

Does Social Responsibility Activities Keep Future Earnings Sustainability?†

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〈Abstract〉

Companies shall hold social responsibility as a member of the social community. Corporate social responsibility uses corporate resources, yet it plays important roles in reducing social imbalance. Their responsibilities are highly associated with the corporate sustainability. Many earlier studies on the association between corporate social responsibility and corporate sustainability have been attempted. Yet it should be mentioned that they do not show a variety of realities as linearity between dependent variables and independent variables were assumed. Thus, this study aims to analyze Markov blanket, a node of minimum descriptive variables that relieve a rigid assumption among variables and affect corporate sustainability by using Bayesian network. Sensitivity analysis was used to elicit how other variables affect by reflecting the complex reality when real factors are changed. As an important result of this study, the firm's future earnings sustainability is naturally related to operating earnings, and as the corporate governance structure is sound, the firm is able to steadily fulfill its social responsibility. However, the fact that the size of a company is large does not mean that it is in good compliance with corporate laws. This would not be unrelated to the fact that many of today's companies are not complying with the law and are suffering social condemnation. Results from this study will serve as a useful analytic tool when investors and creditors showing interests in corporate sustainability for assessing the value of companies and making investment decisions. Moreover, they can be used as references for relevant agency supervising capital markets to establish or improve appropriate institutions aimed at improving corporate sustainability.

Key Words: Corporate Social Responsibility, Sustainability, Bayesian Network, Markov Blanket

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I. Introduction

The concept of “social enterprise” gaining attentions due to sluggish economy, exploding unemployment, and downsizing social welfare service in the Western Europe around 1970 is now universally adopted in daily routines. Although the primary objective of companies is not to pursue public interest, it is true that members are highly satisfied and company reputation is enhanced when companies complete social responsibility(Hillman and Keim, 2001).

There are numerous viewpoints on whether corporate social responsibility gives positive impacts on corporate financial performance since fulfilling some portions of duties by showing interests in environmental, social, and regional interests require massive capitals. For example, some claims that corporate social responsibility fulfills desires of many concerned people over companies and contribute to financial performance on the one hand(King and Lennox, 2001; Waddock and Graves, 1997; Wright and Ferris, 1997; McWilliams and Siegel, 2000; Posnikoff, 1997). On the other hand, others view that massive investments are negative or irrelevant with financial performance (Brammer et al., 2006; Nelling and Webb, 2009).

However, it should be reminded that no sustainable growth is expected without addressing social problems arisen from the contemporary society where various interests are intertwined. That is, companies can ensure corporate sustainability by addressing the

imbalanced engendered by these social problems. Their efforts to solve environmental pollution, for instance, can bring about massive investment and rather put adverse pressures on financial performance; on the different aspect, their efforts to reduce expenditure may generally lead to technological progress and diminishing environmental pollution that accompanies the consumption of resources, thereby leading to a virtuous cycle that enables to enhance the competitiveness due to corporate expenditure reduction.

The Bayesian network will be used to analyze the association corporate social responsibility and corporate future sustainability in this study. Specifically, it will analyze the association between corporate social responsible activities and corporate future profit sustainability among 955 businesses with KEJI index from 2011 to 2013 and elicit the causality among variables through the Bayesian network. The Bayesian network adopted in this study presents Markov blanket, a node of minimum explanatory variables influencing corporate future profit sustainability(e.g. social responsibility factors and corporate financial feature variables). In addition, sensitivity analysis that reflects a wide array of realities is performed and the association among corporate social responsibility, corporate sustainability, and corporate financial characteristics will be examined from the given causality graph.

The Bayesian network herein can overcome limitations of other earlier studies that surveyed corporate social responsibility and sustainability. In other words, previous studies

were pointed out as limited, in that they did not mirror complex realities by assuming the linearity between dependent variables and independent variables. On the contrary, this Bayesian network not only represents the interdependence among certain variables, but expresses the complex relationship among variables. In other words, it is available for describing the association between two different variables as well as the association among independent variables.

This study aimed to draw the causality among corporate social responsibility, corporate sustainability, and financial characteristics by using Bayesian network and identify whether each variable has mutually direct or indirect interactions. It will provide insightful information on more effective decision-making to investors or creditors interest in corporate sustainability and enhance the efficiency of supervision of relevant organizations that supervise and manage companies in the capital market. In other words, the imbalance of distorted capital market can be diminished if companies with lower future sustainability are earlier identified and management measures are reinforced based on these results. This study will be also adopted as reasonable evidence to adopt or improve institutions in hope of elevating corporate sustainability during the recession.

As an important result of this study, the sustainability of the future earnings is naturally related to the operating earnings, and the sound corporate governance allows the company to consistently fulfill its social

responsibilities. However, just because a company is big doesn't mean that it's a compliant company law. It is not related to the fact that many companies today are not complying with the law and suffering social criticism.

This paper follows the constitution. The introduction is shown in Chapter 1 and earlier studies are reviewed in association with this research; particularly, it focuses on reviewing previous papers related with corporate social responsibility, sustainability, and Bayesian network. Chapter 3 determines research methods and covers the research procedure, definition of variables, and selection of samples. For the definition of variables, it surveys variable measurements regarding corporate social responsibility, sustainability, and corporate financial characteristics. Chapter 4 shows results by drawing descriptive statistics and the causality among variables and further performs sensitivity analysis reflecting various realities. Lastly, Chapter 5 draws conclusions in which findings are recapitulated and leads to an end by mentioning contributions.

II. Review on Earlier Studies

1. Corporate social responsibility

With many definitions of social enterprise, it generally refers to a company aiming at providing various benefits to environmental,

social, and regional society as a top priority(Bebbington and Gray, 2000). In other words, it does not set a corporate objective to maximizing profits like general private businesses, but establishing and carrying out organizational objective for public benefits such as environment and society. Following the economic downturn and demolition of welfare system including the sluggish economic growth, rising unemployment, and reduction in social service in the western countries around 1970s, the world began to discuss this new company(Borzaga and Defourny, 2001).

Companies, not just for social enterprises, tend to hold social responsibilities for their interests. If they fulfill their duties, demands from many concerned people around businesses are fully met and bring about the improvement of corporate values(Swanson, 1999). The completion of corporate social responsibilities boosts trust from customers, leading to enhancing corporate loyalty. In addition to this, it upgrades corporate reputation, fulfills employee satisfaction, and eventually elevates firm values(Hillman and Keim, 2001).

Numerous studies present contrary viewpoints regarding how companies fulfill social duties affect corporate financial performance(e.g. ROA, ROE, price earning ratio, etc.). However, despite the disagreement, corporate social responsibility activities have generally positive effects on financial performance, firm value, sales activities, and job attitudes of members. That is, it can be said that corporate social responsibility on many concerned people(e.g. customer, supplier, regional society, and

employee, etc.) with companies meets those concerned and offer positive effects on financial performance (Herremans et al., 1993; King and Lennox, 2001; Waddock and Graves, 1997; Pave and Krausz, 1996; Wright and Ferris, 1997; McWilliams and Siegel, 2000; Posnikoff, 1997).

For example, Many Korean companies are increasing their financial performance by offsetting the risk factors caused by globalization through CSR activities(Byun and Nam, 2017). Also faithful implementation of social responsibilities contributes to reducing capital costs and ushers to boost corporate values (Harjoto and Jo, 2015). And, corporate social responsibility activities can reduce the tax avoidance tendency of a company, increase job satisfaction of members, and induce organizational commitment(Jee et al., 2017; Seo and Choi, 2017). In addition, corporate social responsibility activities can enhance the image of the company and encourage consumers to increase their purchases(Yang and Song, 2018).

But, some studies reveal that corporate social responsibility exerts tremendously adverse pressures on financial performance or has no significant correlation due to the generation of massive investment of corporate resources(Brammer et al., 2006; Nelling and Webb, 2009). As firm is bigger, more demanding corporate social responsibilities are likely to be imposed on involved people(Bernea and Rubin, 2010).

2. Sustainability

Companies should keep on communicating with the society, not isolated from the society, and complete some portions of social responsibilities for the sustainable growth due to its ever-growing entity. In other words, the era of sustainable growth by which companies complete social and environmental responsibilities has already arrived(Oh, 2010). The ruin of ecosystem due to environmental pollution, for instance, does not guarantee the continuation of corporate management as it triggers the imbalance of social community(Shrivastava, 1995).

Accordingly, the objective of company can be said to seek the sustainable development by addressing “social issues”(Drucker, 1984) since these problems addressed for the sustainable growth can offer new opportunities to enterprises. Efforts to reduce environmental pollution can lead to a new technological advance. In this way, financial performance such as reducing costs can be improved and corporate competitiveness can be reinforced by meeting regulatory conditions such as social and environmental ones imposed by the government(Gunasekaran and Spalanzani, 2012).

Corporate sustainability is associated with the comprehensive corporate social responsibilities regarding society, economy, and environment, which are interconnected(Adams, 2006). In particular regards to the economic sustainability, future cash flow generated by companies is essential for the sustainable growth. The quality of earnings is one of major indices for predicting

cash flows of future companies. There are a variety of methods for measuring it, which include earnings sustainability and corporate earnings-generating capabilities(Kormendi and Lip, 1987). For example, the higher quality of earnings can be said that companies are likely to generate future cash flows(Lev, 1989). Accordingly, the higher quality of earnings leads to low earnings variability, sustainable earnings, and greater corporate cash generating capabilities(Bernstein and Siegel, 1979).

Corporate profitability and financial status should be stable for make corporate social responsibilities sustainable. Some emphasize that the financial independence and sustainability from economic performance independent of corporate social responsibility should be guaranteed(Perrini and Tencati, 2006). However, others argue that the supportable financial status and sustainability are inadequate for social enterprises since its objective is not to seek earnings(Crainer, 2002).

3. Bayesian network

The Bayesian network is the most effective way to represent the association between combinations with qualitative or quantitative discrete distribution features into acyclic graph and probability distribution(Baesens et al., 2004). This network is used to obtain information on independence or dependence among variables as well as the probable interdependence among them(Pearl, 1998; Jensen, 1996). This network thus can be said a significantly useful statistical analytics

capable of utilizing probabilistic part and time part.

Each variable is herein referred to as node and arch means the relationship among variables. For example, each node in the Bayesian network is a node representing corporate social responsibilities, measurements that present corporate sustainability, and financial characteristics as research variables. Moreover, the association of nodes can be connected by marking arrows, which show the association among corporate social responsibilities as well as sustainability and corporate social responsibilities.

Each variable is marked as a conditional probabilistic variable through the unplanned mechanical learning, which is represented by acyclic graph with visual directions. The Bayesian network marks the interdependence among variables in probability and arch is shown as the direction of dependence among these variables(Moea et al., 2016). The interdependence among variables involves uncertainty when the Bayesian network is used to analyze the association among variables. Therefore, each variable refers to discrete distribution or continuity probabilistic variables. This study is conducted by using the unplanned mechanical learning to draw this variable.

On the other hand, the ordinary Bayesian network is universally adopted in that it represents the causality of variables properly without marking the difference among nodes(Bouckaert, 1995). This network is used to express the association of variables in

visual forms based on analyzed results. The relationship among variables can be represented in probability as well as posterior probability distribution not observed among groups can be obtained by the unplanned mechanical learning by classifying variables into specific groups. It helps predicting the relationship among variables in the presence of noise in analysis data in comparative accuracy.

Furthermore, the Bayesian network is understandable and available for interpreting results compared to other mechanical learning methods such as artificial neural network since it draws the minimum group of explanatory variables needed to separate dependent variables from analysis data by using Markov blanket(Korb and Nicholson, 2010).

III. Methods

1. Procedure

This study aims to use the Bayesian network to examine the relationship between corporate social responsibility and financial characteristics associated with corporate sustainability. It also aims to draw meaningful findings by using the sensitivity analysis to reflect various management environments surrounding companies. The Bayesian network represents the relationships of diverse variables in probabilities and can be employed as a useful tool in case of management decision-making since it extracts at least relevant

variables.

When the causality among corporate sustainability, social responsibility, and financial characteristics is drawn by this network, they alter environments of each variable. This enables us to see how these variables are changed dynamically. The procedure of research by using this network can be summarized as follows.

First, quantitative data associated with corporate sustainability, social responsibility, and financial characteristics are collected. Second, each data is learned by using unplanned mechanical learning. Third, the relationship with each variable such as corporate sustainability, social responsibility, and financial characteristics are drawn by using the Bayesian network. Lastly, it examines how probable variables of other variables are changed if the probable distribution of a particular variable is shifted by reflecting various management environments surrounding companies.

Since there is no paper on the association between corporate social responsibility and sustainability by using the Bayesian network, the value of this pioneering research is expected to be profound.

2. Definition of variables and sample selection

2.1 Definition of variables

2.1.1 Corporate social responsibility

Corporate social responsibility focuses on addressing demands from various concerned

people surrounding companies such as local community, employee, and environmental group. Since they are related with complicated social issues, it is extremely difficult to estimate social interests (Dees and Anderson, 2003). Therefore, there are many different indices that measure social responsibility. For instance, the most reliable assessment index includes Dow Jones Sustainability and FTSE4 Good Index, Ethibel Sustainability Index (Choi, 2017).

In South Korea, KEJI under the Economic Justice Practice Federation assesses companies for selecting “good company prize” and adopts KEJI index. This organization was founded in 1989 by citizens in order to accomplish economic justice such as eradication of political and economic tie, fair distribution of wealth, and constraint of speculation in real estate. It was organized by people who are willing to cooperate in promoting the entire interests in the society and known for autonomous operation without subsidy from the government. Moreover, this institution pursues economic justice and implements “good company” award for the implementation of ethical management for the transparent and sound corporate culture.

Good Company Award hosted by KEJI has three-decade history since 1991 and its KEJI index are used in many studies as an objective index regarding corporate social responsibility. In this study, this index will be used as an objective index regarding corporate social responsibility.

Assessment criteria include soundness (25 points), fairness (20 points), social contribution

(15 points), consumer protection(15 points), environmental management(10 points), and employee satisfaction(15 points). Corporate soundness assesses the soundness of dominating structure such as internal equity ratio, level of professional manager, social executive activity, and the distance between ownership and dominance, soundness of investment expenditure such as consumption expenditure, expenditure in research and development, and facility investment, soundness of capital procurement such as debt ratio, company credit rating, subsidiary investment and financial guarantee. Fairness assesses the observance of fair transaction act, prohibition of unfair subcontract transaction, resold price maintenance, separation of capital, undutiful public announcement, appropriateness of business report, operation of inspection board, and implementation of voting such as concentrated voting, written voting, and electronic voting. Social contribution assesses employment equality such as percentage of employing people with disabilities, social contributions such as donation and social volunteering, and tax payment. Consumer protection includes the protection of the right of consumer such as certification of customer satisfaction, winning of customer satisfaction award, and number of consulting consumer dissatisfaction, observance with relevant consumer acts such as Electronic Commerce Consumer Protection Act and Door To Door Sales Act, and categories associated with the safety of consumers. Environmental management includes efforts to improve corporate environment

such as reporting environmental management, environment-related certification and award, violation of environmental act and history of pollution. Employee satisfaction involves health and safety in workplaces such as the occurrence of industrial accident, development of human resources such as training expense per capita, wage and welfare such as level of wage compensation, length of service, labor welfare capital in the company, and labor-management relationship such as the occurrence of labor-management conflict, percentage of temporary workers, and labor-management relationship recovery programs.

Target companies used for selecting KEJI index in the institution include nearly 400 companies by years including companies listed in KOSPI except for companies with net income deficit for the three consecutive years, impaired capital, companies with less than 1 times interest earned ratio, and newly listed companies. KEJI obtains the objectivity and fairness in the course of assessment by the standardization and grading of each index.

2.1.2 Sustainability

Earnings sustainability refers to information that current earnings are constantly maintained in the future. Therefore, it is estimated by the slope shown in Formula (1) below(Dechow and Dichov, 2002). It can be said that higher earnings sustainability can lead to the higher quality of earnings and better corporate ability of generating cash.

$$\text{Earnings}_{S_{t+1}} = \alpha_1 + \beta_1 \text{Earnings}_t + \gamma_1 \quad (1)$$

As shown in the Formula (1), it can be said that the higher earnings sustainability leads to higher quality of earnings and thereby results in greater corporate cash generating capabilities. Earnings in the above Formula (1) can employ earnings during the term as shown by Formula (2) below.

$$\text{Net Income}_{t+1} = \alpha_2 + \beta_2 \text{NetIncome}_t + \gamma_2 \quad (2)$$

Since net income during the term involve external other profits and losses independent of business, earnings sustainability can be extracted as shown in Formula (3) except for non-current and non-repeated categories (Jun, 2003).

$$\begin{aligned} \text{Operating Earnings}_{t+1} = \\ \alpha_3 + \beta_3 \text{OperatingEarnings}_t + \gamma_3 \quad (3) \end{aligned}$$

Moreover, return on asset serves as an alternative for net income as shown in Formula (4) below to control the effects of changing profitability due to firm size (Fairfield and Yohn, 2001).

$$\text{ROA}_{t+1} = \alpha_4 + \beta_4 \text{ROA}_t + \gamma_4 \quad (4)$$

2.1.3 Corporate financial characteristics

Firm size is considered as the most important

among other corporate financial characteristics. As companies are huge, its market dominance is huge, capable of taking advantage of corporate sources efficiently due to its huge economic power. In case of huge firm size, it is likely to hold its social responsibility by utilizing corporate resources more efficiently than other businesses (Jang and Choi, 2010).

Meanwhile, debt ratio is considered as a financial characteristic to control corporate risks that may affect the corporate sustainability (Waddock and Graves, 1997). Higher debt ratio forces massive investment due to corporate pressure over compensating principle and interest, which results in poor corporate social responsibilities (Jensen, 2002).

2.2 Sample selection

Companies with KEJI index from 2011 to 2013 obtained from this institution were selected as the first samples. Financial data was collected from KIS-VALUE from Korea Investors Service Inc. The financial industry was removed from other sectors to enhance the homogeneity of samples and limited to settlement corporations in December listed in the stock exchange.

<Table 1> Process of selecting samples

| Criteria | Firm-year |
|---|-----------|
| Samples are listed in the securities market | 2,214 |
| (-) Companies without settlement corporations in December | (83) |
| (-) Companies where KEJI index and financial data are unavailable | (1,176) |
| (=) Final sample | 955 |

Final samples were 955 company-years after eliminating observed data unavailable with all financial data needed for empirical analysis. The above procedure of selecting samples is presented in <Table 1>. 2,214 first samples are listed in the securities market. There were 955 final samples after removing 83 companies without settlement corporations in December and 1,176 companies where KEJI index and financial data are unavailable.

The present study aimed to draw the association between corporate social responsible activities and earnings sustainability as well as causality of each variable by using the Bayesian network analysis methods. To see the association among corporate social responsible activities, earnings sustainability and financial characteristics as an objective of this research, variables used in this study are shown in <Table 2> below.

<Table 2> Categorization of each variable

| Variables | Description | Scope | N |
|-----------|--|------------------|-----|
| SIZE | Firm size=(natural logarithm of total assets) | (~26.027] | 318 |
| | | (25.027 ~27.012] | 319 |
| | | (27.012~) | 318 |
| ROA | ROA(=net income/total assets) | (~0.026] | 318 |
| | | (0.026 ~0.054] | 319 |
| | | (0.054~) | 318 |
| OPE | Operating margin of total assets(=operating income/ total assets) | (~0.033] | 318 |
| | | (0.033 ~0.063] | 319 |
| | | (0.063~) | 318 |
| OCF | Operating cash flows(=operating cash flows/ total assets) | (~0.030] | 318 |
| | | (0.030 ~0.075] | 319 |
| | | (0.075~) | 318 |
| LEV | Debt ratio(=total liabilities/ total assets) | (~0.280] | 318 |
| | | (0.280 ~0.472] | 319 |
| | | (0.472~) | 318 |
| SON | Soundness(=Divided by 25 points. If the variable is 1, it is a perfect score) | (~0.651] | 318 |
| | | (0.651 ~0.705] | 319 |
| | | (0.705~) | 318 |
| FAI | Fairness(=Divided by 20 points. If the variable is 1, it is a perfect score) | (~0.75] | 313 |
| | | (0.75 ~0.769] | 325 |
| | | (0.769~) | 317 |
| COM | Social contribution(=Divided by 15 points. If the variable is 1, it is a perfect score) | (~0.361] | 318 |
| | | (0.361 ~0.463] | 319 |
| | | (0.463~) | 318 |
| ENV | Environmental management(=Divided by 10 points. If the variable is 1, it is a perfect score) | (~0.463] | 405 |
| | | (0.463 ~0.54] | 296 |
| | | (0.54~) | 254 |

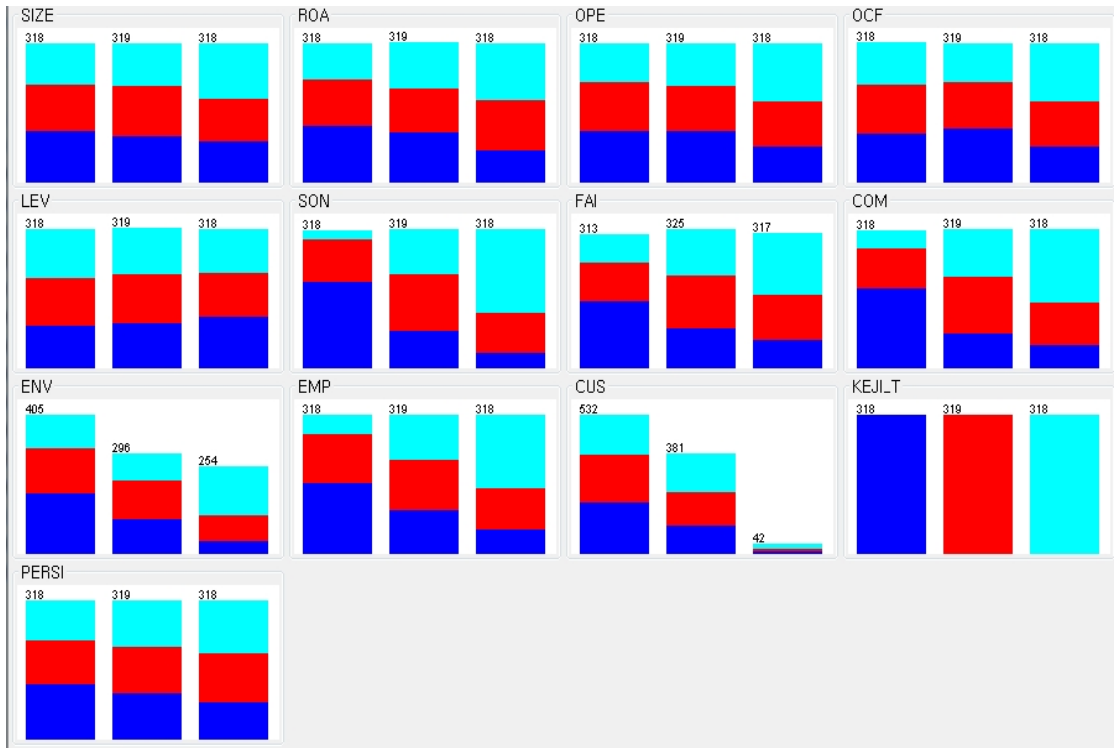
| | | | |
|--------|---|---------------|-----|
| EMP | Employee satisfaction(=Divided by 15 points. If the variable is 1, it is a perfect score) | (~0.561] | 318 |
| | | (0.561~0.636] | 319 |
| | | (0.636~) | 318 |
| CUS | Consumer protection(=Divided by 15 points. If the variable is 1, it is a perfect score) | (~0.645] | 532 |
| | | (0.645~0.685] | 381 |
| | | (0.685~) | 42 |
| KEJI_T | KEJI Index total scores(=Divided by 100 points. If the variable is 1, it is a perfect score) | (~0.610] | 318 |
| | | (0.610~0.633] | 319 |
| | | (0.633~) | 318 |
| PERSI | Earnings sustainability. It is estimated using the rolling five-year period for each firm-year in formula (4). Specifically, firm i's future earnings sustainability for year t implies β_4 of the regression formula (4) estimated from the data for five years from t to year t+4 | (~ 0.233] | 318 |
| | | (0.233~0.507] | 319 |
| | | (0.507~) | 318 |

Each variable must involve categorical values for the analysis of Bayesian network. Variables in this study thus were categorized into three groups by using the identical frequency. Specific scopes were presented in <Table 2>. All variables in the present study were categorized into three groups by using the identical frequency. Yet discrete distribution cannot be performed by using the identical frequency if identical scores are found in corporate social responsible activities. For example, the frequency varies according to groups due to repeated same scores in particular grades in case of environmental management (ENV) and consumer protection (CUS).

<Figure 1> shown below presents the distribution of KEJI index total scores representing corporate social responsible activities on the following variable that converted all variables into categories. All corporate financial variables were classified into three groups by using the identical frequency and blue parts under variables note

the extent less than 0.610 where corporate social responsible activities are the lowest and the red parts are the interval where these activities are the medium(exceeding 0.610 and less than 0.633). Blue parts indicate the interval where these activities are higher (exceeding 0.633).

The distribution reveals that no difference between corporate social responsible activities by groups was found according to financial variables such as firm size, return on asset, operating margin of total assets, operating cash flows, and debt ratio. In addition, it was found that future earnings sustainability was equally distributed by corporate social responsible activity groups. However, specific index of these activities such as soundness, fairness, social contribution, environmental management, employee satisfaction, and consumer protection revealed that the distribution of KEJI index total scores varied according to each variable group.



<Fig. 1> Distribution of KEJI index total scores of each variable

IV. Results

1. Descriptive statistics

<Table 3> shows descriptive statistics on major variables used in this study. The mean and median of firm size were 26.710 and 26.495, respectively. The mean and median of return on assets turned out 4.9% and 3.9%, respectively. Moreover, the mean and median of operating margin of total assets were 5.7% and 4.7%, respectively. Similarly, the mean and median of operating cash flows representing

operating cash flows compared total assets were found 0.058 and 0.053. The mean(median) of debt ratio was 0.382(0.378), which indicates that total debts of sample companies accounted for 38.2%(37.8%) in total assets.

Observing the mean(median) on KEJI specific indices, soundness(SON) was 0.679(0.676), fairness (FAI) was 0.752(0.768), social contribution(COM) was 0.411(0.433), environmental management (ENV) was 0.516(0.515), employee satisfaction (EMP) was 0.595(0.599), and consumer protection(CUS)¹⁾ turned out 0.656 (0.643). The mean and median of KEJI index total scores were 0.621 and 0.621, respectively.

1) Because of repeated same scores in CUS, the 25% and the median value are the same.

<Table 3> Descriptive statistics of major variables

| Variables | Mean | Std. | 25% | Median | 75% |
|-----------|--------|-------|--------|--------|--------|
| SIZE | 26.710 | 1.342 | 25.831 | 26.495 | 27.333 |
| ROA | 0.049 | 0.100 | 0.020 | 0.039 | 0.065 |
| OPE | 0.057 | 0.047 | 0.026 | 0.047 | 0.076 |
| OCF | 0.058 | 0.067 | 0.019 | 0.053 | 0.092 |
| LEV | 0.382 | 0.188 | 0.236 | 0.378 | 0.531 |
| SON | 0.679 | 0.066 | 0.637 | 0.676 | 0.720 |
| FAI | 0.752 | 0.073 | 0.723 | 0.768 | 0.793 |
| COM | 0.411 | 0.090 | 0.326 | 0.433 | 0.479 |
| ENV | 0.516 | 0.069 | 0.455 | 0.515 | 0.555 |
| EMP | 0.595 | 0.077 | 0.540 | 0.599 | 0.650 |
| CUS | 0.656 | 0.036 | 0.643 | 0.643 | 0.683 |
| KEJL_T | 0.621 | 0.030 | 0.602 | 0.621 | 0.641 |
| PERSI | 0.363 | 0.468 | 0.137 | 0.372 | 0.584 |

Summarizing specific indices of KEJI index, sample companies in this study exceeded 0.6 points in soundness(SON), fairness(FAI), and consumer protection(CUS). It indicates that they generally performed faithfully. However, low scores in social contribution(COM) and environmental management(ENV) showed that they are inadequate in both criteria. Furthermore, standard deviation of social contribution(COM) turned out 0.09, which was relatively higher than other specific indices.

Consumer protection(CUS) was 0.036, which was slightly lower.

Moreover, standard deviation of social contribution(COM) was 0.09, which was relatively higher than other specific indices. Consumer protection(CUS) was found the lowest as 0.036. This suggests that social contributions of sample companies included in this study showed a significant difference,

while consumer protecting activities showed the narrow difference between companies.

2. Drawing causality among variables

Previous studies on corporate social responsible activities were analyzed by mainly using regression models. However, this analysis does not reflect the real world adequately since it simply makes a linear assumption on the association between explanatory variables and dependent variables. On the contrary, the Bayesian network presents the relationship between explanatory variables and dependent variables and the causality between explanatory variables. Since it readily draws the combination of minimum explanatory variables needed for distinguishing dependent variables, it holds advantages in easy understanding and excellent interpretation

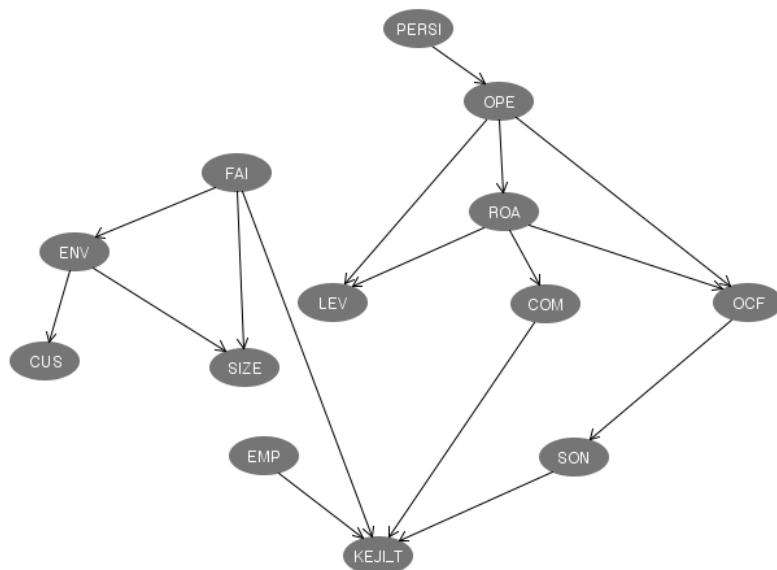
(Korb and Nicholson, 2010). Variables used in this study drawn by using this network are exhibited in <Figure 2> below.

Operating margin of total assets(OPE) was found to be a variable that presents the direct causality with corporate future earnings sustainability(PERSI). This sustainability is more associated with operating earnings generated from continuous and repeated activities than profits during the term including profits out of operating activities. Operating margin of total assets(OPE) showed direct causalities with debt ratio(LEV), return of assets(ROA), and operating cash flows(OCF). Return of assets (ROA) also showed direct causalities with debt ratio(LEV) and operating cash flows(OCF).

Observing the causality of variables related with corporate social responsibilities, variables showing direct causalities with KEJI total

scores(KEJI_T) included soundness(SON), fairness(FAI), social contribution(COM), and employee satisfaction(EMP). However, KEJI total scores(KEJI_T) exhibited no direct causality with environmental management(ENV) and consumer protection(CUS). Furthermore, fairness(FAI) showed direct causalities with environmental management(ENV), while environmental management(ENV) did with consumer protection(CUS).

The causality of social responsible activity variables and financial variables shows that fairness(FAI) and environmental management (ENV) had a direct causality with firm size(SIZE) and return on assets(ROA) presented a direct causality with social contribution (COM), operating cash flows(OCF), and soundness(SON).



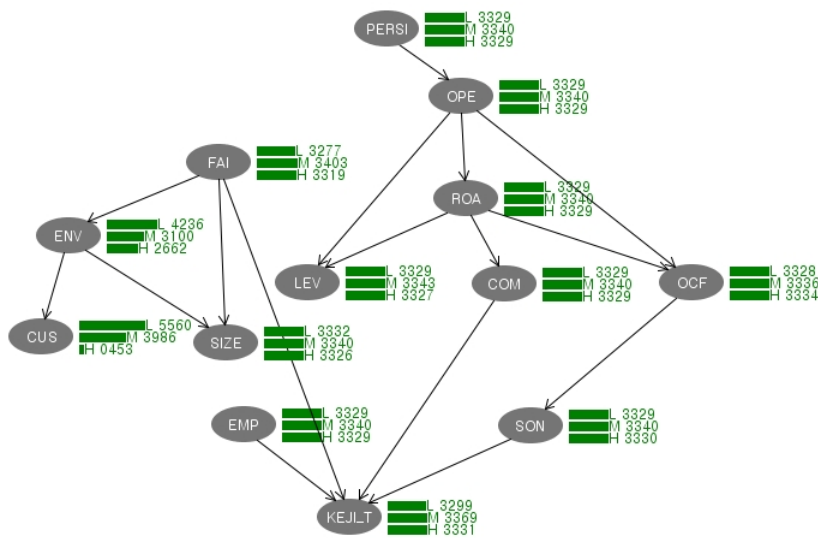
<Fig. 2> Causality graph by using Bayesian network

3. Sensitivity analysis(What-if analysis)

Sensitivity analysis(What-if analysis) can be carried out when posterior probabilities of certain variables are added since the Bayesian network can draw the probability from the relationship among variables. This analysis can bring about the probabilistic change of other variables arisen from the variation of probabilities of particular variables and results depending on various scenarios can be presented. Considering these reasons, the Bayesian network is frequently employed in business decision-makings and the most appropriate analytic tool for business strategy

that provide profitable information for users' decision-makings.

<Figure 3> presents the prior probability of the causality graph drawn from the Bayesian network. Variables used in this research were classified into three group by using all the identical frequency. Therefore, prior probabilities of low group(L), middle group(M), and high group(H) turned out approximately 33.3%, respectively. However, only environmental management(ENV) and consumer protection (CUS) incapable of being classified by the identical frequency due to the distribution concentrated in certain scores showed distinct distribution by groups according to a low group(L), middle group(M), and high group(H).



<Fig. 3> Prior probability of each variable

The change of posterior probability of each variable is shown when total KEJI index scores have a certain value(<Fig. 4>). For

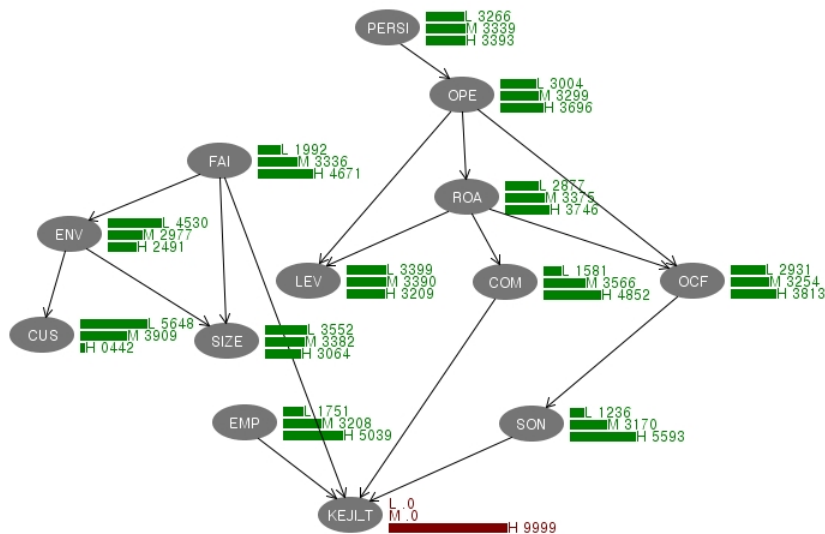
groups with higher KEJI index, the probability of being into a highly sound group that shows a direct causality with this index rose about

23% point from 33.3% to 55.93%. On the other hand, the probability of being into a low group dropped nearly 21% point from 33.3% to 12.36%. That is, sound corporate dominance structure, investment expenditure, and capital procurement suggest that they fulfill social responsibilities.

In the same vein, the probability of employee satisfaction representing the direct causality with KEJI index into a high group rose from 33.29% to 50.39%. In addition, the probability of fairness into a high group went up from 33.19% to 46.71%. This reveals that faithful social responsibilities executed by companies boost employee satisfaction and active participation in social contributions, and eventually

affects faithful fulfillment in relevant rules.

However, the probabilities of consumer protection and environmental management exhibiting the direct causality with KEJI index into high groups showed slight drops from 4.53% to 4.42% and 26.62% to 24.91%, respectively. This suggests that companies independent of social responsibilities are not influenced by KEJI index as they handle consumer protection and environment management. The probability of future earnings sustainability into a high group without a direct causality with KEJI index slightly rose from 33.29% to 33.93% and one into a low group rose from 33.29% to 32.66%, which indicates almost no variation.



<Fig. 4> Higher KEJI Index total scores

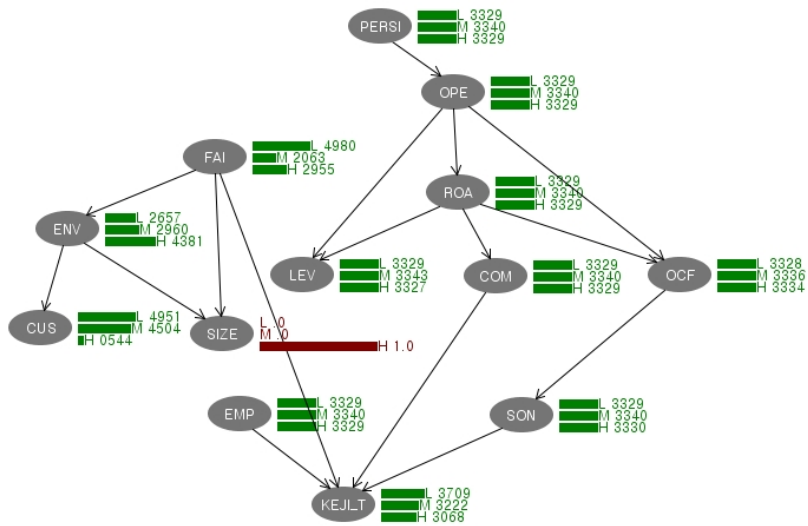
More massive firm size enables to augment corporate social responsible activities by taking advantage of corporate resources more efficiently

(Jang and Choi, 2010). According to results, firm size(SIZE) showed a direct causality with environmental management(ENV) and fairness

(FAI) among other corporate social responsible activities and no direct causality was found with other indices. Specifically, as one belongs to a group with higher firm size, the probability of being into a group with higher environmental management jumped from 26.62% to 43.81%, which shows approximately 17% point rise. The probability of being into a low group dropped nearly 16% point from 42.36% to 26.57%. This implies that executives in bigger firm size are generally devoted to promoting environmental management based on

adequate financial assets.

Moreover, the probability of being into a highly fair group decreased by approximately 4% point from 33.19% to 29.55%. The probability of being into a low group increased by nearly 17% point from 32.77% to 49.8%(<Fig. 5>). Bigger firm size leads to low probability of fairness. This result appears outrageous, for bigger firm size means not complying with rules such as fair transaction act and faithful public announcement.



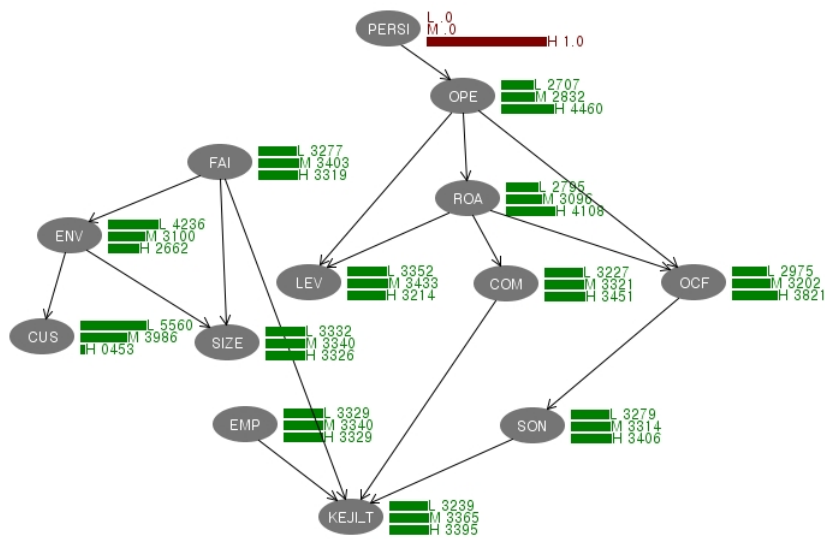
<Fig. 5> Higher firm size

Lastly, <Figure 6> shows posterior probability change of corporate financial variables and social responsible activity variables if future earnings sustainability pertains to a higher group. To see operating margin of total assets(OPE) representing the direct causality with future earnings sustainability(PERSI), the probability of being into a higher group with

future earnings sustainability(PERSI) rose nearly 11% point from 33.29% to 44.6%. On the contrary, the probability of being into a low group dropped nearly 6% point from 33.29% to 27.07%. This suggests that operating earnings irrelevant of external other profit and loss directly affect corporate future earnings sustainability.

When future earnings sustainability mounts, the probability of return on assets(ROA) pertaining to a higher group increased by nearly 11% point from 33.29% to 44.6%; whereas, the probability of being into a low group fell nearly 6% point from 33.29% to 27.95%. This suggests that effects give

impacts on future earnings sustainability due to operating earnings primarily accounting for net income during the term. However, no variation in posterior probabilities of social responsible activity variables such as KEJL_T, SON, FAI, ENV, COM, CUS, and EMP was shown.



<Fig. 6> Higher Future Profit Sustainability(PERSI)

Lastly, <Figure 6> shows posterior probability change of corporate financial variables and social responsible activity variables if future earnings sustainability pertains to a higher group. To see operating margin of total assets(OPE) representing the direct causality with future earnings sustainability(PERSI), the probability of being into a higher group with future earnings sustainability(PERSI) rose nearly 11% point from 33.29% to 44.6%. On the contrary, the probability of being into a low group dropped nearly 6% point from

33.29% to 27.07%. This suggests that operating earnings irrelevant of external other profit and loss directly affect corporate future earnings sustainability.

V. Conclusion

This study analyzed the association among financial corporate features, social responsibility factors, and variables that influence future corporate earnings sustainability by employing

the Bayesian network. For this end, 955 firm-year with KEJI index and corporate financial data from 2011 to 2013 was used for analysis.

Future corporate earnings sustainability in this study was estimated by using future time series data for five years by companies and years from a simple regression formula of return on assets in this term and following term. Corporate responsible activities adopted KEJI index calculated by the Economic Justice Institute. KEJI index categories include six factors such as soundness(25 points), Fairness (20 points), social contribution(15 points), consumer protection(15 points), environmental management(10 points), and employee satisfaction(15 points), which total to 100 points. Moreover, corporate financial variables included firm size, return of assets, operating margin of total assets, operating cash flows, and debt ratio. In summary, the causality graph analyzed by using the Bayesian network showed that corporate future earnings sustainability and operating margin of total assets were directly associated. Moreover, operating margin of total assets was directly related with debt ratio, return on assets and operating cash flows. Return on assets showed direct associations with debt ratio and operating cash flows.

Second, KEJI index showed a direct causality with soundness, fairness, social contribution, and employee satisfaction; on the contrary, it showed an indirect causality with environmental management and consumer protection. Fairness presented a direct causality

with environment management; whereas, environmental management did with consumer protection.

Third, firm size is directly correlated with fair and environmental management. Return on assets is directly connected with social contribution and operating cash flows with soundness.

Fourth, the sensitivity analysis was performed by using Markov blanket drawn by the Bayesian network. When the prior probability of KEJI index total scores is varied, soundness, employee satisfaction, and fairness were dramatically changed. Moreover, environmental management and fairness were changed when the prior probability of firm size was modified. The prior probability of future earnings sustainability significantly changed posterior probabilities such as operating margin of total assets and return on assets.

Analyzing the important results of this study, the firm's future earnings sustainability directly depends on operating earnings. And the sounder corporate governance structure, the more stable the companies were in carrying out their social responsibility activities. However, due to the large size of the company, it was found that the company did not comply with the company's laws more closely or sincerely. It seems that this is not irrelevant to the fact that many large Korean companies in recent years do not comply with the law and often suffer social criticism.

The present study proposes the correlations between corporate social responsibility and

financial characteristics affecting the corporate future earnings sustainability in graphs by using the Bayesian network. This graph on the causality can support investors in implementing decision-making paying attention to corporate future earnings. Moreover, our results may be used by financial institutions lending fund to companies or supervisory organizations to set up policies managing corporate debt ratio or improving relevant institutions by proposing corporate characteristics directly associated with corporate future earnings sustainability. Additionally, this study serve as an useful decision-making tool for implementing reasonable decision-making associated with future corporate earnings to a variety of concerned people as the sensitivity analysis showed that how the posterior probability of future earnings sustainability is altered when the prior probability of particular variables are changed. The causality analysis and sensitivity analysis performed in this study by using the Bayesian network is a unique contribution that no earlier study related with corporate social responsibility and sustainability has conducted.

References

1. Ameer, R., and Othman, R.(2012), "Sustainability Practices and Corporate Financial Performance: A Study Based on the Top Global Corporations", *Journal of Business Ethics* 108(1), 61-79.
2. Baesens, B., G. Verstraeten, D., Michael, E. P., Kenhove, P. V., and Vanthienen, J. (2004), "Bayesian Network Classifiers for Identifying the Slope of the Customer Life Cycle of Long Life Customers", *European Journal of Operational Research* 156(6), 508-523.
3. Barnea, A., and Rubin, A.(2006), "Corporate Social Responsibility as a Conflict between Shareholders", *Journal of Business Ethics* 97(1), 71-86.
4. Bebbington, J., and Gray, R.(2000), "An Account of Sustainability: Failure, Success and a Reconceptualization", *Critical Perspectives on Accounting* 12(5), 557-587.
5. Bernstein, L. A., and Siegel, J. G.(1979), "The Concept of Earnings Quality", *Financial Analysis Journal* 35(4), 72-75.
6. Borzaga, C., and Defourny, J.(2001), "Conclusions: Social Enterprises in Europe: A diversity of Initiatives and Prospects", *The Emergence of Social Enterprise*, London and New York Routledge, 350-370.
7. Bouckaert, R.(1995), "Bayesian Belief Networks: From Construction to Inference", *Doctorial Dissertation*, University of Utrecht, Netherlands.
8. Brammer, S., Brooks, C. and Pavelin, S.(2006), "Corporate Social Performance and Stock Returns: UK Evidence from Disaggregate Measures", *Financial Management* 35(3), 97-116.
9. Byun, S. Y., and Nam, H. J.(2017), "Globalization, Corporate Social responsibility and Corporate Financial Performance: Evidence from Korea", *Management*

- Information System Review* 36(1), 127-146.
10. Choi, S. B.(2017), "A Study of the Effects of CSR on Financial Performance", *Korean Review of Corporation Management* 8(1), 149-174.
 11. Crainer, S.(2012), "Social Enterprise: The Quiet Revolution", *Business Strategy Review* 23(4), 14-21.
 12. Dechow, P. M., and Dichov, I. D.(2002), "The Quality of Accruals and Earnings: The Role of Accrual Estimation Errors", *The Accounting Review* 77(1), 35-59.
 13. Dees, J. G., and Anderson, B. B.(2003), "For-Profit Social Ventures", *International Journal of Entrepreneurship Education* 2(1), 1-26.
 14. Drucker, P.(1984), "Converting Social Problems into Business Opportunities: The New Meaning of Corporate Social Responsibility", *California Management Review* 26(2), 53-63.
 15. Fairfield P. M., and Yohn, T. L.(2001), "Using Asset Turnover and Profit Margin to Forecast Changes in Profitability", *Review of Accounting Studies* 6(4), 371-385.
 16. Gunasekaran, A., and Spalanzani, A.(2012), "Sustainability of Manufacturing and Services: Investigation for Research and Applications", *International Journal of Production Economics* 140(1), 35-47.
 17. Harjoto, M., and Jo, H.(2015), "Legal vs. Normative CSR : Differential Impact on Analyst Dispersion, Stock Return Volatility, Cost of Capital, and Firm Value", *Journal of Business Ethics* 128(1), 1-20.
 18. Hart, S. L.(1997), "Beyond Greening: Strategies for a Sustainable World", *Harvard Business Review* 75(1), 66-76.
 19. Herremans, I. M., P. Akathaporn, and McInnes, M.(1983), "An Investigation of Corporate Social Responsibility Reputation and Economic Performance, Accounting", *Organization and Society*, 18(7), 587-604.
 20. Hillman, A. J., and Keim, D.(2001), "Shareholder Value, Stakholder Management, and Social Issues: What's the Bottom Line?", *Strategic Management Journal* 22, 125-130.
 21. Jang, J. I. and Choi, H. S.(2010), "The Relation between Corporate Social Responsibility and Financial Performance", *Korean Journal of Business Administration* 23(2), 633-648.
 22. Jee, Y. I., Kim, C. J. and Kim, H. G.(2017), "The Influence of Employees' Perceived CSR on Job Attitude-Focusing on the Mediating Effect of Organization Identity-", *Management Information System Review* 36(4), 167-185.
 23. Jensen, F. V.(1996)., *An Introduction to Bayesian Networks*, London, UCL Press, London, UK.
 24. Jensen, M.(2002), "Value Maximization, Stakeholder Theory, and the Corporate Objective Function", *Business Ethics Quarterly* 12(2), 234-256.
 25. Jun, J. M.(2003), "An Empirical Test of the Earnings Persistence and the Quality of Accounting Earnings", *Journal of Business Research* 18(1), 271-288.
 26. King, A. A., and Lenox, M. J.(2001), "Does It Really Pay to be Green? An Empirical

- Study of Firm Environmental and Financial Performance”, *Journal of Industrial Ecology* 5(1), 105–116.
27. Korb, B. K., and Nicholson, A. E.(2010), *Bayesian Artificial Intelligence*, CRC Press Company, Boca Raton.
 28. Kormendi, G., and Lipe, R.(1987), “Earnings Innovations, Earnings Persistence, and Stock Returns”, *The Journal of Business* 60(3), 323–345.
 29. Lev, B.(1989), “On the Usefulness of Earnings and Earnings Research: Lessons and Directions from Two Decades of Empirical Research”, *Journal of Accounting and Research* 27(s), 153–192.
 30. McWilliams, A., and Siegel, D. S.(2000), “Corporate Social Responsibility and Firm Financial Performance”, *Strategic Management Journal* 21(5), 602–609.
 31. Moea, S. J., Haandea, S., and Couture, R. M.(2016), “Climate Change, Cyanobacteria Blooms and Ecological Status of Lakes : A Bayesian Network Approach”, *Ecological Modeling* 337, 330–347.
 32. Nelling, E., and Webb, E.(2009), “Corporate Social Responsibility and Financial Performance: The ‘Virtuous Circle’ Revisited”, *Review of Quantitative Finance and Accounting* 32(2), 197–209.
 33. Oh, H. T.(2010), “Corporate Sustainability Management and The Sustainability Evaluation”, *Journal of Business and Economics* 33(1), 44–77.
 34. Pava M., and Krausz, J.(1996), “The Association between Corporate Social Responsibility and Financial Performance: The Paradox of Social Cost”, *Journal of Business Ethics* 15(3), 321–357.
 35. Pearl, J.(1988), *Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference*, Morgan Kaufmann Publishers Inc., San Francisco, CA, USA.
 36. Perrini, F., and Tencati, A.(2006), “Sustainability and Stakeholder Management: The Need for New Corporate Performance Evaluation and Reporting Systems”, *Business Strategy and The Environment* 15(5), 296–308.
 37. Posnikoff, J.(1997), “Disinvestment from South Africa: They did well by doing Good”, *Contemporary Economic Policy* 15 (1), 76–86.
 38. Shrivastava, P.(1995), “The Role of Corporations in Achieving Ecological Sustainability”, *The Academy of Management Review* 20(4), 936–960.
 39. Seo, G. S., and Choi, M. H.(2017), “Corporate Social Responsibility Performance, CEO Turnover and Tax Avoidance”, *Management Information System Review* 36(3), 255–268.
 40. Swanson, D. L(1999), “Toward an Integrative Theory of Business and Society: A Research Strategy for Corporate Social Performance”, *Academy of Management Review* 24, 506–521.
 41. Waddock, S. A., and Graves, S. B.(1997), “The Corporate Social Performance–Financial Performance Link”, *Strategic Management Journal* 18(4), 303–319.
 42. Wright, P., and Ferris, S.(1997), “Agency Conflict and Corporate Strategy: The Effect of Divestment on Corporate Value”, *Strategic*

- Management Journal* 18(1), 77-83.
43. Yang, S. K., and Song, E. G.(2018), “A Study on the Influence of CSR and Corporate Ability on Purchase Intention- Focused on the mediating effects of product attitude and the moderating effects of corporate reputation-”, *Management Information System Review* 37(2), 1-21.

요약

사회적 책임활동은 기업의 이익을 지속시키는가?†

박성진* · 선은정**

기업은 사회의 구성원으로서 사회적 책임을 다해야 하는 의무가 있다. 비록 기업이 사회적 책임을 완수하기 위해서 기업의 자원을 일정 부분 소비하지만 이러한 기업의 사회적 책임활동은 사회적 불평등을 해소하는데 도움을 주고 있다. 한편, 기업의 사회적 책임활동은 기업의 지속적 성장과 관련이 높을 수 있다. 많은 선행연구들은 기업의 사회적 책임활동과 기업의 지속가능성에 대해 관심을 가지고 있다.

그러나 기존의 선행연구들은 변수들간의 관계를 단순하게 선형이라고 가정하고 있기 때문에 복잡한 현실세계를 반영하지 못하는 한계점 또한 존재하고 있다. 따라서 본 연구에서는 마코브 블랭킷을 통해 변수들간 최소한의 상관관계를 도출하고 베이지안 네트워크를 통해 다양한 현실세계 속에서 변수들간의 관련성을 분석하고자 한다. 또한 본 연구에서 사용한 민감도분석은 복잡한 현실세계에서 다양한 변수들간의 변동성을 파악하는데 유용하게 활용될 수 있을 것이다.

본 연구는 기업의 지속가능성에 관심이 많은 투자자와 채권자들에게 유용한 정보를 제공할 수 있을 것이다. 왜냐하면, 그들은 기업의 가치에 관심이 많은데 사회적 책임활동은 기업의 가치에 긍정 또는 부정적인 영향 모두 미칠 수 있기 때문이다. 본 연구의 중요한 결과로 기업의 미래이익지속성은 당연히 영업이익과 밀접한 관련이 있으며, 기업의 지배구조가 건전할수록 기업은 안정적으로 사회적 책임을 완수하는 모습을 보였다.

그러나 기업의 규모가 크다고 하여 기업 관련 법규를 잘 준수하는 것을 아니라는 것이 나타났다. 이는 최근의 많은 기업들이 법규를 준수하지 않아 사회적 지탄을 받는 일과도 무관하지 않을 것이다. 한편, 기업의 지속가능성이 자본시장에 미치는 영향을 고려할 때 이러한 자본시장을 감독하는 관계당국도 본 연구의 결과를 활용하여 정책을 입안하거나 규정을 정비하는데 도움을 받을 수 있을 것이다.

핵심주제어: 기업의 사회적 책임, 기업의 지속가능성, 베이지안 네트워크, 마코브 블랭킷

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