

Firms' Effectiveness in Information System and Their Sustainable Performance, does Organizational Identity Matter?

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Abstract-This study tested the relationship between firms' effectiveness in use of information technology (IT) and performance in sustainable development based on the perspective of organizational identity orientation. We made some theoretical contributions. We predict that firms' collectivistic identity orientation can moderate the relationship between firms' effectiveness in IT and their performance in sustainable development. Moreover, the same identity may also have a direct and positive effect on performance in sustainable development. Analyzing empirical data from China's manufacturing industry, we found evidence supporting the effects of IT effectiveness and organizational identity.

Keywords-Organizational Identity; Sustainable Development; Information Technology; Collectivistic Identity Orientation; Effectiveness in IT

I. INTRODUCTION

The relationship between effectiveness of firms' usage of information technology (IT) and their performance in sustainable development (CSD) has been studied by several authors (Dewett and Jones 2001; Bansal 2005; Day 1994). However, it remains unclear whether and how the perception of firms' stakeholders about their firm's identity may moderate the relationship. As we predict in the rest of this paper, this perception may have a direct effect on firms' performance in sustainable development. Moreover, the perception may also have a moderating effect on the relationship between firms' IT usage effectiveness and their performance in sustainable development. Our predictions here are developed based on the theory of organizational identity orientation (OIO) (See Brickson 2007 for a detailed discussion of this theory).

The perspective of OIO is developed by taking into account the issue of sustainable development from the very beginning (Brickson 2007). According to Brickson (2007), for example, many problems related to firms' performance in sustainable development result from their excessive obsession with profit alone. With a better understanding of issues related to organizational identity, firms may have a clearer understanding of implications of their identities and do more than just maximizing wealth or profit. Here the assumption is that the performance in sustainable development may require firms to identify or develop strategies and alternatives more distinct than the traditional neoclassical economic approach,

which stresses the firms' self-interest being the basis for individual and organizational motivation (Brickson 2007, p. 864).

According to this theory of organizational identity, we are testing the effect of organizational identity on the relationship between the effectiveness of firms' information technology usage (ITE) and its performance in sustainable development in this study. Theoretically, results of this study are expected to contribute to the theory of information management. As mentioned above, prior research has suggested that firms' ITE should have a positive relationship with performance in sustainable development. However, some important contingencies influencing this relationship remain unclear. One such contingency is organizational identity. Therefore, the results of this study will contribute to the literature by identifying the important moderating effect of the identities on the relationship between ITE and performance in sustainable development.

For practitioners, we believe the results of this study will help them better understand how their organizational identity may influence firms' performance in sustainable development. Given the fact that shareholders and customers are paying more and more attention to such issues as corporate social responsibility and sustainable development, after developing an appropriate organizational identity, difficulties and criticism encountered by managers should recede.

The rest of this paper first provides a brief review of the relevant literature, and then proposes a theoretical model integrating these perspectives, followed by a discussion of tests of the predictions suggested in the models. After that, the paper reports the findings of this study and discusses their implications.

II. THEORETICAL BACKGROUND AND HYPOTHESES

A. Research on IT Effectiveness and Performance in Sustainable Development

Researchers have studied the relationship between firms' IT usage effectiveness and their performance in sustainable development for many years (Dehning and Richardson 2002; Karimi et al. 2007). Here sustainable development can be defined as a business strategy that tries to meet the needs of

organizational stakeholders without compromising resources and interests of the local community (Dyllick and Hockerts 2002). This strategy is considered an ethical business practice with the objective of “going green” by striking a balance between social, economic, and environmental development interests (Sharma 2002). Theoretically, this strategy could be defined as “the adoption of business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future” (IISD 1992, p.116). The path to sustainable development can be understood as a continual process of change, or even a process of evolution (Newman 2007).

Research has identified two approaches to improve performance in sustainable development: strategic and operational. The strategic approach focuses on cost reduction; for example, pollution prevention may be expensive and cause companies to lose money (Hart 1995; Porter and Van der Linde 1995). A firm can improve its performance if it can identify an effective way to reduce the costs of production (Aragón-Correa 1998). On the other hand, the operational approach involves changes made at the production level that reduce harm to the environment (Gilley et al. 2000). Firms may adopt many methods to protect the environment. For instance, they could adopt the approach of product-related development, such as packaging and eco-labeling, or that of process-related development, such as recycling waste and redesigning products in ways that will reduce waste (Gilley et al. 2000).

As mentioned above, several authors have suggested that firms' IT usage effectiveness may have a positive effect on their performance in sustainable development (Sambamurthy and Zmud 1992; Tallon 2008). For example, Bharadwaj (2000) indicated that IT capabilities could achieve process agility, treating this as a specific type of firm performance. Stoel and Muhanna (2009) provided a consistent conclusion after empirically analyzing the moderating role of environmental factors in the relationship between IT capabilities and performance. Bharadwaj and co-authors (1999) also suggested that effective IT management can have a positive effect on firms' overall IT success as well as other dimensions of performance, which could include their performance in sustainable development. In addition, Boynton and co-authors (1994) pointed out that IT effectiveness represented routines and procedures that embody pragmatic knowledge and know-how, which in turn improved overall firm performance and help firms' opt for more sustainable development. Finally, Mata and co-researchers (1995) explained the reasons why IT management could be the major source of competitive advantage: (1) IT management evolves through history and “learning by doing” so that it makes the process heterogeneous and difficult to copy, and (2) IT management could build good relationships among different business functions. Firms that have effective IT management to coordinate multifaceted activities have been found to have improved efficiency and effectiveness in their business processes which in turn allows them to enjoy better financial performance by bolstering firm revenues and/or decreasing firm costs. Based on this, we predict that firms' IT

effectiveness should have a positive effect on performance in sustainable development.

H1: There is a positive relationship between firms' IT effectiveness and its performance in sustainable development.

Some authors have also suggested that the relationship between a firm's IT effectiveness and CSD may be moderated by certain environmental factors (Aragón-Correa and Sharma 2003). Consistently, Stoel and Muhanna (2009) also argued that the relationship between IT capabilities and business strategy could be contingent on such environmental factors. In this paper, we focus on an internal environmental variable that we have discussed above, i.e. firms' organizational identity orientation. In other words, we examine the effect of this orientation of image on the relationship between ITE and performance in sustainable development. Below we first review extant research on identity orientation, based on which we then predict its effects on the relationship between ITE and CSD.

B. The Perspective of Organizational Identity Orientation

Organizational identity can be defined as shared perceptions of stakeholders or relevant participants of an organization, including the central, distinctive and enduring qualities of this organization (Albert and Whetten 1985; Dutton and Dukerich 1991; Pratt and Foreman 2000). In other words, the identity consists of the participants' shared perceptions about what their organization is (Ashforth and Mael 1996), in answer to such a question as who they are as an organization (Albert and Whetten 1985), which in turn drives the organization's motivation and behaviors (Albert et al. 2000; Dutton and Dukerich 1991). Motivations and behaviors of firms include those on the dimension of sustainable development. The reason is that, as some authors have stressed, organizational identity is shaped and negotiated through iterative interactions between managers and stakeholders, which include customers, suppliers, patrons and shareholders (Scott and Lane 2000).

Because organizational identity speaks of the very definition of an organization (Albert et al. 2000), it can help understand the organization's coherent actions toward others and their environments. It can also help others understand how to interact with the organization (Brickson 2007). Brickson (2007) developed a model of organizational identity orientation, defined as the perceived nature of the association between an organization and its stakeholders (Brickson 2005). Following this definition, Brickson (2007) identified three types of orientations, namely, individualistic, relational and collectivistic. All these orientations address the question “Who are we as an organization vis-à-vis our stakeholders?” (Brickson 2007, p.866), which has powerful motivational effects for a given organization and its members (Brewer and Gardner, 1996; Cialdini et al. 1997). Below, we discuss the three orientations in more detail.

First, an individualistic orientation is defined as the organization's self-conception of being a sole entity, atomized and distinct from others (Brickson 2007). According to Brickson (2007), this orientation stresses self-interest, which encourages the organization and its members to view

themselves as distinct from others according to their individual traits and characteristics such as being more competitive and stronger, to use interpersonal comparisons for self-evaluation purposes, and to compete based on self-interest and a desire to be perceived as more competent than others. Internally, individualistic organizations might be described as “expecting people to perform at a high level.” The point of reference for evaluating such an organization is how it outperforms others. For example, does this organization make more money or is it more successful than others? For a business organization, profitability is often the key criterion for performance assessment (Brickson 2007, p.868).

Second, a relational orientation is defined as an organization’s self-conception of being a dyadic partner having particularized bonds with specific stakeholders (Brickson 2007). While the individualistic orientation is associated with organizational self-interest, relational orientation is associated with a concern for benefit of the dyadic partner. This orientation encourages a given organization and its members to view themselves in terms of dyadic roles to particularized others. Influenced by this orientation, organizational members evaluate themselves against a role standard such as whether an individual is a good partner, which make them have a stronger need to help relationship partners. Here, the point of reference for organizational evaluation is how actual performance compares with some role standard, provided by the organization itself and/or by its stakeholders (Brickson 2007, p.868).

Finally, a collectivistic orientation is defined as an organization’s self-conception of being a member of a larger group with generalized ties to other stakeholders in the group (Brickson 2007). This orientation is associated with a motivation to benefit the community as a whole. The collectivistic orientation encourages a given organization and its members to view themselves in terms of the collective prototype (e.g., as a member of one’s company or department), and to enhance the welfare or relative standing of the organization or community, which is a desire to advance the relative standing of its community. Internally, collectivistic organizations might be described as “fostering an internal sense of community.” Organizational evaluations are conducted through assessment of contributions to the organization or community (Brickson 2007, p.868).

The perspective of organizational identity orientation has been validated empirically (Brickson and Brewer 2001; Gabriel and Gardner 1999; Kashima and Hardie 2000). For example, with a sample of 1,126 individuals in two industries, Brickson (2005) showed convergent and discriminant validities of the three orientation-constructs at the organizational level. The study also identified a number of variables such as industry, type of clients served, cooperative structure, etc. which may predict identity orientations of organizations. Moreover, all three orientations showed high correlations between members’ perceptions of how their organizations relate to outsiders and how they relate to organizational members (ranging from 0.62 to 0.78). The findings are consistent with past research suggesting that

organizations follow similar principles to manage external and internal relations (Rousseau and Wade-Benzoni 1994).

Following this perspective of organizational identity orientation, we predict a positive relationship between a firm’s collectivistic identity and its performance in sustainable development. The reason is that, as reviewed above, the collectivistic orientation encourages a given firm and its employees to view themselves in terms of the collective prototype and to enhance the welfare or relative standing of the community. Moreover, research on identity orientation has shown a high correlation between employees’ perceptions of how their firm relates to outsiders and how they relate to the firm. Accordingly, firms with a collectivistic orientation should be more likely to pay more attention to interests of the community, which include interests involving environmental protection and other socially-responsible activities, than other firms. This is especially true when some negative firm activities, such as polluting the environment, affects their employees directly. For instance, environmental pollution created by a firm may affect its employees. On the other hand, such a firm may today be criticized by the community or society and even families of its employees. All these can affect employee morale and motivation. Even worse, a firm creating pollution may also affect the health of its own employees directly, which can also negatively affect its relationship with them. For a firm with a collectivistic orientation, these are undesirable consequences that should be avoided. Therefore, a firm with a collectivistic orientation is likely to perform better than firms with other orientations in sustainable development. Accordingly, we predict the following:

H2: A collectivistic identity orientation should have a significant and positive effect on a firm’s performance in sustainable development.

Moreover, following the literature as reviewed above, we also predict a moderating effect of organizational identity orientation on the relationship between ITE and performance in sustainable development. The reason is that this relationship is arguably contingent upon identity orientation. For a firm with an individualistic orientation, for example, effectively managing IT may lead to better financial performance, but not better performance in sustainable development, since such performance may not always be positively related to financial performance. In other words, financial performance may be affected when a firm makes a high commitment to sustainable development. To a firm with an individualistic identity orientation, financial performance may take priority over performance in sustainable development. Because of this possibility, firms with an individualistic orientation may perform better in sustainable development only when sustainable development shows a positive relationship with financial performance; otherwise, this relationship may be negative. With the effects offsetting each other, an individualistic orientation may not have a consistent moderating effect on the relationship between ITE and performance in sustainable development.

On the other hand, we predict a positive moderating effect

of collectivistic orientation on the relationship between ITE and performance in sustainable development. With a high level of this orientation, as discussed above, a firm should be highly committed to such tasks as environmental protection, which should enhance the positive relationship between ITE and performance in sustainable development. Accordingly, we predict as follows:

H3: A firm's collectivistic identity orientation will moderate the relationship between its ITE and its performance in sustainable development. Other conditions being equal, the higher the collectivistic identity orientation, the stronger will be the positive relationship between ITE and performance in sustainable development.

III. METHOD

A. Setting, Sample, and Data

To test our hypotheses empirically, we collected data from manufacturing firms in China. We selected this sample for several reasons. First, China has the largest number of manufacturing firms in the world today. Yet relatively few studies have been conducted among Chinese firms. Thus, testing our hypotheses among Chinese firms should be more significant than testing them in other economies. Second, generally speaking, Chinese firms today face more challenges than their Western counterparts on many issues of sustainable development. For example, environmental pollution in China today is much more serious than in any of the advanced economies. Therefore, conducting such a study in China could provide useful knowledge that can possibly help Chinese firms do better in sustainable development. Finally, most relevant research on the relationship between ITE and firm performance has been conducted in the West. Studying the relationship and related variables in China could improve our understanding of external validity of Western findings from past research.

Because manufacturing firms in China consist of several sub-industries, we marked each sub-industry with a number (e.g., car-making being one) so that we could later control the possible effect of industry difference in our data analyses. We discuss this issue further in the next section on data analyses.

We randomly selected firms in this sample so long as they had an IT manager leading an IT division, department, or unit ($N = 317$). Among these firms, 214 were from North China and 103 from South China. The largest firm employed 11,638 people, and the smallest 102. Table 1 shows other information about the sample, as discussed below.

For a given firm in our sample, we first invited one of its top managers to respond to a questionnaire measuring firm performance in sustainable development, focusing on the issue of environmental protection. Afterward, with the permission of the top management, we invited the firm's IT manager to respond to another questionnaire, which measured the firm's ITE and identity (See the Measurement section later). Finally, we also interviewed other stakeholders outside the firm about their perception of the firm's identity.

B. Measurements

1) *Dependent Variables:*

We measured firm performance in sustainable development using an instrument adapted from research published in good journals. Specifically, this instrument measures two dimensions of firms' performance in sustainable developments. One dimension is related to firms' performances in environmental protection, which was based on instruments developed by Chan (2005) and Bansal (2005). This instrument consisted of: (1) reducing impact on animal species and natural habitats; (2) undertaking voluntary actions (i.e. actions not required by regulations) for environmental restoration; (3) reducing waste and emissions from operations; (4) reducing purchases of non-renewable materials, chemicals and components; (5) reducing energy consumption; (6) reducing environmental impact of its products; (7) reducing the likelihood of environmental accidents through process improvement; (8) disposing waste responsibly; (9) using waste as inputs for its own processes; and (10) handling or storing toxic waste responsibly. Our pre-tests showed that this instrument had a reliability alpha of 0.93.

Another dimension of sustainable development is related to firms' contribution toward their societies, which is based on Bansal (2005) and Lichtenstein et al. (2004). Our instrument consisted of (1) improving employee or community health and safety; (2) recognizing and acting on the need to fund local community initiatives; (3) protecting claims and rights of aboriginal people or local community; (4) showing concern for visual aspects of the firm's facilities and operations; (5) communicating environmental impacts and risks of the firm's actions and activities to the general public; (6) considering interests of stakeholders in investment decisions by initiating formal dialogues; (7) committing to non-profits; (8) contributing to local community; (9) benefiting the community; (10) charitable donations; and (11) active corporate giving. The highest score for good performance measured by each item is seven, and the lowest is one. Our pre-tests showed that this instrument had a reliability alpha of 0.90.

2) *Independent Variables:*

We measured ITE using an instrument developed by Tallon (2008). This instrument has four items: (1) "Our IT personnel are encouraged to improve their technical skills," (2) "Our IT personnel can quickly develop solutions to business problems," (3) "Our IT personnel are adept at multi-tasking," and (4) "Our IT personnel are trained in a variety of programming methodologies and tools." Again, the highest score for good performance measured by each item is seven, and the lowest is one. Our pre-tests showed that this instrument had a reliability alpha of 0.90. Firms' IT managers responded to these items.

On the other hand, we measured firms' organizational identity with two sets of data. First, we invited select firms' managers to respond to a set of items by grading given items (adapted from the GLOBLE study measuring collectivistic and individualistic organizational cultures) on a Likert scale (House et al. 2004). These items included: 1) The pay and bonus system in this organization is designed to maximize (individual/collectivism); 2) In this organization, leaders

encourage group loyalty even if individual goals suffer (strongly disagree/agree); 3) This organization shows loyalty to its employees (strongly disagree/agree); 4) In this organization, employees take pride in accomplishments of their organization (strongly disagree/agree); 5) In this organization, personal influence depends on contributions to the organization (strongly disagree/agree).... (See House et al. 2004 for details of this instrument). The aggregated score from the items was used as the measure of collectivistic identity. On the other hand, reversed aggregated score of the items was used as the measure of individualistic identity. We conducted pre-tests of these scales and found they both had a reliability alpha higher than 0.8. At the same time, we also asked IT managers to respond to another set of items, which measured the dimension of relational identity. These items were adapted from an instrument originally developed for testing interfirm relationships (Zhou et al. 2008), which included such items as 1) Our company is very active in searching for partners in business; 2) Our company is very active in searching for opportunities for strategic alliances; 3) Our company is very active in searching for different approaches to build relationships in business co-operation; 4) Our company is working hard to maintain our current relationships in joint ventures and alliances. Our pre-tests showed that this instrument had a reliability alpha of 0.85.

Second, to test a given firm's organizational identity, we collected another set of data from the stakeholders outside the firms. Specifically, for a given firm in a local community, we asked local stakeholders such as firms' customers, shareholders, and even local government officials monitoring the firms, to state their impressions about the firms by giving us some key words reflecting the firm's characteristics. To help these local people find the right key words, we provided a list of key words as examples for their references, such as "very aggressive in competition", "a high sense of social responsibility" and "very good at handling *Guanxi*." Based on these key words, two research assistants, not knowing the purpose of their tasks, were invited to code the key words along three dimensions according to discussions about the three organizational identities. Coding scores ranged from one to seven. For instance, if a firm got a key word of "very aggressive in competition," the firm would get seven marks on the dimension of individualistic identity. If the firm got only "aggressive in competition", it would get five marks on individualistic identity. If nothing about aggressiveness or competitiveness was mentioned, the firm got zero or one mark on this count. If there was a major difference in coding for a given firm, we asked the two research assistants to discuss the issue with each other and reach a consensus in coding. As a result, inter-rater correlations for the three dimensions of codings, i.e., the codings for individualistic, relational and collectivistic dimensions, were high, ranging 0.91, 0.92 and 0.91, respectively.

The reason to have two sets of measures for organizational identity is that internal and external organizational identities may be different. According to research on organizational identity and organizational image, identity and image are closely related to each other (Dutton and Dukerich 1991; Gioia and Thomas 1996). One reason is that when insiders

hold organizational perceptions or shared organizational identity dissonant with the outsiders, the insiders are likely to be motivated to resolve the dissonance (Duimering and Safayeni 1998; Maclean and Behnam 2010). As a result, the similarity between internal and external identity should increase over time. However, extant research has also suggested that the dissonance may still exist (in varying degrees), which should cause tension for insiders and influence their behaviors and decisions to solve the dissonance. Considering the existence of this dissonance as well as the process of decreasing dissonance, in our current study, we have used ratings from outsiders as the principal measure of the identity while controlling for the effect of dissonance between firms' internal and external identities. The major advantage of this approach is that it helps reduce the threat of common method bias among independent and dependent variables.

3) Control Variables:

We controlled for effects of other variables that may influence the relationship between ITE and performance in sustainable development. These included 1) ownership of a given firm (i.e. state-owned or private), 2) for how many years the firm had been using IT, 3) for how many years the firm had been using IT for business activities, 4) firm location, 5) a firm's sub-industries, 6) firm size, and 7) information intensity in a given firm. The seventh control variable was measured by using four items adopted from Karimi et al. (2007): (1) "Our production/service operations require a significant amount of information processing," (2) "There are many steps in our value chain that require frequent use of information," (3) "Information used in our production/services operations needs frequent updating," and (4) "Information constitutes a large component of our product/service to customers." Here the highest score for good performance in each item is seven, and the lowest is one. Our pre-tests showed that this instrument had a reliability alpha of 0.87. Finally, in our regression analyses (conducted later), we controlled for effect of dissonance between internal and external identities. For a given dimension of identity orientations, the dissonance was computed on the basis of the aforementioned measures and calculated with the following formula.

Identity dissonance = square of (rating of outsiders – rating of insiders).

IV. RESULTS

Table 1 presents descriptive statistics and correlations of all variables. The correlation matrix shows that because our data are from three sources, multicollinearity does not threaten the validity of the data (Note that the three organizational identity orientations do not have significant correlations). This result supports the findings by Brickson (2005) about convergent and discriminant validities of the three constructs' identity orientation at the organizational level. [Insert Table 1 about here].

For the social dimension of sustainable development, Table 2 presents four models for testing the proposed hypotheses. Model 1 is the basic model that includes effects

TABLE 1 DESCRIPTIVE STATISTICS

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1 Industry Type	3.49	1.05											
2 Firm size	4.62	1.50	-.20**										
3 Ownership Structure	1.83	1.36	.01	.32**									
4 Length of IT Function	9.55	5.99	-.06	.08	-.17*								
5 Length of IT Purpose	8.94	6.12	-.02	.11	-.08	.12							
6 Proportion of IT use	53.34	30.82	.09	-.11	.03	.06	-.04						
7 Individualistic-identity	2.65	2.61	.01	-.13	-.09	.07	.10	-.02					
8 Relational-identity	3.73	2.43	.11	.21**	.22**	.06	.06	.08	.05				
9 Collectivistic-identity	4.01	2.45	.16*	.01	.02	.13	.11	.00	.11	.10			
10 ITE	5.08	1.23	-.05	.20**	-.02	.18**	.11	.22*	.04	.03	.09		
11 Social development	5.33	.97	-.03	.30**	.08	.09	.04	.03	.06	.07	.15	.45**	
12 Environmental development	5.07	1.26	.01	.22**	.09	.18**	.15*	-.04	.02	.13	.09	.40**	.71**

TABLE 2 THE EFFECTS OF ITE AND COLLECTIVISTIC-IDENTITY ON SOCIAL DEVELOPMENT AND ENVIRONMENTAL DEVELOPMENT

	Social Development				Environmental Development			
	M1	M2	M3	M4	M5	M6	M7	M8
Control Variables								
Industry Type	.04	.04	.04	.03	.06	.07	.07	.06
Firm size	.32***	.22***	.22**	.22***	.19*	.10	.08	.09
Ownership Structure	-.01	.02	.02	.01	.06	.09	.07	.06
Length of IT Function	.13	.07	.07	.05	.17	.11	.11	.09
Length of IT Purpose	-.08	-.07	-.07	-.07	.01	.02	.03	.03
Proportion of IT use	.06	-.04	-.04	-.03	-.04	-.13*	-.13	-.12
Dissonance between internal and external Identities	-.03	-.03	-.02	-.02	.04	.04	.03	.03
Independent Variables								
ITE		.41***	.41***	.16		.39***	.39***	.10
Collectivistic-identity			.03	.69**			.12	.91***
Interaction ITE*Collectivistic-identity				.35**				.58***
R ²	.11	.25	.35	.38	.08	.21	.42	.46
ΔR ²	.11	.14	.00	.08	.08	.13	.01	.07
F	4.06***	9.91***	8.66***	8.82***	3.02**	7.85***	7.36***	8.08***
ΔF	4.06***	40.37***	.21	7.81**	3.02**	33.96***	3.33	10.99***

NOTE: * P ≤ .05; ** P ≤ .01; *** P ≤ .001

of all control variables. Model 2 is concerned with effect of ITE. Model 3 deals with effect of a collectivistic identity orientation. Finally, Model 4 focuses upon interaction effects between ITE and collectivistic orientation. Following past research (e.g., Aiken and West 1991), we first standardized the data before conducting regression analyses.

Table 2 shows results of the analyses. Results from Model 1 indicate that both firm size and information intensity have significant and positive effects on firm performance in sustainable development. Larger firms may be more likely than smaller ones to perform better on this dimension of sustainable development ($\beta = 0.32, p < 0.001$). On the other hand, effects of other control variables are not significant. We provide explanations for these findings in the next section. [Insert Table 2 about here]

Model 2, which tests Hypothesis 1 (H1), shows a significant and positive effect of ITE on sustainable development performance ($\beta = 0.41, p < 0.001$). This result supports H1, which predicts that a firm's ITE should have a positive relationship with its performance in sustainable development.

Model 3, however, shows no significant coefficient for a collectivistic identity orientation. In other words, empirical data fail to support H2, which predicts that a firm's collectivistic identity orientation should be positively related to its performance in sustainable development. This model was not significantly improved either after incorporation of the collectivistic orientation.

Finally, Model 4, which tests Hypothesis 3 (H3), shows a significant and positive coefficient for the interaction between ITE and the collectivistic orientation ($\beta = 0.35, p < 0.01$). Specifically, the results suggest that the positive effect of ITE is more likely to be observed if the level of collectivistic identity orientation is high (see Fig. 1).

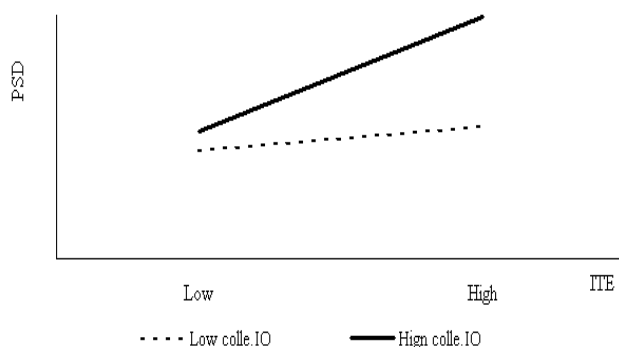


Figure 1 The Moderating Effect of Collectivistic Identity Orientation (Colle. IO) on the Relationship between ITE and Performance in Sustainable Development (PSD)

Notes: * $p \leq .05$; ** $p \leq .01$ (two-tailed).

With a similar approach, we also tested effects of ITE and identity on the environmental dimension of sustainable development (see Table 4). The results show a significant and positive effect of ITE on this dimension of sustainable development ($\beta = 0.39, p < 0.001$). There is also a significant and positive coefficient for the interaction between ITE and

the collectivistic orientation on performance in sustainable development ($\beta = 0.58, p < 0.001$).

To understand the effects of the other two dimensions of organizational identity orientation – that is, individualistic and relational – we conducted regression analyses of these two dimensions, similar to those for the collectivistic identity orientation. Table 3 shows effects of individualistic orientation. While effects of other variables remained basically unchanged, this orientation had neither a significant direct effect (see Model 3 in Table 3) nor a significant moderating effect (see Model 4 in Table 3). We discuss the implications of this finding in the next section. [Insert Table 3 about here]

Table 4 shows effects of the relational identity orientation. This dimension of organizational identity led to some surprising results. Specifically, the relational identity has not only a significant and positive moderating effect on the relationship between ITE and the social dimension of performance in sustainable development ($\beta = 0.15; p < 0.05$), but also a significant and negative direct effect on performance in sustainable development related to environmental protection ($\beta = -0.13; p < 0.05$). We discuss implications of these results in the following section. [Insert Table 4 about here]

V. DISCUSSION, IMPLICATION, AND FUTURE STUDIES

This study has obtained empirical data on several issues that previous research has not tested sufficiently. Firstly, it shows that a firm's ITE does positively influence its performance in sustainable development. Assuming other conditions are equal, the better a firm's ITE, the better its performance (in sustainable development) is likely to be. The reason can be that, as discussed above, IT effectiveness enables a firm to understand internal and external environments better and to develop and implement strategies for sustainable development more effectively. Also, IT effectiveness may have a positive relationship with more advanced technologies, which normally are more socially and environment-friendly.

Secondly, larger firms are more likely to do better than smaller firms in sustainable development, which is true at least for manufacturing firms in China. There may be three reasons for this finding. One is that, since larger firms are monitored more closely by the government and communities in China, they are forced to show better performance in sustainable development. Another reason is that larger firms may also have more financial and technological resources to perform better. The third reason is that firms with different sizes received different levels of attention from the general public or their communities (Jiang and Bansal 2003), and large firms get a high level of attention, which may motivates or triggers the firms to achieve better firm performance in sustainable development. Because of all these, firm size should have a positive relationship with firm performance in sustainable development.

The most important findings of our current study are the effects of organizational identity orientation. On the one hand, a collectivistic identity orientation has a significant

TABLE 3 THE EFFECTS OF ITE AND INDIVIDUALISTIC-IDENTITY ON SOCIAL DEVELOPMENT AND ENVIRONMENTAL DEVELOPMENT

	Social Development				Environmental Development			
	M1	M2	M3	M4	M5	M6	M7	M8
Control Variables								
Industry Type	.04	.04	.04	.04	.06	.07	.07	.08
Firm size	.32* **	.22***	.22**	.22**	.19*	.10	.08	.09
Ownership Structure	-.01	.02	.02	.02	.06	.09	.07	.08
Length of IT Function	.13	.07	.07	.07	.17	.11	.11	.11
Length of IT Purpose	-.08	-.07	-.07	-.07	.01	.02	.03	.03
Proportion of IT use	.06	-.04	-.04	-.04	-.04	-.13*	-.13	-.13
Dissonance between internal and external Identities	-.03	-.03	-.03	-.02	.05	.05	.04	.04
Independent Variables								
ITE		.41***	.38**	.38**		.39**	.37**	.37* *
Individualistic-identity			.05	.05			.11	.11
Interaction								
ITE*Individualistic-identity				-.01				.04
R^2	.11	.25	.25	.25	.08	.21	.22	.22
ΔR^2	.11	.14	.00	.00	.08	.13	.01	.00
F	4.06 ***	9.91***	8.66** *	7.66***	3.02**	7.85***	7.36** *	6.58 ***
ΔF	4.06 ***	40.37** *	.21	.01	3.02**	33.96** *	3.33	.48

NOTE: * $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$

TABLE 4 THE EFFECTS OF ITE AND RELATIONAL-IDENTITY ON SOCIAL DEVELOPMENT AND ENVIRONMENTAL DEVELOPMENT

	Social Development				Environmental Development			
	M1	M2	M3	M4	M5	M6	M7	M8
Control Variables								
Industry Type	.04	.04	.04	.02	.88	.07	.07	.07
Firm size	.32***	.22***	.22**	.22**	2.58*	.10	.08	.08
Ownership Structure	-.01	.02	.02	.01	.06	.09	.07	.07
Length of IT Function	.13	.07	.07	.05	.17	.11	.11	.10
Length of IT Purpose	-.08	-.07	-.07	-.07	.01	.02	.03	.03
Proportion of IT use	.06	-.04	-.04	-.03	-.04	-.13*	-.13	-.12
Dissonance between internal and external Identities	.04	.03	.02	.02	-.06	-.05	-.05	-.04
Independent Variables								
ITE		.41***	.42***	.38** *		.39***	.38***	.39* **
Relational-identity			-.04	-.05			-.12	- .13*
Interaction								
ITE*Relational-identity				.15*				-.07
R^2	.11	.25	.25	.27	.08	.21	.22	.33
ΔR^2	.11	.15	.00	.02	.08	.13	.01	.08
F	4.06***	9.91***	8.67***	8.22* **	3.02**	7.85***	7.36***	6.65 ***
ΔF	4.06***	40.37***	.21	3.78	3.02**	33.97***	3.33	.99

NOTE: * $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$

moderating effect on the relationship between ITE and performance in sustainable development. Firms with a high level of collectivistic organizational identity are more likely to do better in sustainable development. This result is consistent with the theory or views regarding collectivistic organizational identity orientation, which we have discussed above.

On the other hand, relational identity orientation has some significant but surprising effects. On the social dimension of sustainable development, the relational identity has a significant moderating effect. This result suggests that firms with a high level of relational identity may also pay more attention to the building of their social networks by contributing more to relevant local communities. Different from the motives of those with a collectivistic identity, firms with relational identity may make greater contributions to the society mainly for building or strengthening their current connections or relationships, which can be seen as part of their work related to public relations. On the environment dimension of sustainable development, however, our study found a negative direct effect of relational identity on performance in sustainable development. This result is unexpected but explainable, given that this study was conducted among a sample of firms in China, which is a country where connections, or *Guanxi*, are very important for doing business. Firms with relational identities, especially in China, may try very hard to build good *Guanxi*, but may not pay much attention to sustainable performance, such as environmental protection. This may be especially true if their business partners also pay no attention to issues related to sustainable development. Worse, some firms with good relationships with government organizations may even cause heavy environmental pollution without punishment. In other words, their good relationships with the relevant government organizations may protect these firms, even if the firms are not environment-friendly or are even causing heavy environmental pollution.

All these findings regarding collectivistic and relational orientations highlight the importance of identity orientation in the study of IT management, and help to overcome a weakness in the past studies on the relevant issues. Specifically, past research has found that a firm's IT capabilities and effectiveness can have positive effects on many dimensions of firm performance, such as financial, marketing and environmental protection performance (e.g., Melville et al. 2004; Stoel and Muhanna 2009). Extant research has, however, not considered sufficiently the effects of organizational identities on these dimensions of performance. Our study shows that effects of the identity orientation should be given more consideration.

In summary, all the findings above actually suggest a theoretical model in which the identity orientations is functioning as an important contingent factor influencing the relationship between IT effectiveness (ITE) and firm performance in sustainable development. A) Given an individualistic identity, ITE may not have any significant and consistent relationship with performance in sustainable development. In other words, if a firm stresses market competitiveness and profits only, it may be more likely to take

advantage of its IT resources to maximize its profits so that it can achieve better financial performance. Given the competing demands for resources, this firm may be less likely to make full use of its IT capability for such sustainable developments as environmental protection and other contributions to the society.

B) With a relational identity, a firm is more likely to do well on some dimensions of sustainable development, such as the dimension of social development, but not necessarily on the dimension of environmental protection. Our current study shows empirical evidence supporting this argument. The reason seems to be that the relational orientation pays more attention to the accumulation and development of social capital or relationships, which results in better firm performance on the dimension of social development. At the same time, the dimension of environmental protection may not be very important to the firms with this orientation so that they will use less resource, including their IT capability, to improve their performance in environmental protection. Moreover, in a culture such as China today, the performance in environment protection may not be very important either to these firms so long as they can main good relationships or *Guanxi* with their major stakeholders, especially government officials who are monitoring the performance of these firms.

Finally, C) firms' collectivistic identity not only has a direct effect on their performance in sustainable development, but also a significant moderating effect on the relationship between the IT effectiveness and performance in sustainable development. Our current study provides empirical evidence supporting these effects, which shows the significance of studying collectivistic identity when considering the issue how IT effectiveness may influence their performance in sustainable development. We believe that the development of IT management research and its contribution to sustainable development can be improved by making more efforts to integrate the researching findings about organizational identity,

A. Implications

For academic researchers, our results show that more comprehensive investigations need to be conducted in the future for testing factors or variables that may influence the relationship between firms' IT resources and their performance in sustainable development. One such variable is organizational identity orientation. Past research has paid insufficient attention to the effect of this variable and its interactions with other variables. Our findings suggest that this variable could have a very important influence on the explanatory power of the regression equations. Without considering the effect of this variable, effects of many other relevant variables may not be significant.

The results of our study also have useful implications for managerial practitioners, especially those with effective IT management. If a firm wants to adopt a strategy of sustainable development, it may need to establish a collectivistic identity, which would influence its stakeholders in internal and external environments. As our findings suggest, with such an identity, a firm's ITE is more likely to have a positive relationship with its performance in sustainable development.

If a firm has an individualistic identity, however, its ITE may not be very helpful in this respect.

B. Future Studies

Further studies can be conducted to further test the impacts of other dimensions of IT resources/capabilities such as firms' technical IT assets and IT-business partnership, on firm performance in sustainable development. In addition, similar studies can be conducted in other settings. In this study, we focused on firms in manufacturing industry only to test our hypotheses above. On the other hand, firms in different industries can face different environmental conditions, which may influence the results of the research. Future studies are needed to assess the external validity of our results. Lastly, this study focused only two dimensions of performance in sustainable development, namely social and environmental dimensions. Future studies may expand our model to consider other relevant CSD dimensions such as technological (Hill and Bowen 1997) and institutional (Labuschagne et al. 2005) dimensions.

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