakajima, T. (2005). A study of corporate social responsibility and intangible assets : Social information and corporate social accounting. *J Soc Inf Stud*, 12, 113–130.
- Okamoto, D. (2009). Social relationship of a firm and the CSP-CFP relationship in Japan: Using artificial neural networks. *Journal of Business Ethics*, 87, 117–132. doi:10.1007/s10551-008-9874-1

- Okamoto, D. (2014). Sociality of a firm and the CSP-CFP relationship : using artificial neural networks. *MITA Business Review*, 50, 83–103.
- Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. *Organization Studies*, 24, 403–441. doi:10.1177/0170840603024003910
- Pelozo, J., & Shang, J. (2011). How can corporate social responsibility activities create value for stakeholders? A systematic review. *Journal of the Academy of Marketing Science*, 39, 117–135. doi:10.1007/s11747-010-0213-6
- Ploum, L., Blok, V., Lans, T., & Omta, O. (2018). Toward a validated competence framework for sustainable entrepreneurship. *Organization & Environment*, 31, 113–132. doi:10.1177/1086026617697039
- Porter, M. E., & Kramer, M. R. (2006). Strategy and society: The link between competitive advantage and corporate social responsibility. *Harv Bus Rev*, 84, 78–92.
- Porter, M. E., & Kramer, M. R. (2011). Creating shared value. *Harv Bus Rev*, 89, 62–77.
- Robbins, S. P. (1997). *Essentials of organizational behavior*. London: Prentice Hall.
- Sheldon, O. (1923). *The philosophy of management*. London: Pitman.
- Shinohara, Y. (2014). A study on CSP and CFP relationships: When does CSP effect on CFP. And Which Stakeholder Is the Most Influential on CFP? *Mita Business Review*, 57, 21–45.
- Shiu, Y.-M., & Yang, S.-L. (2017). Does engagement in corporate social responsibility provide strategic insurance-like effects? *Strategic Management Journal*, 38, 455–470. doi:10.1002/smj.2494
- Shook, C. L., Ketchen, D. J., Hult, G. T. M., & Kacmar, K. M. (2004). An assessment of the use of structural equation modeling in strategic management research. *Strategic Management Journal*, 25, 397–404. doi:10.1002/smj.385
- Spangenberg, J. H. (2016). The corporate human development index CHDI: a tool for corporate social sustainability management and reporting. *Journal of Cleaner Production*, 134, 414–424. doi:10.1016/j.jclepro.2015.12.043
- Surroca, J., Tribó, J. A., & Waddock, S. (2010). Corporate responsibility and financial performance: the role of intangible resources. *Strategic Management Journal*, 31, 463–490. doi:10.1002/smj.820
- Teruya, Y. (2001). The individual's value theory and the group value theory in the human resource accounting. *Kanagawa University International Management Review*, 21, 37–62.
- Toyo-keizai (2014) TOYO KEIZAI Japan CSR Data Book 2015
- Toyo-keizai. (2016). *TOYO KEIZAI Japan CSR data book 2017*. Tokyo, TOYO KEIZA.
- UN PRI (2006) Principles for Responsible Investment
- van de Schoot, R., Kaplan, D., Denissen, J., Asendorpf, J. B., Neyer, F. J., & van Aken, M. A. G. (2014). A gentle introduction to Bayesian analysis: Applications to developmental research. *Children Development*, 85, 842–860. doi:10.1111/cdev.12169
- Vomberg, A., Homburg, C., & Bornemann, T. (2015). Talented people and strong brands: The contribution of human capital and brand equity to firm value. *Strategic Management Journal*, 36, 2122–2131. doi:10.1002/smj.2328
- Waddock, S. A., & Graves, S. B. (1997). The corporate social performance-Financial performance link. *Strategic Management Journal*, 18, 303–319. doi:10.1002/(SICI)1097-0266(199704)18:4<303::AID-SMJ869>3.0.CO;2-G
- Wall Street Journal. (2017). Justice department gets involved in Kobe Steel Metal Scandal; Kobe Steel received request for information related to standard products sold to U.S. customers. Author.
- Werther, W. B., & Chandler, D. (2005). Strategic corporate social responsibility as global brand insurance. *Business Horizons*, 48, 317–324. doi:10.1016/j.bushor.2004.11.009
- Wickert, C., Scherer, A. G., & Spence, L. J. (2016). Walking and talking corporate social responsibility: Implications of firm size and organizational cost. *Journal of Management Studies*, 53, 1169–1196. doi:10.1111/joms.12209
- Wood, D. J. (1991). Corporate social performance revisited. *Academy of Management Review*, 16, 691. doi:10.2307/258977
- Wright, P. M., Gardner, T. M., Moynihan, L. M., & Allen, M. R. (2005). The relationship between HR practices and firm performance: Examining causal order. *Personnel Psychology*, 58, 409–446. doi:10.1111/j.1744-6570.2005.00487.x
- Youndt, M. A., Snell, S. A., Dean, J. W., Jr., & Lepak, D. P. (1996). Human resource management, manufacturing strategy, and firm performance. *Acad Manag J*, 39, 836–866. doi:10.2307/256714
- Zyphur, M. J., & Oswald, F. L. (2015). Bayesian estimation and inference. *Journal of Management*, 41, 390–420. doi:10.1177/0149206313501200

## Appendix

**Table A1. The list of ESG indicators**

Environment
Department in charge of environment (Dedicated)
Department in charge of environment (Concurrent)
Officer in charge of environment
Documentation of environmental policies
Preparation of environmental accounting
Aggregation of total amount of CO <sub>2</sub> emission by Scope 3
Implementation status of environmental audits (Obtained ISO 14,001 certification)
Implementation status of environmental audits (Implemented original internal EMS)
Implementation of Environmental Management System (EMS)
Medium-term plan for CO <sub>2</sub> (or greenhouse gas) emissions cuts, etc., established at companies
Measures of green procurement (Implemented in line with GPN Guidelines)
Measures of green procurement (Implemented in line with original internal guidelines)
Green procurement of raw materials (Implemented based on comprehensive guidelines)
Green procurement of raw materials (Implemented based on partial guidelines)
Provisions for possible future expenses in the environmental field, such as environmental improvement, emissions and incidents
Monitoring of quantitative data on pollution of soil, groundwater, etc., within business site premises (Quantitative data are monitored and disclosed)
Monitoring of quantitative data on pollution of soil, groundwater, etc., within business site premises (Quantitative data are monitored but not disclosed)
Status of climate change mitigation measures
Status of introduction of renewable energy (solar, wind and geothermal, etc.) to business sites and headquarters building, etc.
Environmental impact assessment measures
Environmental business measures
Social
Establishment of department in charge of CSR (Dedicated)
Establishment of department in charge of CSR (Concurrent)
CSR officer (Dedicated)
CSR officer (Concurrent)
Definition of the materiality of activities
Documentation of CSR policy
Third-party involvement
Implementation of information-exchange meetings and other forums for interactive communication mainly with stakeholders
Policies on anti-corruption and anti-bribery measures
Use of ISO 26,000
Establishment of department in charge of corporate citizenship (Dedicated)
Establishment of department in charge of corporate citizenship (Concurrent)
Collaboration with NPOs and NGOs in conjunction with CSR activities
Implementation of CSR procurement
Existence of CSR procurement audit and evaluation at business partners
Dealing with conflict minerals
Base of pyramid (BOP) business measures
Implementation of community investment
Implementation of pro bono support measures

(Continued)

---

Governance
Establishment of department in charge of legal compliance (Dedicated)
Establishment of department in charge of legal compliance (Concurrent)
Establishment of internal whistleblower hotlines
Establishment of external whistleblower hotlines
Establishment of rules on protection for whistleblower
Guideline for Whistleblower Protection Act
Establishment of internal control committee
Establishment of internal audit division independent of operating divisions
Evaluation of internal controls
Appointment of Chief Information Officer (CIO)
Appointment of Chief Financial Officer (CFO)
Formulation of information system-related security policy
Implementation status of internal audits related to information system security (Implemented regularly)
Implementation status of internal audits related to information system security (Implemented irregularly)
Implementation status of external audits related to information system security (Implemented regularly)
Implementation status of external audits related to information system security (Implemented irregularly)

---

Information Security Management System (ISMS) certification
Establishment of privacy policy
Establishment of risk and crisis management system.
Establishment of risk and crisis management policy
Documentation of risk and crisis management policy
Construction of Business Continuity Management (BCM)
Establishment of Business Continuity Plan (BCP)
Disclosure and documentation of business ethics (Documentation/Disclosure)
Disclosure and documentation of business ethics (Documentation/Not Disclosed)
Code of conduct

---

The model can be expressed as an equation.

$$\begin{bmatrix} f_1 \\ f_2 \\ f_3 \\ f_4 \\ f_5 \\ v_1 \\ v_2 \\ v_3 \\ v_4 \\ v_5 \\ v_6 \\ v_7 \\ v_8 \\ v_9 \\ v_{10} \\ v_{11} \end{bmatrix} = \begin{bmatrix} 0 & 0 & \alpha_{13} & 0 & 0 \\ 0 & 0 & \alpha_{23} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \alpha_{43} & 0 & 0 \\ 0 & 0 & \alpha_{53} & \alpha_{54} & 0 \\ \beta_{11} & 0 & 0 & 0 & 0 \\ \beta_{21} & 0 & 0 & 0 & 0 \\ 0 & \beta_{42} & 0 & 0 & 0 \\ 0 & \beta_{52} & 0 & 0 & 0 \\ 0 & \beta_{62} & 0 & 0 & 0 \\ 0 & 0 & 0 & \beta_{74} & 0 \\ 0 & 0 & 0 & \beta_{84} & 0 \\ 0 & 0 & 0 & \beta_{94} & 0 \\ 0 & 0 & 0 & 0 & \beta_{105} \\ 0 & 0 & 0 & 0 & \beta_{115} \end{bmatrix} \begin{bmatrix} f_1 \\ f_2 \\ f_3 \\ f_4 \\ f_5 \end{bmatrix} + \begin{bmatrix} d_1 \\ d_2 \\ f_3 \\ d_4 \\ d_5 \\ e_1 \\ e_2 \\ e_3 \\ e_4 \\ e_5 \\ e_6 \\ e_7 \\ e_8 \\ e_9 \\ e_{10} \\ e_{11} \end{bmatrix}$$

where

$f_1$  = competence,

$f_2$  = attitude,

$f_3$  = HC,

$f_4$  = CSRA,

$f_5$  = CFP,

$v_1$  = average annual salary,

$v_2$  = average age,

$v_3$  = average length of service,

$v_4$  = permanent employee rate,



$v_5$  = employee retention rate,  
 $v_6$  = employee retention in first 3 years rate,  
 $v_7$  = environment,  
 $v_8$  = social,  
 $v_9$  = governance,  
 $v_{10}$  = sales growth rate,  
 $v_{11}$  = operating profit on Sales,  
 $d, e$  = residual.

The above formula is a structural equation and is common to SEM and BSEM. Estimation is required to get the parameters from this equation. The difference between SEM and BSEM is the estimation method. The least squares method and the maximum likelihood estimation method are mainly used in the SEM (the maximum likelihood estimation method is used in this research). BSEM is an

**Table A2. The result of path values from observed variables to components for SEM in 2017**

Components	Indicators	Value	P-Value
HC	Competence	0.628	
	Attitude	0.654	0.044
Competence	Average annual salary	0.490	
	Average age	0.671	<0.001
	Average length of service	0.908	<0.001
Attitude	Permanent employee rate	0.557	0.003
	Employee retention rate	0.331	
	Employee retention in first 3 years rate	0.464	0.004
CSRA	Environment	0.842	<0.001
	Social	0.930	<0.001
	Governance	0.670	
CFP	Sales growth rate	0.284	
	Operating profit on Sales	0.995	<0.001

**Table A3. The result of path value from observed variables to components for BSEM in 2017**

Components	Indicators	-2.5%	$\mu_B$	2.5%
HC	Competence	0.425	0.616	0.893
	Attitude	0.389	0.692	0.909
Competence	Average annual salary	0.409	0.485	0.603
	Average age	0.565	0.658	0.733
	Average length of service	0.818	0.884	0.952
Attitude	Permanent employee rate	0.376	0.528	0.723
	Employee retention rate	0.218	0.320	0.435
	Employee retention in first 3 years rate	0.265	0.442	0.615
CSRA	Environment	0.791	0.855	0.917
	Social	0.837	0.896	0.948
	Governance	0.527	0.607	0.696
CFP	Sales growth rate	0.184	0.294	0.417
	Operating profit on Sales	0.994	0.995	0.996

estimation method by Bayesian estimation. For more information on the benefits and differences of Bayesian estimation, see (Muthén & Asparouhov, 2012).



© 2019 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.



You are free to:

Share — copy and redistribute the material in any medium or format.

Adapt — remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made.

You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

No additional restrictions

You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

***Cogent Business & Management* (ISSN: 2331-1975) is published by Cogent OA, part of Taylor & Francis Group.**

**Publishing with Cogent OA ensures:**

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

**Submit your manuscript to a Cogent OA journal at [www.CogentOA.com](http://www.CogentOA.com)**

