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An empirical analysis of the influences of corporate social responsibility on organizational performance of Taiwan's construction industry: using corporate image as a mediator

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Corporate social responsibility (CSR) has become a hot issue for modern enterprises recently. The primary purpose of this study was to investigate the relationships of CSR and organizational performance. The secondary purpose was to determine whether the effect of CSR on organizational performance could be mediated by corporate image. To fulfil the primary purpose, a questionnaire-based survey was used to measure CSR, corporate image and overall organizational performance in Taiwan's construction industry. Two hundred and eighty-one valid samples were collected and statistically analysed using factor analysis, correlation analysis and hierarchical regression analysis. The analysis results suggest that CSR is positively correlated with corporate image and organizational performance. Additionally, levels of corporate image are positively associated with organizational performance levels. The results also indicate that corporate image may serve as a mediator between CSR and organizational performance, meaning that companies benefit from investment in CSR realization, even if they also have a positive corporate image.

Keywords: Corporate social responsibility, corporate image, organizational performance, hierarchical regression analysis.

Introduction

In the current era of globalization, corporate social responsibility (CSR) has become the primary prescription for business and governments in dealing with social ills (O'Dwyer, 2003). Lee *et al.* (2011) pointed out that CSR is an increasingly important construct in academia, as well as a pressing item on the practical corporate agenda. CSR has become a major point of interest for development practitioners (Jenkins, 2005). Lichtenstein *et al.* (2004) contended that CSR can be a viable promotional strategy that leads to broader company benefits beyond immediate purchase behaviours. CSR is seen as a potential source of competitive advantage. Socially responsible business behaviour is an effective and necessary strategy to ensure survival in a chaotic, competitive and ever-changing environment (Frederick, 1998; Loosemore and Phua, 2011). CSR can be a catalyst for long-term corporate profits and responsible social development (Berkhout, 2005). CSR reflects an increasing public demand for greater transparency from multinational companies. It can particularly constitute a strategy to cope with externalities and serve as insurance against reputation risks that harm profit prospects and corporate values (Ogrizek, 2002; Hediger, 2010). Piercy and Lane (2009) indicated that the impact of CSR initiatives on customer and other stakeholder relationships is key to performance improvement. Porter and Kramer's (2006) stand as to what CSR should include is worthy of consideration. In their opinion, CSR includes the following: (1) a company's moral obligation to be a good citizen and to do the right thing; (2) sustainability or meeting the

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needs of the present without compromising the ability of future generations to meet their own needs; and (3) a reputation that justifies CSR initiatives towards improving the company's image. Yadong (2007) further suggests that CSR should include: (1) external aspects that relate to relationships with suppliers and commitment to local community protection and engagement; (2) internal aspects that cover relationships with employees and unions; and (3) accountability and transparency that include commitment to reporting on CSR.

The construction process, right through from planning and design to use and demolition, has a major impact on society (Fewings, 2009; Murray and Dainty, 2009). UNEP (2011) estimates that over their lifespan, buildings are responsible for 25–40% of the world's energy use, 30–40% of the world's solid waste generation, 30–40% of the world's global greenhouse gas emissions, 33% of the world's resources, and 8–12% of water use. The construction industry in general has a poor ethical reputation, being widely regarded by the public as a sector with corrupt practices, health and safety failures, and environment-polluting activities (Moodley *et al.*, 2008). Petrovic-Lazarevic (2008) stated that in the Australian construction industry, large companies developed CSR initiatives in order to maintain an image of being a good corporate citizen. Liu *et al.* (2011) pointed out that the UK government's Department of Trade and Industry is promoting CSR as a business contribution to sustainable development; many have argued that corporate citizenship takes shape at the point of government failure in the facilitation of citizens' rights. According to Didier and Huet (2008), CSR-related issues in France are discussed in higher education engineering courses but have not been implemented within the industry. In 2000, *CommonWealth Magazine*, a prestigious business magazine in Taiwan, started its annual evaluation and ranking of Taiwanese companies' CSR realization. Among its 'Top 50 corporate citizens' for the past three years (2009–11), only one large engineering consulting firm is from the construction industry. Given the impact of construction activity on society, the economy and the environment, and the significance of the construction industry as an employer and provider of work, the construction industry has more reasons to focus on its CSR than most others (Murray and Dainty, 2009). Reputed as the 'locomotive of industries', the construction industry still lags far behind other industries, such as service and manufacturing, when it comes to awareness and implementation of CSR.

Corporate image (CI) is described as the overall impression about an organization made on the minds of the public (Barich and Kotler, 1991). Moodley *et al.* (2008) pointed out that building of corporate image is a lengthy process which can be improved rapidly by technological breakthroughs and unexpected achievements. A company's corporate image is an extension of its service brand and a vital indicator of customer trust in this company. By improving its image, a company mainly aims to win recognition and loyalty from customers and ultimately to increase revenues and create profits.

Organizational performance (OP) is an important area of study in business management, and it is also a key indicator for evaluating the operational efficiency of a business. OP has been conceptualized in different ways in relevant empirical research. Both objective and subjective indicators have been used to measure the concept (Paauwe, 2004; Wang *et al.*, 2008). OP is understood as the concentrated reflection of achievements of each organizational function, and reflects the realization of organizational objectives (Shieh, 2008). Yeung *et al.* (1991) pointed out there are two types of OP measurement indicators, financial performance and non-financial performance, for evaluating a company's current operational performance and future development potential.

Even though earlier studies have identified the benefits of CSR, there is a lack of comprehensive empirical research on the benefits of CSR for the construction industry. This may have contributed to the construction industry's reluctance to implement CSR practices. Therefore, a study like this research on the relationships between CSR and OP is urgently needed. Griffin and Mahon (1997) found there was no solid correlation between corporate social performance and financial performance. Their study discussed a wide variety of related research over the past 25 years and came to the conclusion that there was no consensus in the research on the correlation between CSR and corporate financial performance. Even though their research method is quite different from ours, their discussion about the related research demonstrates there has been little related research on a CSR model particularly built for the construction industry. The purpose of this study is to find out the current conditions of CSR realization and OP among the architectural/engineering/construction (AEC) firms in Taiwan and then to explore the connections among CSR, CI and OP by conducting a questionnaire survey and statistical analyses of the survey results using CI as a mediator. Based on the analysis results, this study hopes to offer some suggestions for AEC firms and also to provide helpful references for the promotion of CSR in the construction industry.

Research hypotheses

The related empirical studies in the above-mentioned research focused mostly on the manufacturing or service industries. By contrast, this study focused on the construction industry and proposed the following four hypotheses.

Full realization of CSR could have a positive effect on a company's CI. Zairi and Peters (2002) and Demetriou *et al*. (2010) found that CI had long been a priority for companies. Implementation of CSR practices is helpful for building positive CI and maintaining corporate competitiveness. Pomering and Johnson (2009) pointed out that CI advertising is increasingly being used to create the awareness of a firm's CSR initiatives, and, in turn, preference for its products and brands. CSR is particularly effective at influencing store image when the retailer experiences a positive performance perception among its customers (Gupta and Pirsch, 2008). Based on the findings, the first hypothesis of this research is:

> *Hypothesis 1*: Corporate social responsibility of the AEC firm has a positive and direct influence on its corporate image.

Some research has found a positive correlation between CSR and OP (Ullmann, 1985; Drumwright, 1996; Handelman and Arnold, 1999; Darsono, 2009). Inoue and Lee (2011) pointed out that CSR activities would improve companies' financial performance. Brammer and Millington (2008) indicated that high CSR involvement enables firms to improve profitability through reduced operational costs and increased revenues. Therefore, the second hypothesis is proposed as follows:

> *Hypothesis 2*: Corporate social responsibility of the AEC firm has a positive and direct influence on its organizational performance.

The findings of several other studies indicate that a company can boost its OP by enhancing its CI. Having a positive corporate image can indirectly help a company's OP (Meehan *et al*., 2006). Memili *et al*. (2010) indicated that high family expectations of the firm leader were shown to promote a family firm image and risk taking. In turn, risk taking and family firm image contributed to firm performance. In addition, according to Eberl and Schwaiger (2005), a healthy CI has a positive influence on a company's financial performance. Spyropoulou *et al*. (2010) stated that both financial resources and relationship management capabilities are significant contributors to CI advantage. Therefore, the third hypothesis in this study is as follows:

> *Hypothesis 3*: Corporate image of the AEC firm has a positive and direct influence on its organizational performance.

However, these studies failed to address the possible mediation effect among the three dimensions. A mediation effect occurs when an independent variable affects a dependent variable via the inclusion of a mediator variable. According to Baron and Kenny (1986), full mediation occurs when (1) the independent variable has a significant influence on the mediator variable; (2) the independent variable has a significant influence on the dependent variable; and (3) a regression analysis is conducted on the dependent variable using the independent and mediator variables, and the influence of the mediator variable is found to reach the level of significance. Based on the above-mentioned research, this study contended that, for the construction industry, CI plays a role as a mediator between CSR and OP. Therefore, the fourth hypothesis of this study is as follows:

> *Hypothesis 4*: Corporate image of the AEC firm may act as a mediator between its corporate social responsibility and organizational performance.

Research model and method

In this research, a questionnaire survey was conducted to measure the current CSR, CI and OP of selected Taiwanese AEC firms. The survey results were then statistically analysed to explore the connections among the three concepts. The questions were designed based on not only references from existing literature but also opinions from 10 managers, each with over 10 years of experience in Taiwan's construction industry. All the questions were modified to better suit the measurement of the construction industry in Taiwan. The following is a short description of the question sources in the study:

(1) CSR-related: 37 questions compiled and modified from the questionnaires of Holmes (1978) and Abbott and Monsen (1979) on CSR.
(2) CI-related: 13 questions compiled and modified from the questionnaires of Walters (1970) and Aaker and Keller (1990) on CI.
(3) OP-related: 10 questions compiled and modified from the questionnaire of Morck and Yeung (1991) on OP.

The questionnaires in this study were filled out anonymously by experienced practitioners in the surveyed AEC firms; each manager had at least three years of experience in the industry and clear knowledge of their company. There were 281 valid samples at the end of the survey period. A six-point Likert-type scale was used (from 1 = strongly disagree to 6 = strongly agree) to measure the degrees of CSR and CI. OP is the ultimate dependent variable of interest for researchers concerned in any area of management. Richard *et al.* (2009) had a comprehensive compilation and comparison of all the recent measures of OP, dividing them into objective and subjective ones. The objective measures are common and readily available means of measuring organizational performance, among which the most common ones are accounting or financial measures, such as return on investment, earnings before interest and taxes, market share and earnings per share *et al.* By contrast, subjective measures ask supposedly well-informed respondents about organizational performance. For instance, respondents may be asked to compare the performance, management expectation, or some other benchmarks of their companies with those of their competitors. Wall *et al.* (2004) found the correlation between subjective and objective measures to be between 0.4 and 0.6, while Guthrie (2001) found the correlations could be as high as 0.81 using more specific subjective constructs. These empirical findings suggest that researchers should not view the choice of subjective measures as a second-best alternative but, instead, should weigh the trade-offs between subjective and objective measures against the research context to determine which is more favourable under the circumstances (Richard, *et al.* 2009). From the past years of related research and contacts with Taiwan's construction companies, the authors found most of the local businesses reluctant to answer questions related to objective indicators of their finances.

Referring to subjective measures used in many previous studies, this research chose the subjective approach to ask the respondents to compare the performance of their companies with that of their competitors of the same levels. Generally, experienced practitioners in Taiwan's construction industry are able to have a basic idea of the competitiveness differences between them and their competitors due to frequent interactions with their competitors either from bidding competitions or from business connections with the same companies upstream or downstream. The OP measures used in the study include financial and non-financial indicators, using a six-point Likert scale design with 1 = lagging behind competitors very much and 6 = doing much better than competitors.

The questionnaire survey results were analysed using SPSS for factor analysis, reliability analysis, correlation analysis and hierarchical regression analysis to examine the model in this study.

Research findings

The following section is composed of seven parts, presenting the analysis process and empirical findings of this research analysis process. The first part describes the sample profile and the content of descriptive statistics of the three measurement tools, i.e. CSR, CI and OP, in this study. Then the construct and sub-dimensions of the measurement tools are extracted by factor analysis. After that, the interactions of the sub-dimensions are shown by Pearson's correlations. However, correlation analysis can only indicate the inter-connections among the variables. To find out causality connections among the variables, regression analyses are needed. Therefore, in the following three parts, linear regression analyses are conducted on the mutual connections among the variables and the analysis results are used to test Hypothesis 1 to Hypothesis 3. In the last part, a hierarchical regression analysis is conducted to evaluate the model of the three major dimensions in this study and also find out the influence of each dimension on the other two. The analysis results are used to test Hypothesis 1 to Hypothesis 3 again and, even more importantly, to test if any mediation exists among the three dimensions and hence test Hypothesis 4 of this study.

Descriptive statistics

The surveyed population is the firms in Taiwan's AEC industry. Owing to budgetary constraints, the questionnaire survey was conducted on the participants in the site manager certification training classes held by the Taiwanese government. The participants were requested to fill out the questionnaires anonymously but indicate the names of their organizations in the questionnaires. Incomplete questionnaires were excluded. If more than one participant from the same company responded, only one of the questionnaires they completed was included to ensure that each company was represented by just one sample. To be admitted to the training programme, each participant was required to have at least three years of experience in the construction industry. On average, the responding participants had spent 15.1 years in the construction industry (SD = 6.4) and 5.5 years working for their current companies (SD = 5.1). Therefore, it is reason-

able to assume that the participants have certain levels of knowledge of the industry. Moreover, in the questionnaires, the participants were asked to evaluate the current conditions of their companies. Therefore, the samples filled out by those participants with less than one year working in their organizations were also excluded. In total, 600 questionnaires were given to participants from companies based in major cities in northern, central and southern Taiwan. Three hundred and seventy were completed and returned and, after the exclusion of invalid samples, there were 281 valid samples representing 281 companies. Among these samples, 52.5% were filled out by participants from the management level. The samples representing general contracting firms accounted for the largest portion of the samples (76.5%), followed by those representing architectural design firms and engineering companies (12.4%) and those representing construction companies that own and sell the construction they build (11.2%). Among the samples, 44.8% are companies with a registered capital of NT$50 million (1 GPB = 46.42 TWD, the rate of exchange on 16 February 2012) or less, 22.1% of NT$50 million to NT$100 million, and the remaining 33.1% of NT$100 million or more.

The average score of the CSR dimension in the questionnaire was 4.12 (SD = 0.87). Among the questions, 'My firm respects the privacy of the proprietors and/or its customers and protects their personal information' had the highest average score (5.23). Nevertheless, the question 'My firm deploys pollution inspectors at construction sites in response to the increasingly demanding anti-pollution standards' had an average score of 3.08, lower than the average score of the dimension. This indicates the surveyed AEC firms exercised CSR by paying attention to the privacy of their customers and the protection of their personal information. However, they were less proactive in or enthusiastic about taking action to protect the environment.

The average score for the CI dimension was 4.60 (SD = 0.83). Among the questions, 'My firm is professional' had the highest average score (5.10), followed by the question 'My firm is trustworthy' (4.97). The question 'My firm is well known' had an average score (3.88) lower than the average score of the dimension. This indicates that most of the surveyed AEC firms have high confidence in their professional image and in gaining trust from their customers.

The average score for the OP dimension was 4.04 (SD = 0.73). Among the questions, 'comparing customer satisfaction rate with your competitors' had the highest average score (4.32), followed by the question 'comparing the design of products or services with your competitors' (4.31). The question 'comparing sale growth rate with your competitors' had an average score (3.87) lower than the average score of the dimension.

However, they are less confident in their recognition levels. This is partially because there is a relatively high number of AEC firms in Taiwan given its population, which results in a low industry concentration ratio. For example, the population in Taiwan is 23 million and there are as many as over 20 000 general contracting firms alone.

Constructs of CSR, CI and OP

Factor analysis with Varimax rotation was used to decide the grouping of constructs for the three research dimensions (Hair *et al.*, 1995). The KMO value was 0.917 (>0.5) and the results of Bartlett's sphericity test also reached the level of significance ($p < 0.01$), indicating the CSR dimension was suitable for factor analysis. In the factor analysis, 21 questions were excluded based on related principles and four factors could be extracted from the dimension, i.e. the dimension could be divided into four sub-dimensions. The cumulative variance explained of the factor analysis was good (61.53%). The 21 items of CSR constructs were classified into four factors (sub-dimensions). Based on the attributes of the corresponding questions, the four sub-dimensions were respectively named resource conservation, social participation, social commitment and pollution prevention. The Cronbach's α value of each sub-dimension reached over 0.8, indicating good reliability for each sub-dimension. Among the four sub-dimensions, resource conservation and pollution prevention are related to the concept of sustainability, an issue taken seriously around the world. The practices of resource conservation include use of alternative energies, water consumption reduction and many others while those of pollution prevention include reducing pollution/emissions and updating pollution prevention facilities. Questions in the social participation sub-dimensions ask the respondents if their companies proactively participate in charity activities or activities beneficial for society, such as supporting artistic and cultural activities, supporting charity organizations and developing community relationships. Questions on the social commitment ask the respondents if their companies employ practices of good social citizenship, such as being honest to consumers and protecting interests of clients. Furthermore, the result from nested confirmatory factor analysis (NCFA) model also showed that the four factors model ($\chi^2 = 439.91$, df = 183, CFI = 0.97, RMSEA = 0.073) is better

than a single factor model (χ^2 = 1464.41, df = 189, CFI = 0.87, RMSEA = 0.190). That means the sub-dimensions of the model are discriminate, without the problem of common method variance.

The KMO value was 0.917 (>0.5) and the results of Bartlett's sphericity test also reached the level of significance ($p < 0.01$), indicating the CI dimension was suitable for factor analysis. The cumulative variance explained for the factor analysis was good (58.16%). Similarly, factor analysis was also employed to group 10 categories of the CI constructs. After the factor analysis, only one sub-dimension was extracted from the CI dimension. In addition, the Cronbach's α value was 0.921, indicating good reliability of the dimension.

The KMO value was 0.834 (>0.5) and the results of Bartlett's sphericity test reached the level of significance ($p < 0.01$), indicating the OP dimension was suitable for the factor analysis. Two sub-dimensions were extracted and the cumulative variance explained was good (67.57%). The seven items of OP constructs are classified into two sub-dimensions, respectively named financial performance and non-financial performance. This result is consistent with the analysis results by Yeung *et al.* (1991) and Huang and Hsueh (2007). The Cronbach's α values of both sub-dimensions reached over 0.7, indicating good reliability of the dimension.

Correlation analysis

Correlation analysis was adopted to explore the correlation among the variables of the CSR, CI and OP dimensions in this research. The average scores of the dimension and sub-dimension variables were used in the correlation analysis. As indicated by Table 1, the variables of the three dimensions were modestly positively correlated and their correlations all reached the level of significance. Looking at the results of the correlation analysis, there is correlation among the independent variables. This calls for an assessment of multicollinearity. According to Anderson and Gerbing (1988), the result of CFA showed the model is well fit (χ^2 = 439.91, df = 183, CFI = 0.97, RMSEA = 0.073), so the result showed discriminant validity among these dimensions.

Among the variables of the CI and CSR dimensions, resource conservation ($r = 0.636$, $p < 0.01$), social participation ($r = 0.665$, $p < 0.01$), social commitment ($r = 0.658$, $p < 0.01$) and pollution prevention ($r = 0.600$, $p < 0.01$) were moderately positively correlated. The two sub-dimensions of OP, financial performance and non-financial performance, were significantly positively correlated with the CI dimension (respectively at 0.466 and 0.698). The sub-dimensions of CSR and OP were all significantly positively correlated with each other. The two sub-dimensions of OP were also significantly positively correlated with the CI dimension.

Impacts of CSR on CI

Regression analyses were applied in order to learn about the extent to which the CI dimension was influenced by the four CSR practices (i.e. resource conservation, social participation, social commitment and pollution prevention).

Before further regression analysis, to check whether the model was offending homoscedasticity, independent errors, normally distributed errors and linearity are required. A residual test was conducted based on the normality test results. The Durbin-Watson test was 1.852, indicating the 'uniqueness' variables were normally distributed. This also indicated that the samples in this study have met the principle of best linear unbiased estimator (BLUE).

Table 1 Correlation between the sub-dimensions

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	Resource conservation	(0.916)						
(2)	Social participation	0.509**	(0.891)					
(3)	Social commitment	0.532**	0.434**	(0.817)				
(4)	Pollution prevention	0.629**	0.542**	0.408**	(0.898)			
(5)	Corporate image	0.636**	0.665**	0.658**	0.600**	(0.921)		
(6)	Financial performance	0.316**	0.271**	0.341**	0.260**	0.466**	(0.885)	
(7)	Non-financial performance	0.508**	0.439**	0.550**	0.431**	0.698**	0.520**	(0.847)

Notes: n = 281. Values on the diagonal in parentheses are alpha reliabilities.
*significant at the 0.05 level; **significant at the 0.01 level.

As indicated by the analysis of variance (ANOVA) and t-test results, none of the four variables (capital, size of the company, type of firm, and management level of respondent) had a significant influence on CSR. We also analysed the four variables and CI/OP using ANOVA and t-test and found no significant difference. This indicates none of the four variables had a high influence on CSR, CI or OP. Therefore, these four variables were not included in the variable analysis in this study.

Table 2 presents the regression results for the variables that could impact on CI. Based on the F-statistic, the regression analysis was statistically significant at levels over 0.01, indicating support for Hypothesis 1. In terms of individual regression coefficients, two of the four CSR variables, social commitment and social participation, exhibited statistically positive significance for CI. This finding suggests that increases in levels of CSR may improve CI. But the data do not show statistically significant results for resource conservation and pollution prevention. A company's CI requires long-term dedication and investment. It is related to the company's self-advertising to a certain level. Among the four sub-dimensions discussed in this research, resource conservation and pollution prevention are governed by legal policies or regulations promulgated by the government. Therefore, basically all the companies have employed related practices already. In addition, these two sub-dimensions involve many things unnoticeable or difficult to understand for average consumers without certain professional knowledge. Therefore, practices of resource conservation and pollution prevention are difficult to use directly in a company's advertising to yield relatively effective results. By contrast, practices of social commitment and social participation can attract media attention relatively easily and can be used directly in promotional materials, such as on a corporate website, to enhance a company's image.

Impacts of CSR on OP

Table 2 also presents the regression analysis results of the variables that could impact on financial performance and non-financial performance. The F-statistic results of both financial and non-financial performance were statistically significant at levels over 0.01, supporting Hypothesis 2 of this research. In terms of individual regression coefficients, resource conservation and pollution prevention were both found to have insignificant influences on both financial and non-financial performance. Social commitment and social participation were both found to have significant and high influences on non-financial performance. This is probably because practices of these two sub-dimensions are relatively noticeable and, therefore, tend to have positive influences on non-financial indicators such as staff satisfaction and customer satisfaction. Both social commitment and social participation were found positively correlated with financial performance in Table 1. However, only social participation had a significant and positive influence on financial performance. It is probably because social commitment is commonly seen as a prerequisite of running a business with limited direct connections with its financial performance. Even though social participation can be somewhat costly for businesses, it can help to boost their reputation in the long run and consequently improve their profitability.

Impacts of CI on OP

Table 3 presents the regression analysis results of the influence of CI on OP. The results indicate that CI exhibited a statistically significant influence on both of the OP sub-dimensions. Both F-statistic results were statistically significant at levels higher than 0.01, indicating support for Hypothesis 3. This finding indicates that CI is positively related to OP, suggesting that OP success can be achieved with stronger CI.

Table 2 Sub-dimension regression results of CSR on CI and OP

		OP	
Independent variable	CI	Financial performance	Non-financial performance
Resource conservation	−0.053	−0.029	−0.001
Pollution prevention	0.019	0.102	0.101
Social commitment	0.483**	0.283	0.481**
Social participation	0.459**	0.147**	0.268**
R-squared	0.641	0.142	0.423
F-statistic	74.477**	6.703**	30.413**

Notes: *significant at the 0.05 level; **significant at the 0.01 level.

Table 3 Sub-dimension regression results of CI on OP

	OP	
Independent variable	Financial performance	Non-financial performance
CI	0.466**	0.698**
R-squared	0.217	0.487
F-statistic	73.647**	256.765**

Notes: *significant at the 0.05 level; **significant at the 0.01 level.

Mediators between CSR and OP: applying hierarchical regression

The previous section focused on analysing the connections between every two of the three dimensions and their sub-dimensions. In the previous section, the first three hypotheses of this study were supported while the influence of CSR on the sub-dimensions of the other two variables was also demonstrated. This section will discuss whether CI plays a role as a mediator between CSR and OP by building relationship models of the three dimensions and exploring the influence of CI as a mediator on the models as a whole. In this study, a formal mediation test was subsequently conducted to determine if individual CI dimensions mediate the relationships between CSR and OP. This test is to examine the correlations between the independent and the dependent variables, between the independent and the mediator variables, and between the mediator variables and the dependent variables. To support Hypothesis 4 of this study, all of these correlations should be significant. The relationships between predictor and criterion should be reduced after controlling the relationships between the mediator and criterion variables (Baron and Kenny, 1986). The analysis assessed the effect of including each CI variable in hierarchical linear regressions where CSR was the independent variable and OP was the dependent variable. Multiple regression models were developed with CSR, CI and OP in order to measure the mediating role of CI in the relationships between CSR and OP. While OP is the dependent variable, CSR was entered in the first step (Model 1). Table 4 presents a summary of the hierarchical regression analysis results in this research. The first model explained 30.7% of the variance in OP ($F = 112.413$, $p < 0.01$). This result indicates that higher levels of CSR are associated with higher levels of OP. While CI is the dependent variable, CSR was entered as the independent variable in the second step (Model 2). Model 2 explained 62.5% of the variance in CI ($F = 426.338$, $p < 0.01$). This result indicates that higher levels of CSR are associated with higher levels of CI.

Multiple regression models (Models 3) were also developed with CSR, CI and OP in order to assess the mediating role of CI in the relationships between CSR and OP. While OP is the dependent variable, the first model includes one independent variable (i.e. CSR) in the equation and the third model introduces one more independent variable (i.e. CI) into the equation. Additionally, with the addition of CI, standardized regression coefficients (β) for CSR decreased from 0.557 to 0.057. As shown in Table 4, Model 1 explained 30.7% of the variance ($F = 112.413$, $p < 0.01$) and Model 3 explained 45.2% of the total variance in OP scores ($F = 104.240$, $p < 0.01$). In this analysis, CSR variable accounted for 30.7% of the variance in OP while CSR and CI explained an additional 14.5% (from 30.7 to 45.2) of the variance. In other words, the results still indicate that CI should have a significant and moderately positive influence on OP. The results are also completely consistent with the three criteria proposed by Baron and Kenny

Table 4 Regression analysis for Models 1, 2 and 3

	Model 1	Model 2	Model 3
Independent variable	OP	CI	OP
CSR	0.557**	0.792**	0.057
CI	–	–	0.629**
R-squared	0.307	0.625	0.452
F-statistic	112.413**	426.338**	104.240**

Notes: *significant at the 0.05 level; **significant at the 0.01 level.

(1986) for testing of full mediation. This suggests that CI can fully mediate the relationships between CSR and OP and proves Hypothesis 4 of this research true, i.e. CSR may influence the OP of the construction industry via CI. The models of this study are meaningful in proving (1) CI has a direct and positive influence on OP; and (2) CSR has an indirect and positive influence on OP via CI, which means even when controlling for the effect of CI, CSR still has a strong effect on OP.

Concluding remarks

CSR has become a global trend. For companies, CSR realization would inevitably increase costs and, therefore, many are hesitant to implement it. However, companies are profit-oriented, not philanthropic. They rarely spend on undertakings that will not yield business benefits, let alone pursue initiatives in a strategic manner. Empirical research on CSR of the construction industry remains insufficient. If more empirical research can prove that CSR implementation is beneficial to organizational performance, it will provide an incentive for companies to adopt CSR practices of their own accord, particularly for companies in the construction industry. A better understanding of the long-term benefits of CSR could be helpful in encouraging industry-wide implementation of CSR practices.

In this study, a measurement scale was developed to measure CSR in the AEC industry in Taiwan and factor analysis was conducted to extract four dimensions of CSR: resource conservation, social participation, social commitment and pollution prevention. The scale was tested and found to be highly reliable and able to provide references for future production of CSR measurement scales for the AEC industry. This empirical research found that only a very few of the surveyed AEC firms are thoroughly implementing CSR. There is still much room for improvement in CSR realization for the construction industry. For instance, most of the surveyed AEC firms lack awareness of and enthusiasm about environmental protection. These analyses show that increases in levels of CSR may improve CI and OP. From the hierarchical regression analysis, this research also found that CSR may influence OP of the construction industry via CI. The possible contribution of this study is to help promote the awareness that, if an AEC firm invests more in its CSR realization, it will likely improve its CI and ultimately boost its profits. As indicated by the regression analysis results, the sub-dimensions of social participation and social commitment were found to have more significant and higher influences on performance than the other two sub-dimensions. Therefore, it can be said that, if AEC firms put more emphasis on social participation and social commitment in their short-term strategies, it may be more helpful for them to improve their corporate image and more likely for them to boost their OP as a result. However, in the long run, AEC firms still need to work on all the dimensions of CSR so that they will develop good corporate cultures and then, through suitable advertising, improve their images and competitiveness.

CSR has attracted more and more attention in the AEC industries around the world. Companies in different countries have taken related practices worthy of learning for the companies in Taiwan. Some Taiwanese construction companies have already undertaken CSR initiatives. For example, Cathay Real Estate has been sponsoring outdoor performance activities of cultural and artistic groups to improve its PR exposure and reputation. Sinotech Engineering Consultants Ltd offers scholarships for graduate students in engineering in several prominent universities in Taiwan. Fu-Tsu Construction built and donated temporary housing to residents in the earthquake-hit areas whose houses were levelled by the disastrous 921 earthquake in 1999. Through this CSR initiative, Fu-Tsu was able to not only do something in return for society but also boost its corporate image.

According to Epstein (1996), to achieve sustainable development, a company should incorporate concerns of business, social development and environmental protection into its activity implementation and development strategies. If companies in the construction industry can give greater attention to CSR, invest more in CSR realization, make correct evaluations and incorporate CSR in their strategies and activities, they will benefit greatly, as well as society as a whole. Based on the statistical analyses in the previous section, this research provides empirical evidence demonstrating that CSR implementation is indeed helpful for OP. It is hoped that, through the findings of this research, AEC firms both in Taiwan and around the world will be more dedicated to CSR to not only make profits but also save the environment. Given the fact that the construction industry consumes relatively more resources than the other industries and hence has a larger impact on the environment, there should be further research on the CSR of AEC firms.

Limitation and suggestions for future research

The population in this research was not based on random sampling, owing to budgetary and sampling con-

straints. In lieu of random sampling, this study surveyed experienced professionals from various AEC firms. It is recommended to apply random sampling in the research design for future research, if the budget is sufficient, though researchers should strategize to be able to address a potentially low response rate. Because this study is based on various firms in AEC industries, it is also recommended that future studies focus on specific categories within the industry, such as architecture, manufacturing or development in order to reveal exhibited CSR behaviours in each category.

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Appendix

Questionnaire

Dimensions

Corporate social responsibility

1. Resource conservation
   (1) My firm proactively uses green construction methods and recycled materials.
   (2) My firm plans to use or uses designs or facilities powered by alternative energies such as solar power under suitable circumstances.
   (3) My firm designs and uses water supply systems that store and reuse rainwater.
   (4) My firm designs or uses water-saving utilities, such as water-saving toilets, to reduce water consumption.
   (5) My firm adopts as much natural lighting in its buildings as permitted by the suitable rates of openings on the buildings' exterior.
   (6) My firm uses permeable pavements around building bases to ensure better soil water retention.
   (7) My firm proactively forges partnerships with R&D institutions to develop green methods and/or recycled materials.
   (8) My firm installs wastewater treatment facilities at construction sites to clean polluted water before releasing it.
2. Social participation
   (1) My firm supports artistic and cultural activities (ex: folk art performances).
   (2) My firm supports charity organizations or holds philanthropic activities.
   (3) My firm supports educational affairs (ex: providing scholarships or offering internships and student visits to the firm).
   (4) My firm values the development of the community where it is located and offers something in return for the support of residents in the neighbourhood (ex: holding activities for community residents).
   (5) My firm takes part in improving the environments of the city or the community (ex: adoption of a park or roadside trees).
3. Social commitment
   (1) My firm never engages in anything that violates fair trade with the proprietors or its customers for the sake of its own interests.
   (2) My firm respects the privacy of the proprietors and/or its customers and protects their personal information.
   (3) My firm never lies to, misleads, or has any unfair conduct with regard to its customers or the proprietors.
   (4) My firm follows all the taxation regulations and declares taxes honestly.
   (5) My firm never decides to employ a person or not based on his race, skin colour, religion, or political stance/ background.
4. Pollution prevention
   (1) My firm's efforts in reducing pollution and emission have yielded visible results.
   (2) My firm renews and updates its pollution prevention facilities in accordance with the governing laws of environmental protection.
   (3) My firm deploys pollution inspectors at construction sites in response to the increasingly demanding anti-pollution standards.

Corporate image

   (1) My firm is trustworthy.
   (2) My firm will offer satisfying goods and services.
   (3) My firm is professional.
   (4) My firm's workers present good attitudes.
   (5) My firm is highly attracted to customers for our professionalism and trustworthiness.
   (6) My firm's decoration in construction sites is comfortable and clean.
   (7) My firm will offer complete range of services (ex: after-sale service and construction coordination).
   (8) My firm is well regarded publicly.
   (9) My firm is well known.
   (10) My firm participates actively in or sponsors public welfare activities.

(*Continued*)

Appendix (*Continued*)

Dimensions
Organizational performance
1. Financial performance
(1) Comparing sale growth rate with your competitors.
(2) Comparing productivity with your competitors.
(3) Comparing turnout with your competitors.
(4) Comparing yield rate with your competitors.
2. Non-financial performance
(1) Comparing customer satisfaction rate with your competitors.
(2) Comparing the design of products or services with your competitors.
(3) Comparing employee satisfaction with your competitors.