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Does government support matter? Influence of organizational culture on sustainable construction among Malaysian contractors

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ABSTRACT

There have always been conflicting findings with respect to the effects of organizational culture on sustainable construction, suggesting the need for a moderator variable. Drawing on the resource-based view theory, this study examines the moderating effects of government support on the relationships between adhocracy culture, market orientation and sustainable construction among 172 large contractors in Malaysia, using a 61 item instrument. Both mailed and personally administered survey methods with structured questionnaires were used to collect the data. Using a partial least squared - structural equation modelling for the data analysis, we found a significant positive relationship between the adhocracy culture and sustainable construction. Similarly, the results also indicated that market orientation had a significant positive relationship with sustainable construction. The study also found a significant but negative relationship between government support and sustainable construction. As expected, government support was found to moderate the relationship between adhocracy culture and sustainable construction, while an insignificant interaction effect was found between market orientation and sustainable construction. Implications for practice and future research were also discussed.

KEYWORDS

PLS-SEM; sustainable construction; organizational culture; resource-based view theory

Introduction

Sustainable development is the basis for enhancing our understanding of the principles of sustainable construction (also known as green construction), which emerged as a new pattern to create a favourable built environment that meets human's present needs, without jeopardizing the ability of the future generation to meet theirs (Ofori 2001). In principle, sustainable construction essentially covers the triple bottom line (TBL) of environmental, social and economic attributes that are exemplified in the sustainable development mantra (Tan, Shen, & Yao 2011). Also, it has been affirmed that sustainable construction had risen to fundamentally address the complex problems of construction and the environment, in order to restore balance between the natural and the built environment, as both realms are highly interconnected (Du Plessis 2002).

Considering the size and importance of the construction industry to the economic development of many countries (studies like Giang & Pheng 2011; Wang 2014 indicated that construction development has been an essential part of economic growth in Africa, Asia and the Pacific region), and its immense contribution to environmental damage, suggestions have been made to consider the adoption of sustainability in construction as one of the very important conditions for measuring the construction industry's overall performance (Murray & Cotgrave 2007). Sustainable construction will enhance construction industries' effectiveness, as well as contribute meaningfully towards preserving the environment, enhancing social equity and economic prosperity.

Also, for a long time, the construction industry has been paying little or no attention to the environment, irresponsive to the needs of the people, and inefficient in the consumption of finite resources, including labour, materials, water and energy (Shen & Tam 2002; Shen & Zhang 2002; Shen & Yao 2006; Bakhtiar et al. 2008; Kibert 2008; Tan et al. 2011; Ruparathna 2013; Shi et al. 2013). Construction industry's disregard to the sustainability agenda was first observed in the World Watch Journal in 1994 where it was observed that human beings are fast becoming super species, with the development of structures that has the capacity to adapt to our varying environmentally-degrading lifestyles globally.

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Specifically, Rode et al. (2011) indicated that an approximate 10% of the global energy consumption goes to the building materials manufacturing. Construction and demolition contribute about 40% of the solid waste generated in the developed nations, while the operation stage of construction products emits almost 40% of the entire global greenhouse gas emissions (Rode et al. 2011). With the apprehension associated with resource shortage and the ever-increasing cost of energy, it is imperative for the construction industry to adopt the principles of sustainable construction. This necessitated the emergence of an international collaboration during the last decade to drive the construction industry towards the path of sustainable construction (Kajikawa et al. 2011). During the First International Conference on Sustainable Construction in Tampa, Florida, the United States of America, Kibert (1994) proposed the first known view of sustainable construction as 'the creation and responsible management of a healthy built environment, using resource efficient and ecologically-based principles' (cited in Kibert 2005). However, Kibert's view mainly focused on issues of non-renewable resources, especially energy, and ways to lessen their impacts on the ecosystem, with emphasis on such issues like materials, building components, construction technologies and energy-related design concepts.

Thereafter, Du Plessis (2002) brought a broader view of sustainable construction that takes the concept beyond just resource efficiency and ecological principles by introducing the idea of restoring the environment, as well as explicitly highlighting its social and economic aspects. It shows that by adopting this concept, construction activities' impact on sustainable development is considered under social, economic and environmental dimensions. In this line of thought, non-technical issues (i.e. economic and social sustainability) are given equal prominence as environmental issues. This new paradigm, therefore, gave rise to the TBL of environmental protection, social well-being and economic prosperity dimensions of sustainable construction (Abidin 2009), which have been adopted in this study.

Within the Malaysian construction industry (MCI), however, sustainable construction has been generating several attention for a long time, as the country moved to become one of the first nations in the world to show serious concerns towards the construction's impacts on the environment by enacting the Environment Quality Act way back in 1974 (Hamid et al. 2011). Despite this, several unsustainable practices have been highlighted to be plaguing the industry (Abdul-Rahmanet al. 2006; Goh & Abdul-Rahman 2013; Mehr & Omran 2013). Also, in spite of several noteworthy studies on sustainable construction (e.g. Du Plessis 2002; Abidin 2009; Shen et al. 2010; Liu et al. 2011), very little attention has been directed towards the effects of organizational cultural factors on sustainable construction. If any, findings of such studies are inconclusive, suggesting the possibility of a moderator (Baron & Kenny 1986). Thus, government support is proposed in this study as a moderator because, government support in stimulating green construction is one of the most effective techniques as it is more result-oriented (Atsusaka 2003; Samari 2012). The government is also capable of driving sustainable construction agenda with a number of policies, including fiscal supports, legislation and standards, and building labelling with energy efficiency rating (Pitt et al. 2009).

Examining government support as a possible moderator is yet to be investigated within the context of the MCI. It has, however, been established that the construction project delivery could be improved with government support (Qiang et al. 2015). Therefore, such consideration could increase our understanding by providing theoretical and empirical evidence on how government support could affect the direction and/or strength of the relationship that exists between organizational culture and sustainable construction in the context of Malaysian large construction companies.

Towards meeting the objective highlighted earlier, the rest of this article is organized as follows: the next section reviews the relevant literature related to organizational culture (from the perspective of adhocracy culture and market orientation), government support and sustainable construction, leading to the development of hypotheses. Next, we describe the methodology used in this study, and thereafter, we present the results and discuss the findings in greater detail by relating them to the underpinning theory and past studies. We also highlight several implications within the context of Malaysian large construction companies.

Theory and hypotheses

The central theme emerging in the strategic management resource-based literature rests on the premise that organizational resources are one of the basic sources of sustainable competitive advantage (Conner & Prahalad 1996). The resource-based view (RBV) theory emphasizes organization's usage of its internal resources to formulate strategies that could be of assistance in achieving a sustainable competitive advantage within the marketplace. It must be stressed that the theory is relevant to this study due to its relationship, not only with the specific resources needed to deliver sustainable construction, but also with the organizational culture, which has been presented in several studies as a strategic resource owing to its value, rareness and imperfect imitability

(Barney 1986; 1991; Barney & Wright 1997; Willcoxson & Millett 2000; Genç 2013).

In this sense, Barney (2015) refers to resources as 'all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc., controlled by a firm that enables the firm to conceive of, and implements strategies that improve its efficiency and effectiveness' (p. 284). Notably, materials and human resources are quite important for construction companies, because the activities within the construction industry are based on such resources like assets and human capabilities. Thus, for the construction companies to favourably compete in the delivery of sustainable construction within the industry, they may need the strategic resource (organizational culture in this sense), as this portends a powerful source of advantage for firms (Tidd et al. 2003). Resource-based view is also relevant to this study because sustainable construction delivery requires such resources like fresh knowledge, information and learning within organizations (Rohracher 2001; Rydin 2006). These resources determine firm's choice of strategic orientation while competing in its external environment or within the industry. In some cases, organizational resources could afford construction companies more opportunities to create an added value and new markets for their customers. The organizational resources are being used in this study to refer to those organizational culture dimensions like adhocracy and market orientation that have been identified as rare, valuable and inimitable culture (Prahalad & Hamel 1990; Barney 1991). While adhocracy organizations are typified by entrepreneurship, creativity and innovation, market-oriented organizations prioritize a client-centred service delivery, which are necessary for sustainable construction delivery (von Meding et al. 2013).

Organizational culture, government support and sustainable construction

As indicated earlier, we attempt to investigate the influence of the adhocracy culture, market orientation and government support on sustainable construction. In this study, we refer to adhocracy as an organizational culture that promotes entrepreneurship and dynamism in firms, and the one where innovativeness and acquisition of new resources are emphasized. Drawing from organizational culture literature (Cameron & Quinn 2011), its emergence was based on the assumption that organizational innovativeness and adaptation lead to new resources and economic prosperity. Typically, a major concern of adhocracy organization is fostering adaptability, creativity and flexibility, in addition to producing innovative products and services (Cameron & Quinn 2011). Additionally, these qualities are capable of influencing not only the organizational productivity, profitability and competitiveness, but they are also vital in sustainability adoption in an organization (Chan & Liu 2012). Studies have also demonstrated that innovation-centred culture, like adhocracy, would always make deliberate changes to organizational products or processes, to ensure that they deliver environmental and/ or social benefits, without jeopardizing the economic values (Losane 2013). Recently, Sugita and Takahashi (2015) reported mixed findings while testing the effects of corporate cultural types on sustainability performance among 867 Japanese large firms. Adhocracy culture was, however, found to be significantly related to sustainable environmental management, in terms of pollution prevention, resource conservation etc., which are core indicators of sustainable construction. Because of high flexibility and independence that characterize firms with adhocracy culture, they are able to come up with sustainable solutions to environmental challenges and deliver environmental-friendly products.

Furthermore, in the market-orientation culture, the implementation of marketing procedures that prioritize customer satisfaction more than competitor's ability to do the same is stressed, because firms with this culture believe that customer satisfaction is the most effective way to achieve firms' objectives (Crittenden et al. 2011). Research has, however, suggested that clients are beginning to demand for environmentally sustainable and eco-friendly products and services (Carbone & Moatti 2008; Routroy 2009). This demand for eco-friendly products and services, according to Doonan, Lanoie and Laplante, (2005), is becoming one of the most important factors driving sustainability adoption, and firms with market orientation will have no choice than to provide products that are environmentally sustainable (Green et al. 2012). These dimensions require efficient information systems with regard to customers and competitors, because customer's satisfaction and expectation are a continuous phenomenon that evolves over time, and consistently delivering quality products and services requires continuous observation and response to the changes and needs in the marketplace (Jaworski & Kohli 1993). Again, market-oriented firms promote market penetration with innovative products and services over old and unsustainable practices. Such organization assesses market demands and the policies performance on a regular basis, yielding constant and improved sustainability (Rehman & Shrivastava 2011; Green et al. 2015). Using resource-based view theory as the theoretical underpinning for this study, we argue that market-oriented firms, having a competitive advantage over their counterparts, will be quick to identify these

widespread changes in customer demands for sustainable construction project delivery, and will move swiftly towards its adoption in the project execution. Again, Green, et al. (2015) reported a significant positive relationship between market orientation and environmental sustainability performance, which is one of the dimensions of sustainable construction.

Eco-friendly, green construction practices improve environmental performance and social well-being, and allow firms to prosper economically, because sustainability is a key success factor for firms, as it has been noted to reduce risks in business and increase firms' opportunities within the market (Kuosmanen & Kuosmanen 2009). In line with Rameezdeen and Gunarathna's (2012) study on organizational culture in the construction industry, this study considers market orientation as an antecedent to Malaysian large contractors' adoption of sustainable construction in the project execution, considering its emphasis on continuous creation of superior value for customers, social benefits and employees' commitment to long-term competitive actions and achievement of measurable goals.

Furthermore, sustainable construction is best achieved through government support and regulatory frameworks, considering the fact that the government is not only a major client of the construction industry, but also it has the capacity to stimulate sustainable construction practices through grants and subsidies as incentives for its adoption (Du Plessis 2002; Abidin, Yusof, & Othman 2013). Although this may be less effective in the event of declining government income and a limited revenue base, it is still recognized globally as a way of regulating and controlling environmental degradation resulting from the activities of the construction industry (Shen & Yao 2006). Government, in addition to its role as the construction industry regulator, must necessarily drive sustainable construction delivery through its enormous influence by instituting a comprehensive vision for sustainable construction (Majdalani et al. 2006). Based on the fact that sustainable construction is an active process, in achieving its objectives through adequate government support, there should be concerted efforts from all stakeholders involved in the construction industry to raise necessary awareness and take active roles to encourage its adoption and practice (Häkkinen & Belloni 2011). These links between adhocracy, market orientation, government support and sustainable construction have not been previously established. In view of the above discussion, the following hypotheses are advanced:

Hypothesis 1: Adhocracy culture will significantly influence sustainable construction.

Hypothesis 2: Market orientation will significantly influence sustainable construction.

Hypothesis 3: Government support will significantly influence sustainable construction.

Government support as a moderator

A moderator functions as a third variable that can either be a qualitative or qualitative variable affecting either the direction and/or strength of the relationship existing between an independent variable and a dependent variable (Baron & Kenny 1986). In other words, a moderator variable is one that has a strong contingent effect on the independent variable-dependent variable relationship, such that the presence of this third variable modifies the original relationship between the independent and the dependent variables (Sekaran & Bougie 2013).

Government support in this study refers to the assistance rendered by the authority to stimulate the spread of sustainable construction within the construction industry. It is well recognized that government and its agencies are key players in the promotion of sustainable construction. Government is a well-established factor that exerts a significant influence on sustainability standards (Manning et al.2012), environmental protection regulations (Kumar, 2013) and social well-being of occupants and construction workers (Kien & Ofori 2002; Spiegel & Meadows 2010; Azar & Menassa, 2012; Nguyen & Aiello 2013; Hua, Göçer & Göçer 2014;). For example, research has suggested that governments and construction stakeholders are getting committed to sustainability criteria as an important requirement to the society in project management (Rodríguez López & Fernández Sánchez 2011). It has also been noted that the responsibility of construction sustainability belonged to the government, its agencies and the construction companies (Shi et al. 2013).

Research has also suggested that government support is related to sustainability delivery in construction. Government support in terms of the regulatory framework has been linked to environmental protection, a dimension of sustainable construction (Chang et al.2010; Li & Shui 2015). A cross-sectional study of Hwang and Tan (2012) revealed that through the incentive schemes provided by the Singaporean Government for the construction industry, sustainable construction adoption in design, construction practices and ecologically friendly technologies were improved. Again, Rodriguez−Melo and Mansouri's (2011) study on the influences of government policy, managerial attitude and stakeholder engagement on sustainable construction also indicated that a larger percentage of construction stakeholders emphasized a large effect of government policy on sustainable construction.

In addition to being directly related to sustainable construction, we propose that government support could function as a moderator variable in the relationships among adhocracy culture, market orientation culture and sustainable construction because, according Zerbinati and Souitaris (2005) and Michael and Pierce (2009), policies on government subsidies have been observed to have a noticeable influence on the processes and outcomes of both new and established construction firms. Thus, according to Atsusaka (2003) and Samari (2012), government support in stimulating sustainable construction is the most effective, as it is more result-oriented than other techniques. Furthermore, governments have the capacity to facilitate sustainable construction adoption in a variety of ways, although there are several barriers to developing it (Shafii et al.2006). When projects are managed by government departments and agencies, and the management technique is characterized by a rigid line control of all construction processes, as was done in China's post-reform era, the improvement in project delivery efficiency will be recorded (Qiang et al. 2015). This view was also shared by Pitt et al. (2009), who argued that the government is capable of driving sustainable construction agenda with a number of policies, including fiscal supports, legislation and standards, and building labelling with energy efficiency rating. Based on the foregoing evidence and theoretical perspective, it is expected that government support may improve the relationships among adhocracy culture, market orientation and sustainable construction. Thus, we advance the following hypotheses:

Hypothesis 4: Government support will moderate the relationship between adhocracy culture and sustainable construction, in a way that the relationship between adhocracy culture and sustainable construction will become stronger (positively) for construction companies that have high government support than those with low government support.

Hypothesis 5: Government support will moderate the relationship between market orientation and sustainable construction, in a way that the relationship between market orientation and sustainable construction will be stronger (positively) for construction companies that have high government support than those with low government support.

The conceptual framework for this study is presented in Figure 1 based on the theoretical position and empirical evidence provided earlier. As shown in Figure 1, sustainable construction (which has environmental protection, social well-being and economic prosperity as its dimensions) is the criterion variable, while adhocracy culture, market orientation and government support are the predictors. Additionally, the model shows that government support moderates the effects of adhocracy culture and market orientation on sustainable construction.

Method

Data collection and sample

Prior to the actual data collection, a pilot study was conducted where a total of 45 questionnaires were

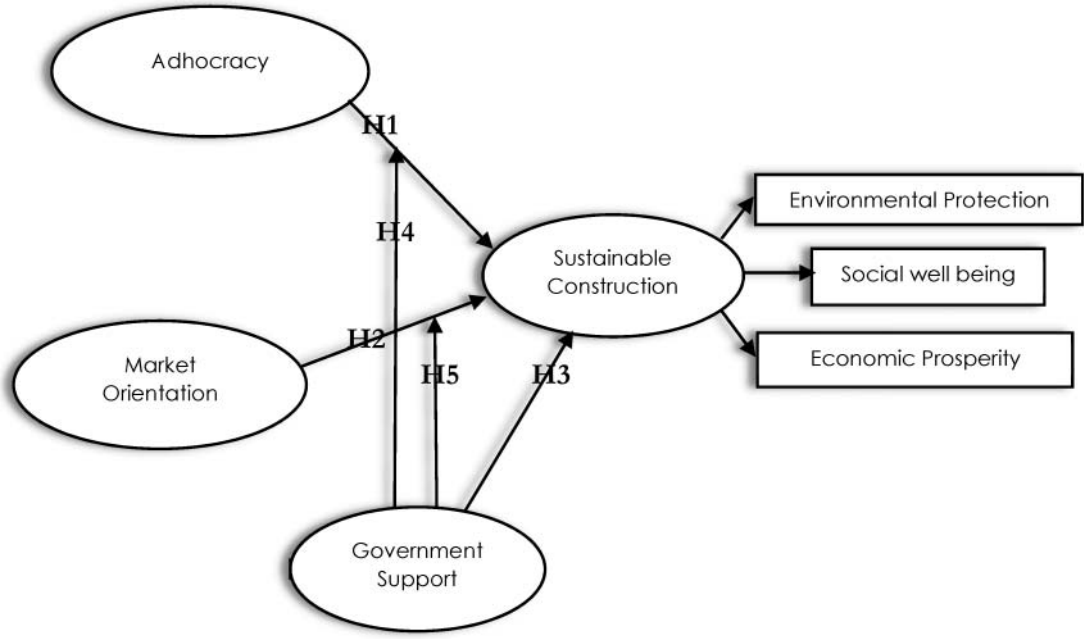

Figure 1. Conceptual model.

personally administered to Malaysian large contractors (also referred to as Grade 7 contractors) in June, 2015. Based on the suggestions of Malhotra (2008), the pilot studies sample size should be relatively smaller, ranging from 30 to 100 respondents. Thus, 45 questionnaires were justified for the purpose of determining the internal consistency of this study's variables. Next, a five-point likert scale interpretation was used in measuring all the variables, anchored by 1 = not at all, to 5 = completely true.

In the main survey, both mailed and personally administered survey methods were employed with the aid of close-ended structured questionnaires. The mailed survey method was extensively used in this study because of its ability to cover a wider geographical area and eliminate interviewer bias. Based on Krejcie and Morgan's (1970) generalized sample size parameters, a sample size of 354 is required for a population of 4520 contractors (sampled from the Construction Industry Development Board database). Again, considering the fact that the MCI is associated with low response rate (Waris et al. 2014), the suggestion of Hair et al. (2008), that the sample size be doubled, is adhered to in this study. Thus, 708 questionnaires were administered. A total of 110 contractors responded from the mailed survey. Similarly, another 79 responded during three different CIDB continuing professional development, and construction certification program attended by the researcher. These Construction Industry Development Board (CIDB) year-round workshops for Malaysian contractors served as better platforms for the researcher to explain in greater detail, the nature of the survey and the need for the respondents to participate in the survey.

Thus, a total of 172 questionnaires were retained for analysis against the entire 189 total responses collected. Invalid and incomplete responses were specifically responsible for the exclusion of nine responses. Another eight cases were removed after the assessment of multivariate outlier. This gives a 24% response rate. The response rate is adequate considering Akintoye (2000) and Dulami et al. (2003) who argued that the survey response for the construction industry is usually within the range of 20%–30%. Hence, the response rate in this study is justified.

In order to reduce the effects of common method variance, certain procedures were carried out in this study, based on the suggestions of Podsakoff et al. (2012) and Podsakoff and Organ (1986). The scale items were further improved by ensuring that the wordings of the questions in the survey instrument were written in simple, English language that can be easily understood by the respondents. Out of the 172 respondents, project managers made up the predominant group (18.9%). Next was engineers (16.7%), quantity surveyors 13.9%, executive directors 13.3%, contract managers 8.9%, construction managers 7.2% and marketing managers only 2.8%. The remaining 18.3% belongs to other senior staff in their respective construction companies. Most participants have working experience that ranged between 1 and 5 years (48.9%), followed by participants with more than 10 years of experience, and 6–10 years, in that order. In terms of the respondents' gender, the percentage for male was 68.9% as compared to that for female respondents 31.1%.

Measures

For each variable used in this study, the latent variable score was computed by the Smart PLS 2.0 software automatically, and the scores generated were used in ascertaining the coefficients of the path model between the latent variables in order to explain the variance of a specific latent variable (Ringle et al. 2005). The latent variable score was then computed by adding the generated raw scores obtained from the questionnaires for each of the latent constructs. The generated scores were later standardized by dividing the summed value by the number of items.

Sustainable construction

We measured sustainable construction in this study with five-point, multi-item rating scales, ranging from '1' '*not at all*' to '5' '*completely true*' adapted from Abidin (2005). The items were introduced with the question about respondent's understanding of sustainable construction concept, based on three dimensions of environmental protection (eight items), social well-being (seven items) and economic prosperity (five items) in respondents' company project execution.

Adhocracy culture

We used Cameron and Quinn's (2011) 10 items in measuring adhocracy. We asked respondents to indicate their responses on a 5-point scale, ranging from '1' '*not at all*' to '5' '*completely true*' on items such as 'Our company is a dynamic working place.'

Market orientation

We measured market orientation with nine items from Jaworski and Kohli (1993). In all cases, we asked participants to indicate their responses on a 5-point scale, ranging from '1' '*not at all*' to '5' '*completely true.*' A sample

of the questionnaire item stated that 'Our competitive advantage is based on understanding clients' needs.'

Government support

We assessed government support based on Akadiri and Fadiya's (2013) measures. All items were also rated on a 5-point scale, ranging from '1' '*not at all*' to '5' '*completely true*', on items such as 'government support is responsible for effective sustainable construction standards and incentives.'

In total, 44 items were used in measuring this study's variables.

Analysis and results

Based on the suggestions of Hair et al. (2010) and Tabachnick and Fidell (2007), assumptions like missing values, normality test and multicollinearity test were checked to screen the data prior to the main analysis. Thereafter, we used the PLS path modelling, after these assumptions had been satisfied. Specifically, SmartPLS 2.0 M3 software (Ringle et al. 2005) was used to test the relationships between the latent variables. PLS-SEM (also known as path modelling) is primarily used for theory development in exploratory research. As against other co-variance-based structural equation modelling like LISTREL and AMOS, this technique was chosen for its ability to handle small sample size (Chin 1998). The 172 sample size in this study can be categorized as a small sample size. Equally, social science and management researches greatly rely on the PLS SEM for model testing and theory confirmation (Chin 1998; Marcoulides et al. 2009). Vinzi et al. (2010) also argued that PLS SEM is 'meant to estimate a network of causal relationships, defined according to a theoretical model, linking two or more latent complex concepts, each measured through a number of observable indicators' (p. 47).

Again, the PLS path modelling is considered ideal in this study because we aim to predict the endogenous latent variable, which is sustainable construction (Fornell & Bookstein 1982; Hulland 1999; Hair et al. 2011; Ringle et al. 2012). Furthermore, PLS-SEM is presently recognized and preferred within social sciences and psychological research as a technique that is most suitable for the multivariate analysis (Hair et al. 2011; Peng & Lai 2012; Hair et al. 2013).

Measurement model results

The measurement model evaluation involves the determination of individual item reliability, internal consistency of reliability and discriminant validity (Henseler et al. 2009; Hair et al. 2011; Hair et al. 2014). To ascertain these assumptions, an assessment of individual indicator reliability was done by examining the outer loadings of each construct's measure (Hair et al. 2014). Thus, items with loadings of 0.50 and above were retained following the rule of thumb by Barclay et al. (1995) and Chin (1998). All items were retained as none of them was below 0.50. The item loadings ranged between 0.716 and 0.891 (see Table 1).

Also, in Table 1, the internal consistency of reliability using the composite reliability coefficient was displayed. According to the rule of thumb set by Bagozzi and Yi (1988) and Hair et al. (2011), the composite reliability coefficient should not be less than .70. This benchmark has been achieved in this study, as the composite reliability coefficients of this study's latent constructs ranged between 0.923 and 0.950, indicating that they all exceeded the minimum acceptable level of .70.

Furthermore, the discriminant validity was ascertained using the square root of the average variance extracted (AVE), as suggested by Fornell and Larcker (1981). The squared correlations (appearing in bold) were compared with the correlations among latent constructs (Fornell & Larcker 1981). Ideally, the squared correlations should be greater than the off-diagonal coefficients or elements in the corresponding rows and columns. As shown in Table 2, all the correlations were lower than the squared root of AVEs along the diagonals, suggesting adequate discriminant validity.

Structural model results

In the structural model specification, the significance of path coefficients is assessed. To achieve this, a standard bootstrapping procedure was applied with 5000 bootstrap samples and 172 cases (Henseler et al. 2009; Hair et al. 2012). Table 3 and Figure 2 present the significant paths for our research model.

Figure 2 shows a diagrammatical representation of the bootstrapping results performed in the structural model to explain the relationship between the latent variables. The *t*-values are shown along the main paths. Going by the directional form of the hypothesized relationships in this study, with one-tailed critical value, the value generated suggests that the relationships are significant at 5% level of significance with critical *t*-value of ± 1.645.

In Hypothesis 1, we predicted that adhocracy would be positively related to sustainable construction. As expected, results in Table 3 (Model 1) and Figure 2 show that adhocracy culture is significantly related to sustainable construction ($\beta = 0.224$, $t = 6.445$, $p < .001$). As such, Hypothesis 1 was strongly supported. Equally, the

Table 1. Factor loadings and reliability.

Latent variables	Items	Standardized loadings	Composite reliability	Average variance extracted
Adhocracy	ADC1	0.754	0.950	0.658
An organizational culture that promotes entrepreneurship and dynamism in firms, and the one where innovativeness and acquisition of new resources are emphasized.	ADC2	0.814		
	ADC3	0.834		
	ADC4	0.796		
	ADC5	0.806		
	ADC6	0.844		
	ADC7	0.839		
	ADC8	0.805		
	ADC9	0.798		
	ADC10	0.814		
Market orientation	MKT1	0.716	0.940	0.634
A culture where firms direct their activities towards achieving customers' satisfaction through continuous needs-assessment.	MKT2	0.781		
	MKT3	0.808		
	MKT4	0.822		
	MKT5	0.831		
	MKT6	0.782		
	MKT7	0.760		
	MKT8	0.809		
	MKT9	0.852		
Environmental protection	EVT1	0.782	0.943	0.672
Construction firms' adoption of environmental protection principles in project execution for the benefits of present and the future generation of stakeholders.	EVT2	0.873		
	EVT3	0.793		
	EVT4	0.826		
	EVT5	0.819		
	EVT6	0.849		
	EVT7	0.863		
	EVT8	0.747		
Social well-being	SWB1	0.745	0.940	0.690
Construction firms' adoption of social well-being principles in project execution for the benefits of present and the future generation of stakeholders	SWB2	0.835		
	SWB3	0.858		
	SWB4	0.849		
	SWB5	0.820		
	SWB6	0.852		
	SWB7	0.852		
Economic prosperity	ECP1	0.803	0.935	0.742
Construction firms' adoption of the principles of economic prosperity in project execution for the benefits of present and the future generation of stakeholders	ECP2	0.803		
	ECP3	0.856		
	ECP4	0.890		
	ECP5	0.891		
Government support	Govs_1	0.851	0.923	0.706
This refers to the assistance rendered by the regulatory authority to stimulate the adoption of sustainable construction within the construction industry.	Govs_2	0.818		
	Govs_3	0.881		
	Govs_4	0.877		
	Govs_5	0.771		

Table 2. Descriptive statistics and correlations among latent variables.

Latent variables		Mean	SD	1	2	3	4	5	6
1	Adhocracy	3.803	.678	**0.811**					
2	Government Support	4.000	.683	0.4691	**0.84**				
3	Market Orientation	3.780	.685	0.6616	0.5224	**0.796**			
4	Economic Prosperity	4.084	.665	0.5517	0.5631	0.6568	**0.861**		
5	Environmental Protection	3.835	.664	0.632	0.6163	0.692	0.6358	**0.82**	
6	Social Wellbeing	3.969	.647	0.5996	0.6561	0.6686	0.7204	0.748	**0.831**

Note: Values (appearing in bold) show the square root of the average variance extracted (AVE).

result in Table 3 (Model 1) provides empirical support for Hypothesis 2, which predicted that market orientation is significantly related to sustainable construction ($\beta = 0.411$, $t = 13.702$, $p < .001$). In examining the direct effect of government support on sustainable construction (Hypothesis 3), the result generated in Table 3 (Model 1) also indicated that government support showed a significant positive relationship with sustainable construction ($\beta = 0.367$, $t = 9.727$, $p < .001$), suggesting that Hypothesis 3 is also supported. This is in consonance with previous studies (like Du Plessis 2002; Cabugueira 2004; Majdalani et al. 2006; Shen & Yao 2006; Khanna & Brouhle 2009; Fraj-Andres et al. 2009; Häkkinen & Belloni 2011; Abidin et al. 2013; Akadiri &

Table 3. Path coefficients.

Relationships	Model 1 (main effects)	Model 2 (interaction effects)
Adhocracy	0.224***	0.242***
Market orientation	0.411***	0.407***
Government support	0.367***	0.342***
Adhocracy * government support		0.064**
Market orientation * government support		0.035

Note: Dependent variable: sustainable construction (SC).
***indicates 0.1% level of significance (1 tailed).
**indicates 1% level of significance (1 tailed).

Fadiya 2013) where it was demonstrated that sustainable construction delivery is dependent on government support.

After the determination of the path model coefficients for the main model, the *R*-squared values, effect sizes (f^2) and predictive relevance of the research model were assessed. Table 4 presents the coefficient of determination (R^2 value) of this study's endogenous latent variable. The research model explained 71.1% of the total variance in sustainable construction, suggesting that the three exogenous variables (i.e. adhocracy culture, market orientation and government support) collectively predict 71.1% of the variance in sustainable construction. The rule of thumb, according to Hair et al. (2011); Henseler et al. (2009), is that the acceptable *R*-squared values for the endogenous latent variables are categorized as 0.75, 0.50 and 0.25 for substantial, moderate, and weak, respectively.

Table 4. Variance explained in the endogenous latent variable.

Latent construct	Variance explained (R^2)
Sustainable construction	0.711

Thus, following the recommendation of Hair et al. (2011) and Henseler et al. (2009), it can be concluded that the model's predictive accuracy has been assured with an acceptable R^2 value of 0.711.

Effect size and predictive relevance

Aside the evaluation of R^2 value for the endogenous variable, another step carried out is the estimation of the effect size. This is achieved by recording the changes in the R^2 values when a specified exogenous latent variable is removed from the model in order to evaluate the substantive effect of the omitted latent variable on the endogenous latent variable (Chin, 1998). Thus, according to Cohen 1988, Selya et al. (2012) and Wilson et al.

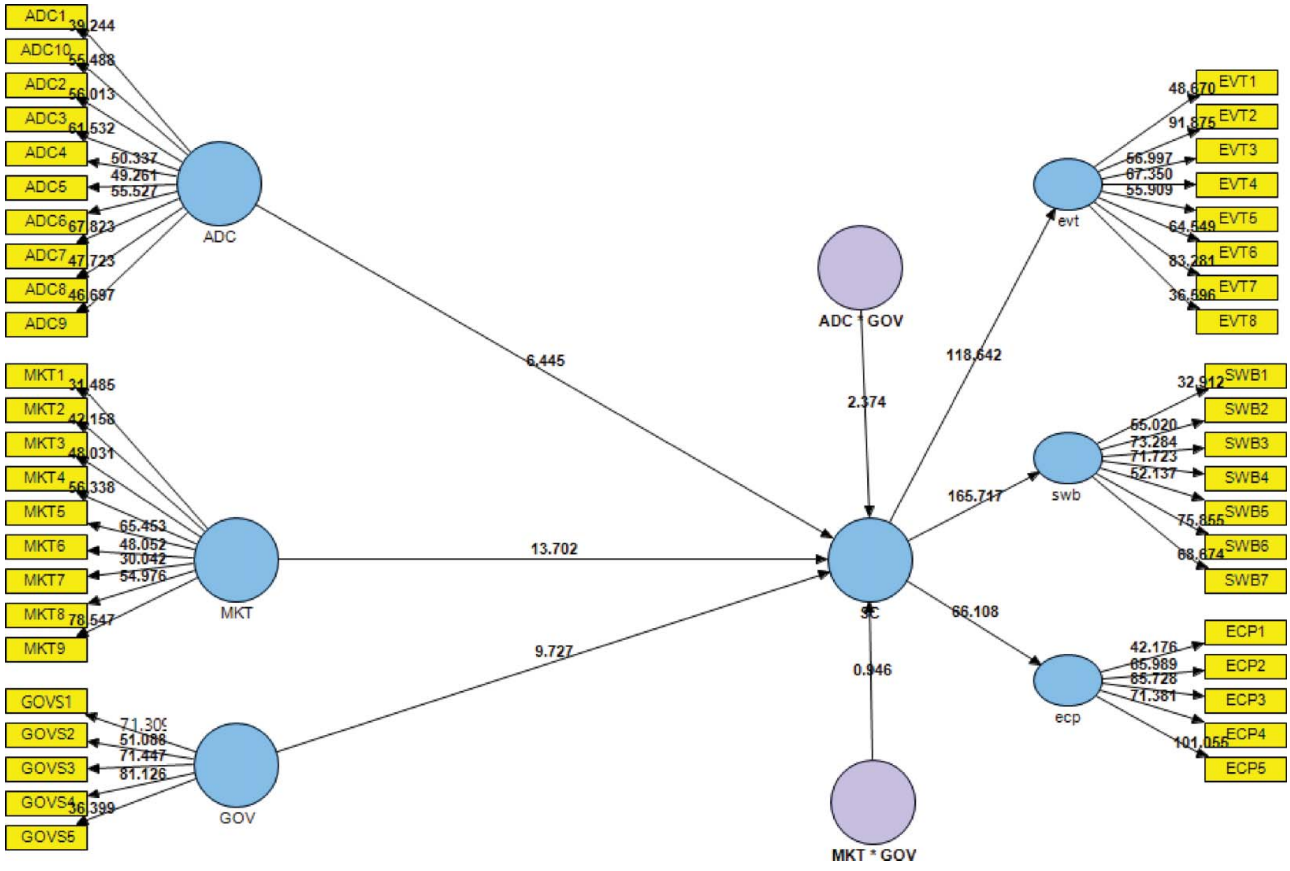

Figure 2. Structural model with moderator (full model).

(2007), the effect size is calculated as:

$$\text{Effect size } f^2 = \frac{R^2\text{included} - R^2\text{excluded}}{1 - R^2 \text{ included}} \quad (1)$$

The guideline for assessing effect size f^2 value is given by Cohen (1988) is 0.02, 0.15 and 0.35 for small, medium and large effects, respectively. From the results generated, the effect size for adhocracy culture was 0.093, market orientation 0.294 and the government support 0.329. Thus, the effect sizes for the three exogenous variables i.e. adhocracy, market orientation and government support could be considered as small, medium and medium, respectively (Cohen 1988).

The present study also applied the Stone–Geisser test of predictive relevance of the research model using blindfolding procedures (Geisser 1974; Stone 1974). Particularly, a cross-validated redundancy, based on the suggestions of Chin 2010, Geisser 1974, Hair et al. 2013, Ringle et al. 2012 and Stone 1974 was applied to measure the model's predictive relevance (Q^2). In the PLS path modelling, Q^2 values higher than zero for the endogenous latent variable indicate that there is predictive relevance for the particular construct. In this study, the result indicates that the Q^2 statistic is 0.374 for the endogenous latent variable. This suggests on the predictive relevance of the model (Chin 1998; Henseler et al. 2009).

Testing moderating effect

In this study, the product indicator approach using PLS SEM was applied to estimate the strength of the moderating effect of government support on the relationship between adhocracy culture, market orientation and sustainable construction (Chin et al. 2003; Helm et al. 2010; Henseler & Fassott 2010). The first step in applying this approach requires examining the direct effects by integrating the entire exogenous variables in the model and also including the moderator variable as another exogenous variable in the model. Secondly, the interaction term is created by multiplying the items/indicators of the exogenous variables by each indicator of the moderator (Henseler & Fassott 2010). The third procedure requires the determination of the strength of the moderating effects using Cohen's (1988) recommendations for estimating effect sizes.

As stated in Hypothesis 4, government support is predicted to significantly moderate the relationship between adhocracy culture and sustainable construction. As expected, the relationship (between adhocracy culture and sustainable construction) is seen to be stronger for construction companies that benefit from the government support than it is for those without support from the government. Thus, Table 3 (Model 2) indicated that the interaction terms representing adhocracy culture and government support ($\beta = 0.064$, $t = 2.374$, $p < 0.01$) were significant statistically. Again, as shown in Figure 3, the interaction between adhocracy and government support in predicting sustainable construction indicates that the effect of adhocracy culture on sustainable construction adoption is positively stronger for construction companies that have higher government support than for those construction companies with low government support.

Furthermore, it was predicted in Hypothesis 5 that government support would significantly moderate the relationship between market orientation and sustainable construction, in a way that the relationship will become stronger for construction companies with higher government support than it is for those with low government support. This hypothesis was not supported as depicted in both Table 3 and Figure 2. While the result indicated a positive β value, there is a low t-value which is an indication that the government support has a minor interaction effect on the market orientation/sustainable construction relationship ($\beta = 0.035$, $t = 0.946$, $p < .01$). However, the two-way interaction effects in Figure 4 indicated that government support was able to strengthen the relationship between market orientation and sustainable construction. Based on the recommendation of Cohen (1988), we calculated the strength of the moderating effects of government support on the relationship between adhocracy, market orientation culture and sustainable construction using the formula:

$$f^2 = \frac{R_i^2 - R_m^2}{1 - R_i^2} \quad (2)$$

where m represents main effect model (without the moderator); and i represents interaction effect model (with the inclusion of the moderator). The results indicated an f^2 value of 0.021, suggesting a small effect size based on

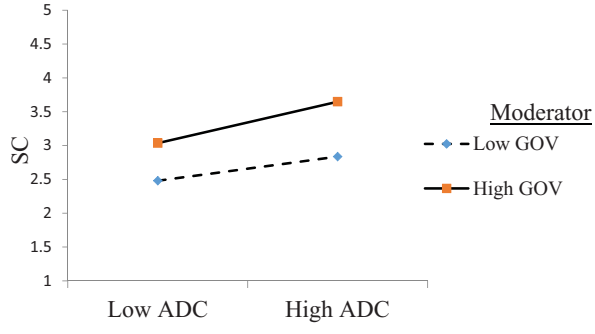

Figure 3. The interaction between adhocracy and government support in predicting sustainable construction. GOV strengthens the positive relationship between ADC and SC.
Note: SC = sustainable construction; ADC = adhocracy; GOV = government support.

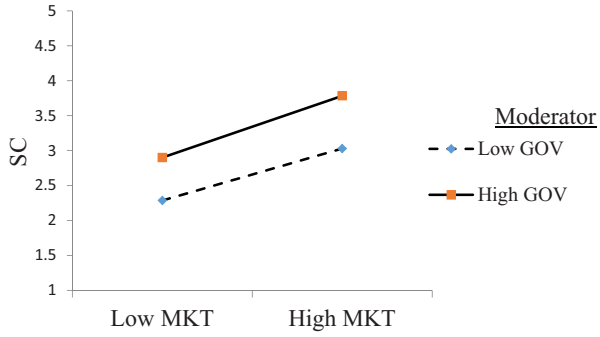

Figure 4. The interaction between market orientation and government support in predicting sustainable construction. GOV strengthens the positive relationship between MKT and SC.
Note: SC = sustainable construction; MKT = market orientation; GOV = government support.

Cohen's (1988) guideline. However, a low effect size does not make the underlying interaction effect insignificant. Chin et al. (2003) argued that once the beta values are meaningful, then the small effect size can be considered.

Discussion

In this study, the main objective was to examine whether government support matters on the relationships among adhocracy culture, market orientation, government support and sustainable construction. Consistent with Hypothesis 1, results generated indicated that there exists a statistically significant relationship between adhocracy culture and sustainable construction, thereby implying that the more a construction company leans towards adhocracy culture, the easier will be the company's ability to adopt sustainable construction in the project execution. This result is consistent with previous studies where adhocracy culture was highlighted to reflect a close link with sustainability (Sugita & Takahashi 2015; Trong Tuan 2012; Übius & Alas 2015).

Again, Hypothesis 2, which stated that market orientation would have a significant positive relationship with sustainable construction, was found to be supported, as findings revealed that there is a significant positive relationship between these two variables. The implication of this is that the more market orientation a construction company integrates into its organizational culture, the greater will be their chances of adopting sustainable construction. This finding is consistent with Green, et al. (2015) who found that market orientation culture has a direct effect on sustainable environmental performance. Furthermore, as predicted in Hypothesis 3, government support showed a significant, but negative relationship with sustainable construction. The implication of this is that Malaysian large contractors have the capacity to adopt sustainable construction in their project execution without the support from the government.

In regard of Hypothesis 4, it was predicted that government support would moderate the relationship between adhocracy and sustainable construction, such that the relationship between adhocracy culture and sustainable construction would become stronger positively, especially for construction companies that have more support from the government than for those with low government support. As hypothesized, the findings revealed that there is a significant interaction effect between government support and adhocracy culture. This finding suggests that construction companies with adhocracy organizational culture are more likely to demonstrate sustainability dimensions in their construction project execution when they have more government support than those with low government support.

In Hypothesis 5, we predicted that government support would moderate the relationship between market orientation and sustainable construction, in a way that the said relationship would become stronger positively, especially for construction companies that have more support from the government than for those with low government support. Against our expectation, the result shows an insignificant *t*-value, which implies that there is a low interaction effect between government support and market orientation, which suggests that government support has a low moderating effect on the relationship between contractors' market orientation culture and sustainable construction. Thus, the findings demonstrate that market-oriented large contractors in Malaysian context are capable of adopting sustainable construction dimensions in their construction project execution without the intervention of the government. The findings has been able to make a significant contribution to sustainable construction discussion by highlighting the importance of contractor's market culture in sustainability adoption, although it deviates from other previous studies like Crittenden et al. (2011), who pointed out that deliberate government policy frameworks are needed to further strengthen firms' market culture for a successful delivery of sustainability.

Conclusion

This study's result, altogether, has important theoretical and practical implications. First and foremost, the study was able to provide a theoretical implication by giving additional empirical evidences within the domain of RBV theory (Barney 1991; Conner & Prahalad 1996; Barney 2015) which posits that organizational resources (i.e. all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc.) are the basic

sources of a firm's sustainable competitive advantage. By extension, this study has been able to examine a broader range of organizational attributes in terms of culture, and additional knowledge to deliver sustainable construction, and it has posited that construction companies may need to develop these cultural attributes (in terms of adhocracy and market orientation cultures) to deliver unique processes leading to the delivery of sustainable construction products, as this portends a powerful source of advantage to compete favourably within the industry (Rohracher 2001).

Second, this study also examines the moderating role of government support on the relationships among adhocracy culture, market orientation, government support and sustainable construction. Thus, due to the fact that extant literature and empirical studies regarding these relationships reported mixed findings (e.g. Silajdžić et al. 2015), this study has attempted to fill this gap by introducing government support as a moderator to enhance the understanding of the influence of adhocracy culture, market orientation and government support on sustainable construction. The results in this study indicated that government support is a relevant and significant moderator of organizational culture influence on sustainable construction, and it also suggests that organizational cultural interventions aiming at improving sustainable construction should consider cultures that promote entrepreneurial, creativity, innovation and customer satisfaction like adhocracy and market orientation.

Despite certain limitations, like the insignificant interaction effect between government support and market orientation, this study has been able to display the moderating effect of government support on the relationship between adhocracy cultures, government support and sustainable construction among Malaysian large contractors. Thus, findings of the study have highlighted how significant adhocracy culture and government support are in influencing sustainable construction among Malaysian large contractors. Taken together, the findings suggest that adhocracy culture and government support are effective in maximizing the tendency of the contracting companies to adopt sustainable construction in the project execution. Particularly, results indicated that the effect of adhocracy culture on sustainable construction depends on government support. Thus, contractors with higher government support are expected to improve their sustainable construction adoption.

Finally, future research might examine how government support could influence sustainable construction adoption among small and medium contractors who have also been shown to be more responsive towards sustainability within their organization's overall mission (Sharma & Henriques 2005; Darnall et al. 2010).

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