Green competence framework: evidence from China

Article (Accepted Version)

Green competence framework: Evidence from China

Article *in* The International Journal of Human Resource Management · April 2015

DOI: 10.1080/09585192.2015.1047394

4 authors:

Nachiappan Subramanian
University of Sussex
83 PUBLICATIONS **882** CITATIONS
SEE PROFILE

Muhammad Abdulrahman
University of Nottingham, Ningbo Campus
23 PUBLICATIONS **147** CITATIONS
SEE PROFILE

Lin Wu
Sino-British College
5 PUBLICATIONS **10** CITATIONS
SEE PROFILE

Prithwiraj Nath
Leeds Beckett University
10 PUBLICATIONS **4** CITATIONS
SEE PROFILE

Green competence framework: Evidence from China

Abstract

Recently Human Resources Management (HRM) functions such as recruitment, selection, training and performance evaluation are expected in considering environmental management (EM) issues. Environmental protective acts with adequate ecological knowledge and socio-economic behavior and skills are referred to in this paper as green competencies. However, a systematic approach for developing and understanding key factors that enhance individuals' green competencies is lacking. This study contributes to green human resource literature by integrating environmental consumer behavior literature with traditional skills and competencies literature to help firms to select the right individuals to achieve their environmental goals. Using Robert's competencies framework and structural equation modeling (SEM), this paper empirically examines the influence of individual green competencies on organizations' green practices and performance objectives. Our model is tested using a sample of 1,230 employees working in key industries in the Chinese coastal city of Ningbo. The results indicate that acquired green competencies are more positively associated with individuals' green competencies and green behavior. The study empirically demonstrates that verifying acquired green competence attributes such as environmental knowledge, green purchase attitude and intention during employee selection would certainly be helpful for firms to identify individual green performance potential.

Keywords: Green Competencies, Green Performance, Human Resources Management, Environmental Management Practices, China

1. Introduction

Environmental research categorically shows that industrial pollution is a major threat to sustainability in the modern world (Xiang, Stuber and Meng 2011). Therefore, attempts to improve sustainability through product and process redesign, and strategic environmental plans have become the focus of industrial activities in firms and at the government-level (Jabbour et al. 2008; Jackson, Renwick, Jabbour and Muller-Camen 2011; Jabbour et al. 2014). However, extant research highlights that firms' intentions to adopt environmental practices and achieve sustainability is often influenced by certain drivers and barriers. For example, research suggests that stakeholder pressure, attainment of green certifications (such

as ISO 14001), and adoption of environmental management system (EMS) are some of the principal drivers that improve firms' quests to improve sustainability (Marcus and Fremeth 2009; Jabbour et al. 2013; Yang, Lin, Chan, and Sheu 2010). Such drivers not only facilitate firms' abilities to meet environmental targets but also positively influence their financial performance (Jacobs, Singhal and Subramanian 2010). However, a majority of firms still consider environmental initiatives as a burden on their profit potentials and adopt short-term compliance strategies to meet targets set by the regulatory authorities (Marcus and Fremeth 2009).

Research often adopts different approaches to explore the issues related to sustainability. For instance, the operational process view (Input/process/output) is widely used to understand causes for environmental degradation. This stream of research focuses on processes such as lean practices, eco-efficiency improvement, carbon foot print reduction, certification and outputs such as metrics development, triple bottom line indices development, performance reporting and monitoring. Another stream of research explores challenges that arise from overproduction, urbanization and demographic changes (Xiang, Stuber and Meng 2011; Vadiati and Kashkooli 2011; Wang, Qian, and Yu 2013). These studies generally use sustainability indices such as socioeconomic development, environmental impact, institutional capacity, ecological and environmental potential indices as popular tools for both monitoring progress toward sustainable development and formulation of efficient policies.

Surprisingly, studies that centered on one of the important elements responsible for the worsening of the natural environment within institutions holds the key to environmental protection; humans as individuals, have been very scarce. This is because the damaging environmental impact we are witnessing today alongside global economic development is due to human activities (Kinnear, Taylor and Ahmed 1974; Grunert 1993; Gan et al. 2008). Recent studies have identified the role of human resources management (HRM) as an entity in supporting and promoting the adoption of environmental protection practices (Renwick, Redman, and Maguire, 2013; Jabbour, C.J.C., 2013; Jabbour, Santos and Nagano 2010; Sarkis, Gonzalez-Torre and Adenso-Diaz 2010).

Studies suggest that major enablers of professional competencies include individual characteristics, behaviours, skills, knowledge, attitudes, self-reflection, beliefs, and employee satisfaction, amongst other factors (Birdir and Pearson 2000; Horng, et al. 2011; Zhao et al.,

2014; Wagner, 2014). These individual characteristics are critical to the successful implementation of any green practice and/or policy in a firm. It is not surprising therefore that the critical role of environmental training in achieving success in environmental management, conservation and recycling of resources has been highlighted (Jabbour, 2013). Therefore, to effectively align its practices of recruitment, selection, training and performance evaluation with environmental protection practices, HRM needs to understand as well as to reasonably be able to predict employee's green involvement and green competencies. This would enable effective integration of green issues with HRM practices and to achieve effective Green Human Resource Management (GHRM) (Renwick, Redman and Maguire 2008).

The importance of green human practices for environmental protection and the role of green consumer behavior are often highlighted in HRM and marketing literature. However, very few studies attempt to integrate green consumer behavior with human resources skill development and their combined effect on green performance. Hence, this study bridges the gap by integrating consumer behavior with human skills and competencies literature to develop a conceptual model to identify a competent green individual.

In addition to the above, to the best of our knowledge, there are no large scale empirical studies on China that have explored the green competencies of individuals that would enable the prediction, sensitization and strategic management of such individuals to enhance firms' environmental protection efforts and environmental friendliness. Previous studies mainly focused on the developed and industrialized world (Ramus, 2002; Sarkis et al. 2010; Wagner, 2013; Wagner, 2014) and it is hard to find any study with respect to China (Tan and Lau 2010; Zhao et al., 2014). This is despite China being the world's most seriously polluted country in regards to automobile and industrial emissions coupled with a huge population (TIME, 2007; Tan and Lau, 2010). Precisely the dearth of research on people's green competencies that contributes to the enhancement (or otherwise) and sustainability of a firm's greenness is a key motivator for this paper. Understanding people's green competencies will be particularly useful not only for developed countries but also for emerging economies such as China, who are now keen towards a green movement in the face of experiencing environmental degradation for a long period of time (Tan and Lau, 2010; Tantawi et al. 2009; Zhao et al., 2014).

This study develops a green competencies framework for the individual/employee and simultaneously attempts to evaluate these green competencies by examining the relationship between 'natural' and 'acquired' green competencies of people with green performance, based on Roberts's (1997) competency framework. By developing and testing the green competencies framework, the study helps to understand the tight alignment of HRM with the given green business operations objectives of a firm.

The rest of this paper is organized as follows: Section 2 of the paper provides a brief review of extent literature with respect to green human resource management, types of green competencies and green performance. Section 3 explains the conceptual model and the hypotheses of our study. Section 4 presents the methodology and sample characteristics of the research. Section 5 reports the results and discussion. The last section summarizes the major findings and implications.

2. Literature review

2.1. Green Human Resource Management and Green Competencies

Green Human Resource Management (GHRM) becomes problematic if firms try to solve green challenges on an adhoc basis. For example, firms often use bits of technology and other isolated environmental management solutions without necessarily bringing in organizational changes. This leads to suboptimal green performance (Wagner, 2014; Renwick, Redman, and Maguire, 2013; Jabbour, 2013). This is even further reinforced by employees increasing environmental consciousness and their subsequent demand and expectation from employers to incorporate environmental issues in the form of corporate social responsibility practices in their workplace (Ramus, 2002; Crane, Matten, & Moon, 2008). This is not surprising given that past studies have long attributed a worsening global natural environment with economic development all over the world and human activities (Kinnear, Taylor and Ahmed 1974; Grunert 1993; Gan et al. 2008). Indeed, it is reported that about 40% of environmental problems have been caused by human activities, in terms of their behavior, production and consumption patterns (Grunert 1993; Gan et al. 2008).

While the environmental initiatives of a firm influences its employees' green behavior beyond their individual behavioral motivation (Ramus, 2002; Chou, 2014), adopting green

practices depends on both the firm's position and its explicit strategy towards tackling environmental issues and on its employees' alignment with and support for environmental protection (Ramus, 2001; Ramus, 2002; Ramus and Killmer, 2007; Chou, 2014). In fact, Sweetman (2007) opined that irrespective of the quality and comprehensiveness of a firm's environmental policy and designed practices nothing substantial will be achieved without the active support of employees across the organization. This has now resulted in the realization that a firm can become green only if it has a workforce with substantial green skills and green competencies (Ramus, 2002; Gunasekaran and Gallear, 2012; Jabbour, 2013; Jabbour et al., 2015) resulting in the increasing quest to understand GHRM. In fact to achieve true and lasting environmental sustainability, the literature proposes that innovative fusion of GHRM and green supply chain management (GSCM) practices and policies is needed (Jabbour and Jabbour, 2015). This is substantiated with the findings that the greater the degree of alignment between HR and environmental issues the higher would be the adoption of green practices by firms (Renwick, Redman and Maguire 2008; Bohdanowicz, Zientara and Novotna, 2011; Wagner, 2013).

Competencies are the behaviors and attitudes required of people to do their job effectively (Wood 1997; Brownell 2008; Zopiatis 2010). Extant literature suggests that professional competencies include individual characteristics, behaviours, skills, knowledge, attitudes, self-reflection, personal factors, values and beliefs (Horng et al. 2011). These listed competencies were noted to contribute significantly to career success (Birdir and Pearson 2000; Horng et al. 2011). Recently, competency research models have been widely used to determine and align individual capabilities, knowledge, skills, attitudes, behaviors, habits, abilities and personal characteristics with organizational performance core competence in different fields (Çizel, Anafarta and Sarvan 2007; Zopiatis 2010).

Past studies on HRM have attempted to identify individuals' traditional competencies and subsequent selection for specific positions in organizations since Robert Wood's (1997) seminal work on "Working in Hotel and Catering" on the competencies needed for the profession of "chef" (Jauhari 2006; Brownell 2008; Zopiatis 2010; Wagner, 2013; Jabour et al., 2015). A major issue in GHRM is the identification of key green competencies (GC) of potential employees. GC competencies are considered an important practitioner topic that has not received attention from researchers.

GC are the requisite ecological knowledge, skills and other socioeconomic behavior an individual has to help him/her behave and act rightly and responsibly towards the overall well-being of his/her immediate environment. Understanding GC of individuals can significantly enhance the GHRM role in its functions such as hiring and training employees towards green objectives of firms. This is because GC motivates individuals to always ensure they only engage in resource-conserving and environmentally-friendly activities. We believe that such self-motivating competencies, collectively, will ensure the World Commission on Environment and Development (WCED) requirement for a 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED 1987).

Studies in the field of consumer psychology and green consumerism have attempted to identify the characteristics of environmentally-conscious consumers through their ecological attitude-knowledge as early as the 1970s (Kinnear, Taylor and Ahmed 1974; Dunlap and Van Liere 1978; Zho et al., 2014). In their study to identify the characteristics of environmentally-conscious consumers in Canada, Kinnear, Taylor and Ahmed (1974) -were first to put forward the concept of perceived consumer effectiveness. They found that personality variables were better predictors than the socioeconomic variables. Other scholars found individual personal attitudes and beliefs to be significant in predicting green behavior (in term of their purchases) (Gan et al. 2008; Fraj and Martinez 2007a; Chan, 2001). Other than environmental knowledge, attitudes and values of individuals have been found to be major factors that influence green competencies (Ramayah, Lee, and Mohamad, 2010; Zho et al., 2014). For example, Chinese consumers are rather insensitive to environmental issues (Tantawi et al. 2009; Tan and Lau, 2010). Even in the more developed parts of China such as Hong Kong, people are just at the stage of green awakening (Lee, 2009). This insensitivity exists despite China having 16 of the world's 20 most seriously polluted cities and being coined 'the world's manufacturing factory.'

Extant literature on green behavior is mostly based on two established theories; the theory of reasoned action (Ajzen and Fishbein, 1980) and the theory of planned behavior (Ajzen, 1991). However, Roberts (1997) suggested viewing competencies in four categories: 'natural', 'acquired', 'adapting' and 'performing' competencies to solve organizational problems. Robert's framework is regarded as a practical way of incorporating both concepts of competencies (in the US) and output-type of competences (in the UK) as the four clusters

that can be used at different stages of HR cycle of selection, performance management and development (Cousins 2002). This study adopted Robert's (1997) framework to the green context and the definition of different types of green competencies and green performance are explained in table 1.

Insert Table 1 about here

2.2. Natural green competencies (NGC)

The natural green competencies (NGC) of people are the underlying traits and personality dimensions of the individuals. Basically, natural competencies are generally derived from individuals' observations and mentoring received at their formative stages on the dominant green behavior of their immediate social groups such as parents, relations and friends. This mimetic behavior develops the natural feeling of environmental concern, which without additional acquired green competencies, may be the only determinant of one's long-term green behavior. Studies suggests that employees' motivation to engage in green behaviour is partly based on their individual personal predisposition and environmental values (Ramus and Killmer, 2007; Pichel, 2008). When employees' environmental values match that of the organization, the employee will respond positively and experience greater job satisfaction (Hoffman, 1993; Chou, 2014). The logic of this study is that the natural competencies and personal commitments of employees will make it easier for organizations to activate their green behavior through mild-persuasion compared to the prevailing rigid organizational policies, practices and/or regulatory demands.

NGC competencies are difficult to develop because it is a slow process but individual possessing such NGC can be identified and easily assessed through personality questionnaires as suggested by Roberts (1997), based on individuals strong attitude and inclination towards greener activities and environmental concern (EC). According to Yeung (2004), environmental concern (EC) is "an attribute that can represent a person's worries, likes and dislikes about the environment'. Similarly, Kim and Choi (2005), describe EC as "an individual's general orientation toward the environment and an individual's concern level as to environmental issues". Determining what people know about the environment, how they

feel about it and what actions they take (or would likely take) to help the environment is critical to establishing a sustainable green development (Tantawi et al. 2009). EC is therefore a general attitude that refers to the way people value environmental protection (Lee 2009). Tan and Lau (2011) think that the concept of EC is more often used to describe people's attitude towards the natural environment. Others believe that the concept of EC can refer to both general attitude towards the natural environment and attitudes towards any specific green behavior (Milfont and Duckitt 2004). From the above discussion, EC refers to the general attitude toward the environment. A specific attitude is regarded as a relatively stronger predictor of behavior on a particular attitude object, while a general attitude is the tendency for individuals to engage in relevant behaviors within a category of attitude objects (Tan and Lau 2011; Mainieri et al. 1997). As a result, a specific attitude, rather than general attitude, is better and more effective in predicting a specific behavior. The study used EC as a proxy in measuring the natural green competencies (NGC).

2.3. Acquired green competencies

Acquired green competencies are the green knowledge and skills that an individual has accumulated through previous experiences (Cousins, et al. 2008). This includes education, qualifications and professional knowledge on environmental issues that leads to individuals' strong convictions and feelings towards adopting and acting in environmentally friendly manner. Chou (2014) posits that formal education and training help to strengthen knowledge and impact of green behavior that enable individuals to adjust and internalize green behavior and/or green attitudes in general. In other words, the individual's environmental actions and behavior is guided by the acquired competences through learning and general information gained on environmental issues (Chou, 2014).

A key means of acquiring green competencies is environmental knowledge (EK). EK refers to "a general knowledge of facts, concepts and relationships concerning the environment and its major ecosystems" (Fryxell and Lo 2003). EK is "one's ability to identify or define a number of ecologically-related symbols, concepts and behavior" (Laroche et al. 2001). The acquisition of EK is considered as a precondition of the related behavior, and this has been found to be both true for simple and sophisticated behaviors (Frick et al. 2004). The acquisition of EK further enhances the adapting competencies of individuals. This refers to individuals' ability to accept changing environmental conditions.

EK consists of abstract knowledge (AK) (knowledge about the environmental issues, such as environmental problems, causes, solutions and so on) and concrete knowledge (CK) (knowledge that can be utilized or acted upon, such as factual knowledge) (Schahn and Holzer, 1990; Mostafa, 2007). It is generally believed that AK is more likely to influence green behavior (Tan, 2011a; Tanner and Kast, 2003).

While EK raises individual concerns and awareness, it does not necessarily result in behavioral changes (Zsóka, 20103; Tan, 2011a). Attitude however, defined as "an enduring set of beliefs about an object that predisposes people to behave in particular ways toward the object" (Weigel, 1983), results in behavioral changes. In fact, EK and pro-environmental attitudes are highly interrelated (Zsóka, 20103). The literature suggests, however, that a general attitude is relatively poor in predicting a specific behavior when compared with a specific attitude with a strong predictor of an appropriate kind of behavior (Tan, 2011a; Tan and Lau, 2011; Sun and Wilson, 2008; Mainieri et al. 1997). In an environmental context, an attitude towards green behavior (a specific attitude), refers to people's feeling and beliefs on adopting this specific environmentally-friendly behavior (Tan, 2011a).

According to Tan and Lau (2010), individuals will engage in green behavior such as green purchase only when it meets their primary needs and when they understand how a green product can contribute to the improvement of the environment. This explains why, for example, consumers who express concerns for the environment may not engage in the actual green purchase behavior (Laroche et al. 2002; Fraj and Martinez 2007a; Tan and Lau 2010; Tan and Lau 2011). As a result, we divide green attitudes into general (i.e., green purchase intention (GPI) and specific, (i.e., green purchase attitude (GPA)), and explore their relationships with green competencies respectively. We adopted environmental knowledge (EK), green purchase attitudes (GPA) and green purchase intention (GPI) as proxies to measure individuals' acquired green competencies. Individuals with superior adapting competencies will be able to accept, react to and cope with new environmental realities using their natural and acquired competencies.

2.4. Green performance

Green performance is the final output or observable behavior resulting from the combination of natural, acquired and adapting competencies. This study uses green purchase behavior (GPB) as a proxy for green performance. GPB is pro-environmental behavior in which a

person acts in an environmentally friendly manner or purchases and consumes only products that are environmentally friendly (Follows and Jobber, 2000; Tan, 2011b; Mainieri et al., 1997; Kaufmann, Panni and Orphanidou 2012). Green consumerism is a broad concept including environmental preservation, pollution minimization, responsible resource use, animal protection, and species preservation.

There is an argument in literature why GPB can be considered as a proxy for green performance. There is one stream of research that shows individual behaviour is significantly linked to job performance (Penney et al., 2011; Spector and Fox, 2005; Rotundo and Sackett, 2002). Using the theories of personality and performance, Penney et al. (2011), posits that the primary mechanism by which individual behaviour affects job performance is motivation. Their study argues that "personality traits are associated with broad intentions to pursue certain types of goals, and to the extent that those goals are congruent with job requirements, traits are likely to facilitate effective performance" (Penney et al., 2011, pg. 298). In line with the above, organizational scientists are in agreement that overall job performance are evaluated in terms of three broad dimensions such as task performance, contextual performance, and counterproductive behaviour (Penney et al., 2011; Rotundo and Sackett, 2002). Briefly, task performance refers to activities that directly or indirectly contribute to the organization's technical core (Borman and Motowidlo, 1997), while contextual performance contributes to organizational effectiveness and task performance through employees' behaviours such as volunteering, helping others, and possession of extra enthusiasm. The last aspect, counterproductive behavior, refers to employee's behaviors that could potentially harm the organization or its members (Rotundo and Sackett, 2002; Spector and Fox, 2005). Certainly, GPB can only be associated with the first two performance definitions.

There is another stream of research that considers individual employee's behaviours (such as work quantity and quality, job skills, and job knowledge) as proxy for task performance (Rotundo and Sackett, 2002; Campbell, 1990; Koopmans et al., 2011). Individual behaviors or actions that are relevant to the goals of the organization have also been used as a form of individual work performance (IWP) (Campbell, 1990, pg. 704). According to Campbell (1990), IWP depends on behaviours or actions that are under the control of the individual employees, excluding behaviours that are workplace constrained. This is similar to our use of

GPB which is totally outside the constraints of the work environment but directly in line with overall objective of the green and/or lean organisations.

GPB reflects the effective green behavior of individuals whose acts are based on their self environmental consciousness and convictions. Such individuals purchase only natural and eco-friendly products that use biodegradable packaging (Schwartz and Miller, 1991; Minton and Rose, 1997). Literature further suggests that such individuals would not participate in any form of activity that would harm the environment (Schwartz and Miller, 1991; Minton and Rose, 1997).

Such arguments are further substantiated with findings that suggest self-motivation and avoidance of negative environmental impact can be compared with lean behaviour of individuals (Emiliani, 1998). Individuals who exhibit lean behaviors resist any form of waste, in contrast with individuals with "fat" behaviors who easily participate in non-value added activities. More interestingly, Emiliani, (1998), posited that lean behaviour is positively associated with financial performance and quality of everyday life in the workplace.

Based on literature on individual behaviour and effective job performance, this study has suggested the use of GPB as a proxy for green performance as effective green behaviour of individuals (Schwartz and Miller, 1991; Minton and Rose, 1997; Albayrak, Caber, Moutinho and Herstein, 2011). The use of GPB as proxy for green performance enable GHRM managers to achieve their key objective of identifying and recruiting potential candidates with reasonable green commitment for a given position for their organization, without their prior engagement (Jabbour et al., 2010). This significantly eases GHRM practice of identifying and hiring of employees who are committed to the environmental protection and the greening organization through self-motivated engagement and support for the organisation's waste reduction/lean practices (Jabbour and Jabbour, 2015). Appendix A provides detailed literature items adopted in measuring the above the green competencies and green performance.

3. Conceptual model and Hypothesis development

A conceptual model linking natural, acquired and adapting green competencies to green performance, based on Roberts's (1997) framework, is shown in Figure 1. This study adopts environmental concern (EC) as the 'natural' green competency of individual. We also

consider the 'acquired' green competencies as combinations of individuals' environmental knowledge (EK), green purchase intention (GPI) and green purchase attitude (GPA). Briefly, the model relates to individuals' natural green competencies and acquired green competencies as a subset of effective green competencies with green performance.

Insert Figure 1 about here

We adopt EC as the individual's general attitude towards the natural environment in the current study. It is only when an individual is both concerned and worried about the his or her impact on the environment (Yeung, 2004) and generally oriented to positive environmental actions (Kim and Choi, 2005) than such individuals will likely help to prevent environmental degradation and be willing to engage in sustainable green development (Tantawi et al. 2009). EC is therefore a general attitude that refers to the way people value environmental protection (Lee 2009). It has been shown that this personal and/or general environmental norm (i.e. EC) positively predicts employees' energy conservation attitude and behavioral patterns in the workplace (Scherbaum, Popovich and Finlinson, 2008). As a general attitude, EC is considered to be a poor predictor of green behavior when compared with green purchase attitude, a specific attitude refers to as the way people value green products, which plays a more significant role in explaining green purchase behavior (Mainieri et al, 1997; Tan and Lau 2011). However, being more or less accurate in measuring an outcome does not negate the usefulness of a scale, especially where an approximation is sufficient. Based on the above, we hypothesize the following:

H1*: Natural competencies will play a positive role to mold an individual to adapt to the environment and to develop individual's effective green competencies.*

Past studies suggest that EK significantly predicts one's environmental friendly behavior (Hines, Hungerford and Tomera 1987; Wang, Liu and Qi 2014). The specific role of EK in determining green purchase behavior (GPB) is well established (Ramus, 2002; Tanner and Kast 2003; Fraj and Martinez 2007b; Jabbour, 2013; Wang, Qian, Yu, 2013). Specifically, Tanner and Kast (2003) found that EK is one of the key predictors of green purchase behavior and stated that an appropriate level of knowledge is absolutely needed for green purchase behavior. Similarly, Fraj and Martinez (2007b) found consistent evidence that

indicates EK is a predictor of green purchase behavior in their study of Spanish consumers. They provide evidence that the possession of related knowledge is necessary for the behavior. In other words, the more knowledgeable a person is in environmental issues the more he or she is likely to engage in GPB. Furthermore, GPI and GPA are components of green competencies that are acquired through learning and experience over time.

Studies advocate environmental training to enhance individuals' environmental knowledge and awareness (Sarkis et al. 2010; Jabbour, Santos and Nagano, 2010; Jabbour, 2013; Jabbour et al., 2015). Recent studies suggest that the motivation and training of employees not only positively impact firms' achievement of their environmental goals but also act as a major driver in achieving green maturity by firms (Renwick et al., 2013; Wagner, 2013; Jabbour 2013). In the context of Chinese firms, research finds firms that provide their employees with intense levels of training witnessed the most intense environmental sustainability performance (Ji et al., 2012; Liu et al., 2013).

What the above studies suggest is that it is highly uncommon for people to naturally have all components of competencies and thoughts regarding their environment and its management. For example, Chou (2014, p443) suggested that "formal education and training sessions strengthen knowledge of consequences that flow from a lack of green behavior and enable a behavioral adjustment that is helpful in establishing personal environmental norms and internalizing green behavior in general situations or with regard to specific tasks." Similarly, Ramus and Steger (2000) opined that creating and enhancing green competence through education, communication and incentives systems positively affect employees' green behavior. Following this argument, we hypothesize that:

H2: *Acquired green competencies will play a positive role to influence an individual to adapt to the environment and to develop individuals' effective green competencies.*

For effective alignment of HRM activities with EM objectives, acquired green competencies are more desirable compared with natural green competencies. This is because acquired competencies consist of specific attitudes, rather than the general attitude that natural competencies represent. Research finds that acquired competencies are a stronger predictor of behavior in a particular situation (Horng, et al. 2011; Tan and Lau, 2011; Sun and Wilson, 2008; Mainieri et al. 1997). This is because individuals have some level of natural competencies, depending on their immediate environment. However, these natural

competencies are significantly enhanced to a more advanced level by additional acquired competencies through environmental knowledge (EK), information and general awareness from training and exposure to related environmental issues, amongst others. This explains why employees living in large urban environments with exposure to various environmental problems, such as polluted air and water, noise pollution, and waste disposal problems have greater awareness than their counterparts in the countryside (Straughan and Roberts 1999; Mostafa, 2007; Barber, Taylor and Strict 2010). EK and general awareness of the negative impact of environmental degradation, a specific competence, leads to a more positive attitude towards environmental issues than natural competencies. Following the above analysis, we posit the following:

H3a: *Acquired green competencies are more strongly related to effective green competencies when compared with natural green competencies*

H3b: *Natural green competencies are less strongly related to effective green competences when compared with acquired green competencies*

H4: *Individuals' effective green competencies (natural plus acquired) are positively associated with his or her green performance*

4. Methodology

4.1 Survey instrument and data collection

Large-scale survey method was utilized in this study. The variables used in this study are based on well-established scales from previous studies. The main variables measured are: Perceived Environmental Knowledge (PEK) (Ellen, Eroglu, and Webb 1997; Mostafa, 2007), Perceived Consumer Effectiveness (PCE) (Kim and Choi, 2005), Environmental Concern (EC) (Kim and Choi, 2005), Green Purchase Behavior (GPB) (Mostafa, 2007; Lee, 2009; Kim and Choi, 2005), and Green Purchase Intention (GPI) (Lee, 2009; Kim and Choi, 2005). Appendix A provides the complete list of the scale items. All items' responses were measured based on a five-point Likert-scale that ranges from 1 = strongly disagree to 5 = strongly agree.

Back-translation method involving first translation from English to Chinese and then retranslation back to Chinese was employed to insure that no linguistic or cultural differences in the initial translation from English to Chinese was an issue (Bhalla and Lin, 1987). Although the scales were based on past studies, we nonetheless pre-tested the questionnaire with a sample of individuals (28) to ensure there are no issues with understanding, wording and formats of the instrument before they were distributed. Due to the nature of the survey and to enhance participants' accessibility, an abridged sample technique was utilized where any employee is a consumer and is able to participate in the study. The survey was conducted among employees residing in China's coastal city of Ningbo and working in automotive manufacturing, raw material extraction, IT, and other industries. The survey data was collected between June 2011 and January 2012. To overcome the general distrust of outsiders resulting in a low response rate to mail-based surveys in China (Zheng et al., 2006), intermediaries were used in the survey distribution. The researchers trained the intermediaries on the research objectives, questionnaire administration and confidentiality of responses.

Our study collected 1,230 valid questionnaires (1950 were issued), with a response rate of 63%. Following Faul et al. (2007) and Jabbour (2013), and despite our large sample size, we tested for the adequacy of the sample using G*Power 3.1.9.2 software (with a parameter effect size of 0.1 and power of 0.95) resulting in the requirement of sample size of 1073 as the minimum for the validity of the study. This indicates that our sample of 1,230 meets the minimum stated requirement in the literature.

Table 2 shows the profile of respondents. Among the 1,230 valid questionnaires used, 38.6% were from employees of automotive companies (including end-assemblers and tier-1 suppliers), 28.4% from raw material extractive industries (including iron, copper, lead, alunite and pyrophyllite), 22.3% were IT and hardware sector employees and 10.7% were employees in various offices of related industries. Automotive and raw material sectors are often criticized and subjected to intense focus as being overwhelmingly responsible for the environmental degradation in China (Geng et al., 2012; Zhao et al., 2014; Time, 2007). These sectors are amongst those experiencing increased pressure to become greener under China's circular economy policy (Geng, Sarkis and Xue, 2012; Gunasekaran, Jabbour and Jabbour 2014), forcing them to have internally well-developed environmental policies and initiatives to guide their workforce.

4.2 Nonresponse bias and common method bias

Following Armstrong and Overton, (1977), we assessed non-response bias by examining the differences in the mean scores (age and income of employees) between early (810) and late waves (420) of returned surveys. The t-test results showed no significant difference at the 0.05 level, indicating that response bias was not an issue with the survey data. As recommended by Podsakoff and Organ (1986), we further conducted Harman's single-factor test to assess common method bias. The result of the un-rotated factor loadings showed the factor with the largest eigenvalue accounted for 36.29% variance, that is, no factor accounting for over 50 percent of the variance; indicating that common-method bias is not a significant problem in this study.

_____

Insert Table 2 about here

_____

4.3 Data analysis and results

We employed structural equation modeling (SEM) approach to investigate the green competence model. We followed the two-step approach suggested by Anderson and Gerbing (1988) by first examining the measurement model and then the structural model to analyze the data, using AMOS 20 package. Measurement model, including convergent validity, discriminant validity and common method bias, as reported above, were assessed in order to ensure that all measures used in the analysis were reliable and valid.

Exploratory factor analysis (EFA) based on principal component analysis was conducted to identify the structure of the relationships between the scale items employed in this study. We used Varimax rotation of the EFA that captures the greatest information using the least number of factors. This approach helped minimize the number of variables with high loads in a factor, resulting in improved ability of the factor or construct interpretation. Table 3 shows Cronbach's alpha for all variables ranging from 0.73 to 0.92, indicating adequate reliability of our instrument (Nunnally and Bernstein, 1994).

Following from EFA, we carried out confirmatory factor analysis (CFA) to establish the convergent validity of the data used. Convergent validity exists when a group of scales measuring a single common factor, established by the statistical significance of the loadings at a given alpha, e.g., p = 0.05. A loading of 0.7 is suggested as a minimum level for item loadings on established scales (Fornell and Larcker, 1981). Our result indicates all items have higher loadings. Composite reliability (CR) and average variance extracted (AVE) were calculated using the procedures suggested by Fornell and Larcker (1981). Composite reliability (CR) for each of our constructs is above 0.70 and Cronbach's alpha values of all factors are well above the minimum recommended value of 0.70 (Nunally, 1978). Table 3 provides detailed values and indicates adequate convergent validity. This indicates all items in the study have their highest loadings on their respective constructs only, providing further support for discriminant validity.

_____

Insert Table 2 about here

_____

_____

Insert Table 3 about here

_____

4.4 Structural equation model and hypothesis testing

Figure 2 shows the results of our proposed hypotheses based on structural equation modeling while Table 4 presents the fit indices for the model. Based on the suggested cut-off fit indices shown in table 5, our model meets the minimum requirements (Relative chi square (χ2(df)= 590.562; Comparative fit index (CFI)=0.951; Root mean square error of approximation (RMSEA)=0.064 and incremental fit index (IFI)=0.840).

Overall, all our hypotheses are supported (see Figure 2). Detailed results for each of our findings are as follows: Our first hypothesis (H1) that natural competencies *played a positive role* (β=0.43, p<.001) *to influence an individual to adapt to the environment and to develop individuals' effective green competencies.* Individuals' acquired green competencies also played a significant positive role (β=0.89, p<.001) *to mold an individual to adapt to the*

environment and to develop individuals' effective green competencies. As predicted, H3a and H3b were supported as acquired green competencies have a strong relationship with effective green competencies (β=0.89, p<.001) when compared with natural green competencies (β=0.43, p<.001) and vice versa. Also, individual's effective green competencies (combined natural and acquired), H4, are positively associated with green performance as measured by employee's green behavior (β=0.99, p<.001). Overall therefore, all our hypotheses are supported and we provide detailed discussions of our results and its implications in the discussion section below.

_____

Insert Figure 2 about here

_____

_____

Insert Tables 4 and 5 about here

_____

5. Discussions

This study empirically demonstrates that, firstly, both natural and acquired green competencies of individuals are vital in shaping their overall effective green competencies. The findings of this study corroborate HRM literature, which suggests that individual characteristics, behaviors, skills, knowledge, attitudes, and self-reflection, amongst other personal factors, influence their competencies and professional performances (Brownell, 2008; Zopiatis, 2010; Horng, et al. 2011). Furthermore, our findings reveal that influences of individuals' natural and acquired green competencies on their overall effective green competencies are quite different. Acquired green competencies contribute significantly more (i.e., β=0.89) than a natural green competencies contribution (β=0.43) to the individual's effective green competencies (see figure 2). All the measurement constructs (GPI, EK and GPA) of acquired green competencies construct contribution are significant.

The above findings suggest that acquired competencies are better contributors to individual effective green competencies as supported by literature which refers to natural competencies such as EC as a general tendency, rather than a specific attitude, towards green behavior (Milfont and Duckitt, 2004; Tan and Lau, 2011; Mainieri et al. 1997). These studies conclude

that acquired competencies, being a highly specific attitude, is a stronger predictor of behavior towards green behavior. The findings suggest firms that intend to do well in environmental aspects have to concentrate more on the individual employee selection process. The process should give due importance towards acquired competencies such as environmental knowledge, green purchase attitude and green purchase intension. Similarly firms have to device suitable training packages to improve environmental knowledge, attitude and recognize green purchase intention. The results also indicate that additional effort to establish a green culture would be an added advantage to trigger employees' green potential.

The study further empirically demonstrates that the resultant direct effect of individuals' effective green competencies on green performance. The results indicates a strong and positive (β=0.99) relationship on green performance. Given that the green performance is measured using specific attitude, rather than general attitude, and the fact that the effective green attitude combined both natural and acquired competencies, we expect the individuals with such effective competencies would enable firms to meet their environmental/green performance targets.

Our findings towards green competencies development is similar to the quality culture development study carried out by Srinivasan and Kurey (2014). The study reports that quality culture could be developed well if the focus is on leadership emphasis, message credibility, peer involvement, employee ownership, and autonomy. Hence, it is obvious from our study that creating green culture depends on a leadership focus on environmental aspects, message credibility, peer involvement, employee ownership and autonomy.

The findings of our study provide important practical implications. Managers, especially the human resources managers responsible for aligning employees' green competencies with firms' green performance objective, need to focus specific attention on identifying potential employees with acquired green competencies. They can do this by examining individual's degree of environmental knowledge and attitudes towards green behaviors in recruitment and selection process. For existing employees, the findings suggest that HRM should focus on well-designed environmental training that centers on improving employees' specific attitudes, rather than using the usual general green awareness, and to evaluate and retrain employees with updated facts as they emerge to achieve desired green objectives of the organization.

Our findings highlight the importance of how managers in general and HR managers in particular must take an active role in promoting green practices. As leaders, managers should offer clear and unambiguous green performance indicators and expectations for evaluating green performance to their employees.

6.0 Conclusion

This study attempts to capture the green competencies of individuals and to identify the influential elements that enhance individuals' green competencies through empirical evidence from Chinese employees working in automotive manufacturing, raw material extraction, IT and other sectors. This study indicates that while both individuals' natural and acquired green competencies enhance their overall effective green competencies and green performance, acquired green competencies play a dominant role in shaping their effective green competencies. This study suggests that human resources managers should pay attention on identifying potential employees based on acquired green competencies and design specific environmental training that enhances existing employees' environmental knowledge and attitudes towards green behavior. Doing this will enable human resource managers to achieve the alignment of their employees' green competencies with their firm's green performance objectives.

In addition to the practical implications for managers and policymakers regarding green competencies of employees suggested by our findings (see section 5 above); this study makes a number of additional contributions as follows. This study contributes to the grey aspects of environmental skills literature. The study also captures the effect of a green competence model in an emerging economy's context. This is important considering the fact that despite China having the world's most seriously polluted cities and worst polluting industries (TIME, 2007; Tan and Lau, 2010), studies on GHRM is mostly lacking on China (Tan and Lau 2010; Zhao et al., 2014). It is also particularly worrying that China is only now awakening to the environmental movement (Tan and Lau 2010; Tantawi et al. 2009; Zhao et al., 2014). Our study contributes further as the research model is quantitatively tested using a large-sample (1230) .

While we acknowledge the unique characteristics of each country and their respective state of environmental awareness and policies, we strongly believe that our model is applicable to many nations, especially fast-developing nations, such as the so-called BRIC (Brazil, Russia,

India, and China) block. We based our assertion on Gunasekaran, Jabbour and Jabbour (2014) which opined that the BRIC countries would have a major impact on the future of our environment and climate negotiations issues. Our model will therefore be useful for the managers in these emerging economies to understand and apply green competencies of their workforce to achieve sustainability development.

Our study also has few limitations that can be addressed in future research. Firstly, the current study is limited in its data collection coverage. For generalizing, future large-scale data collection that covers major provinces in China is needed. As of now the questionnaires were answered self-reportedly, so the risk of social desirability effect exists (Lee, 2009). Future research should attempt to avoid any bias associated with social desirability effects. Our study demonstrates the positive impact of effective green competencies on green performance based on structural equation modeling techniques. Future studies could use other methodologies such as hierarchical or multi-level modeling to test the robustness of our findings. A detailed study is essential to understand the influence on competence on green culture and performance. Finally, as suggested above, it would nice to undertake the examination of our model in the context of other nations, especially the BRIC nations, to support or disprove from our assertion its possible application and to gain insights into any unique findings from such studies.

References

Ajzen, I. (1991), 'The theory of planned behavior,' *Organizational Behavior and Human Decision Processes*, 50, 179-211.

Ajzen, I., and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behaviour*, NJ, Englewood Cliffs.

Akehurst et al. (2012), 'Re-examining green purchase behaviour and the green consumer profile: new evidences,' *Management Decision*, 50, 5, 972-988.

Albayrak, T., Caber, M., Moutinho, L., and Herstein, R. (2011), 'The influence of skepticism on green purchase behavior,' *International Journal of Business and Social Science*, 2, 3, 189–197.

Anderson, J.C., and Gerbing, D.W. (1988), 'An updated paradigm for scale development incorporating unidimensionality and its assessment,' *Journal of Marketing Research*, 25(2), 186-192.

Arcury, T.A., Scollay, S.J., and Johnson, T.P. (1987), 'Sex Differences in Environmental Concern and Knowledge: The Case of Acid Rain,' *Sex Roles*, 16, 463-472.

Armstrong, J.S., and Overton, T.S. (1977), 'Estimating nonresponse bias in mail surveys,' *Journal of Marketing Research*, 14 (3), 396–402.

Bamberg, S. (2003), 'How Does Environmental Concern Influence Specific Environmentally Related Behaviors? A New Answer to an Old Question,' *Journal of Environmental Psychology*, 23, 21-32.

Barber, N., Taylor, D. C., and Strict, S. (2010), 'Selective Marketing to Environmentally Concerned Wine Consumers: A Case for Location, Gender and Age,' *Journal of Consumer Marketing*, 27, 64-75.

Bhalla, G., and Lin, L. (1987), 'Cross-cultural Marketing Research: A Discussion of Equivalence Issues and Measurement Strategies,' *Psychology & Marketing*, 4, 275-285.

Birdir, K., Pearson, T. (2000), 'Research Chefs' Competencies: A Delphi Approach,' *International Journal of Contemporary Hospitality Management*, 12, 3, 205–209.

Bohdanowicz, P., Zientara, P., and Novotna, E. (2011), 'International hotel chains and environmental protection: an analysis of Hilton's we care! Programme (Europe, 2006-2008),' *Journal of Sustainable Tourism*, 19, 797-816.

Borman, W.C., and Motowidlo, S. M. (1997), 'Task performance and contextual performance: The meaning for personnel selection,' *Human Performance*, 10, 99-109.

Brownell, J. (2008), 'Leading on Land and Sea: Competencies and Context,' *International Journal of Hospitality Management*, 27, 137–150.

Campbell, J.P. (1990), 'Modeling the performance prediction problem in industrial and organizational psychology", in Dunnette, M.D. and Hough, L.M. (Eds), Handbook of Industrial and Organizational Psychology, Consulting Psychologists Press, Palo Alto, CA, 687-732.

Chan, R. Y. K. (2001), 'Determinants of Chinese consumers' green purchase behavior,' *Psychology and Marketing*, 18, 389-413.

Chou, C.-J. (2014), 'Hotels' environmental policies and employee personal environmental beliefs: Interactions and outcomes,' *Tourism Management*, 40, 436-46.

Çizel, B., Anafarta, N., and Sarvan, F. (2007), 'An Analysis of Managerial Competency Needs in the Tourism Sector: the Case of Turkey,' *Tourism Review*, 62, 2, 14–22.

Cousins, P. (2002), 'A Conceptual Model for Managing Long-term inter-organisational Relationships', *European Journal of Purchasing and Supply Management*, 8, (2), 71-82

Crane, A., Matten, D., and Moon, J. (2008), 'Ecological citizenship and the corporation: Politicizing the new corporate environmentalism,' *Organization & Environment*,, 21, 371–89.

Dunlap, R., and Van Liere, K. (1978), 'The 'New Environmental Paradigm': A Proposed Measuring Instrument and Preliminary Results,' *Journal of Environmental Education*, 9, 10-19.

Eagly, A., and Chaiken, S. (1993), *The Psychology of Attitudes*, New York, Harcourt Brace Jovanovich.

Elefsiniotis, P., and Wareham, D.G. (2005), 'ISO 14000 environmental management standards: their relation to sustainability,' *Journal of Professional Issues in Engineering Education and Practice*, 131 (3), 207-12.

Ellen, P., Eroglu, D., and Webb, D. (1997), 'Consumer Judgments in a Changing Information Environment: How Consumers Respond to 'Green Marketing Claims,' Working Paper, Georgia State University.

Emiliani, M.L., (1998), '"Lean behaviors",' *Management Decision*, 36, 9, 615-631. http://dx.doi.org/10.1108/00251749810239504

Faul, F., Erdfelder, E., Lang, A. G., and Buchner, A. (2007), 'G* Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences,' *Behav. Res. Methods*, 39, 175-91.

Follows, S. B., and Jobber, D. (2000), 'Environmentally Responsible Purchase Behavior: A Test of a Consumer Model,' *European Journal of Marketing*, 34, 5, 723-746.

Fornell, C., and Larcker, D.F. (1981), Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.

Fraj, E., and Martinez, E. (2007a), 'Ecological Consumer Behavior: an empirical analysis,' *International Journal of Consumer Studies*, 31, 26-33.

Frick, J., Kaiser, F. G., and Wilson, M. (2004), 'Environmental Knowledge and Conservation Behavior: Exploring Prevalence and Structure in a Representative Sample,' *Personality and Individual Differences*, 37, 1597-1613.

Fryxell, G.E., and Lo, C.W.H. (2003), 'The Influence of Environmental Knowledge and Values on Managerial Behaviors on Behalf of the Environment: An Empirical Examination of Managers in China,' *Journal of Business Ethics*, 46, 45-69.

Gan, C., Wee, H.Y., Ozanne, L., and Kao, T.H. (2008), 'Consumers' Purchasing Behavior towards Green Products in New Zealand,' *Innovative Marketing*, 4, 93-102.

Gendall, P., Smith, T.W., and Russell, D. (1995), 'Knowledge of Scientific and Environmental Facts: A Comparison of Six Countries,' *Marketing Bulletin*, 6, 65-74.

Geng, Y., Fu, J., Sarkis, J., and Xue, B. (2012), 'Towards a national circular economy indicator system in China: an evaluation and critical analysis,' *Journal of Cleaner Production*, 23, 216-24.

Grunert S.C. (1993), 'Everybody Seems Concern About the Environment: But Is This Concern Reflected in (Danish) Consumers' Food Choice?' *European Advances in Consumer Research*, 1, 428-433.

Gunasekaran, A., Jabbour, C. J. C., and Jabbour, A. B. L. S. (2014), 'Managing organizations for sustainable development in emerging countries: an introduction,' *International Journal of Sustainable Development & World Ecology*, 21, 195-97.

Gunasekaran, A., and Gallear, D. (2012), 'Special issue on sustainable development of manufacturing and services,' *International Journal of Production Economics*, 140, 1–6.

Hines, J., Hungerford, H., and Tomera, A. (1987), 'Analysis and Synthesis of Research of Research on Environmental Behavior: A Meta-analysis,' *Journal of Environmental Education*, 18, 1-8.

Hoffman, A. J. (1993), 'The importance of fit between individual values and organizational culture in the greening of industry,' *Business Strategy and the Environment*, 2, 10-18.

Horng, J., Hsu, H., Liu, C., Lin, L., and Tsai, C. (2011), 'Competency Analysis of Top Managers in the Taiwanese Hotel Industry,' *International Journal of Hospitality Management*, 30, 1044– 1054

Jackson, S.E., Renwick, D.W.S., Jabbour, C.J.C., and Muller-Camen, M. (2011), 'State-of-the-Art and Future Directions for Green Human Resource Management,' *German Journal of Research in HRM*, 25, 99–116.

Jacobs, B.W., Singhal, V.R., and Subramanian, R. (2010), 'An empirical investigation of environmental performance and the market value of the firm,' *Journal of Operations Management*, 28 (5), 430-441.

Jabbour, C. J. C. (2013), 'Environmental training in organisations: From a literature review to a framework for future research,' *Resources, Conservation and Recycling*, 74, 144– 55.

Jabbour, C.J.C. and de Sousa Jabbour, A.B.L., (2015), 'Green Human Resource Management and Green Supply Chain Management: linking two emerging agendas,' *Journal of Cleaner Production*, http://dx.doi.org/10.1016/j.jclepro.2015.01.052

Jabbour, C.J.C., et al., (2014), 'Eco-innovations in more sustainable supply chains for a low-carbon economy: A multiple case study of human critical success factors in Brazilian leading companies,' International *Journal of Production Economics*, http://dx.doi.org/10.1016/j.ijpe.2014.11.015i

Jabbour, C.J.C.,et al., (2015), 'Green product development and performance of Brazilian firms: measuring the role of human and technical aspects,' *Journal of Cleaner Production*, 87, 442-451.

Jabbour, C.J.C., Jabbour, A.B.L.S, Govindan, K., Teixeira, A.A., and Freitas, W.R.S. (2013), 'Environmental management and operational performance in automotive companies in Brazil: the role of human resource management and lean manufacturing,' *Journal of Cleaner Production*, 47, 129-140.

Jabbour, C. J. C., Jugend, D., Jabbour A.B.L. S., Gunasekaran, A. and Latan, H. (2015), 'Green product development and performance of Brazilian firms: measuring the role of human and technical aspects,' *Journal of Cleaner Production*, 87, 442-51.

Jabbour, C.J.C., and Santos, F.C.A. (2008), 'Relationships Between Human Resource Dimensions and Environmental Management in Companies: Proposal of a Model,' *Journal of Cleaner Production,* 16, 51–58.

Jabbour, C.J.C., Santos, F.C.A., and Nagano, M.S. (2010), 'Contributions of HRM throughout the stages of environmental management: methodological triangulation applied to companies in Brazil,' *International Journal of Human Resource Management*, 21 (7), 1049-1089.

Jauhari, V. (2006), 'Competencies for A Career in the Hospitality Industry: An Indian Perspective,' *International Journal of Contemporary Hospitality Management,* 18, 2, 123–134.

Ji, L., Huang, J., Liu, Z., Zhu, H., and Cai, Z. (2012), 'The effects of employee training on the relationship between environmental attitude and firms' performance in sustainable development,' *Int. J. Hum. Resour. Manag*, 23, 2995-3008.

Kaufmann, H.R., Panni, M.F.A.K., and Orphanidou, Y. (2012), 'Factors Affecting Consumers' Green Purchasing Behavior: An Integrated Conceptual Framework,' *Amfiteatru Economic*, XIV, 31, 50-69.

Kim, Y., and Choi, S.M. (2005), 'Antecedents of Green Purchase Behavior: An Examination of Collectivism, Environmental Concern, and PCE,' *Advances in Consumer Research*, 32, 592-599.

Kinnear, T.C., Taylor, J.R., and Ahmed, S.A. (1974), 'Ecologically Concerned Consumers: Who Are They?' *Journal of Marketing*, 38, 2, 20-24.

Koopmans, L., Hildebrandt, C.B.V., Buuren, van S., Beek, A.J.van der, and Vet, H.C.W.de. (2012), 'Development of an individual work performance questionnaire,' *International Journal of Productivity and Performance Management*, 62, 1, 6-28. http://dx.doi.org/10.1108/17410401311285273

Laroche, M., Bergeron, J., and Barbaro-Forleo, G. (2001), 'Targeting Consumers Who Are Willing to Pay More for Environmentally Friendly Products,' *Journal of Consumer Marketing*, 18, 6, 503-520.

Laroche, M., Bergeron, J., Toniuk, M., and Barbaro-Forleo, G. (2002), 'Cultural Differences in Environmental Knowledge, Attitudes and Behaviors of Canadian Consumers,' *Canadian Journal of Administrative Sciences*, 19, 3, 267-283.

Lee, K. (2009), 'Gender Differences in Hong Kong Adolescent Consumers' Green Purchasing Behavior,' *Journal of Consumer Marketing*, 26, 2, 87-96.

Liu, Z., Li, J., Zhu, H., Cai, Z., and Wang, L. (2013), 'Chinese firms' sustainable development the role of future orientation, environmental commitment, and employee training,' *Asia Pacific Journal of Management,* 31, 195-213.

Mainieri,T., Barnett, E.G., Valdero, T.R., Unipan, J.B., and Oskamp, S. (1997), 'Green Buying: The Influence of Environmental Concern on Consumer Behavior,' *The Journal of Social Psychology*, 137, 2, 189-204.

Marcus, A., and Fremeth, A. (2009), 'Green management matters regardless,' *Academy of Management Perspectives*, 23 (4), 17-26.

Minton, A.P., and Rose, R.L. (1997), 'The effects of environmental concern on environmentally friendly consumer behavior: an exploratory study,' *Journal of Business Research*, 40, 37-48.

Milfont, T.L., and Duckitt, J. (2004), 'The Structure of Environmental Attitudes: The First- and Second- Order Confirmatory Factor Analysis,' *Journal of Environmental Psychology*, 24, 289-303.

Mostafa, M.M. (2006), 'Antecedents of Egyptian Consumers' Green Purchase Intentions,' *Journal of International Consumer Marketing*, 19, 2, 97-126.

Mostafa, M.M. (2007), 'Gender Differences in Egyptian Consumers' Green Purchase Behavior: the Effects of Environmental Knowledge, Concern and Attitude,' *International Journal of Consumer Studies*, 31, 220-229.

Nunnally J.C., Bernstein, I.H. (1994), *Psychometric theory*, third ed., McGraw-Hill, New York.

Penney, L.M., David, E., Witt, L.A. (2011), 'A review of personality and performance: Identifying boundaries, contingencies, and future research directions,' Human Resource Management Review, 21, 297–310.

Pichel, K. (2008), 'Enhancing ecopreneurship through an environmental management system: a longitudinal analysis of factors leading to proactive employee behaviour', In Wüstenhagen, R., Hamschmidt, J., Sharma, S. & Starik, M. (eds) *Sustainable innovation and entrepreneurship*. Edward Elgar Publishing.

Podsakoff, P.M., and Organ, D., (1986), 'Self-reports in organizational research: problems and prospects,' *Journal of Management*, 12, 531–543.

Ramayah, T., Lee, J. W. C., and Mohamad, O. (2010), 'Green product purchase intention: some insights from a developing country,' *Resources, Conservation and Recycling*, 54, 1419-27.

Ramus, C. A. (2002), 'Encouraging innovative environmental actions: what companies and managers must do,' *J. World Bus*, 37, 151-64.

Ramus, C. A., and And Killmer, A. B. (2007), 'Corporate greening through prosocial extrarole behaviours e a conceptual framework for employee motivation,' *Business Strategy and the Environment*, 16, 554-70.

Renwick, D., Redman, T., and Maguire, S. (2008), 'Green HRM: A Review, Process Model, and A Research Agenda,' *Working Paper Series*. Sheffield, UK, University of Sheffield Management School.

Renwick, D., T., R., and Maguire, S. (2013), 'Green human resource management: a review and a research agenda,' *International Journal of Management Reviews* 15, 1–14.

Roberts, G. (1997), *Recruitment and Selection: A competency Approach*, London, IPD.

Rotundo, M., and Sackett, P.R. (2002), 'The relative importance of task, citizenship, and counterproductive performance to global ratings of performance: a policy-capturing approach,' *Journal of Applied Psychology*, 87, 1, 66-80.

Sarkis, J., Gonzalez-Torre, P., Adenso-Diaz, B. (2010), 'Stakeholder pressure and the adoption of environmental practices: the mediating effect of training,' *Journal of Operations Management*, 28, 163-176.

Schahn, J., and Holzer, E. (1990), 'Studies of Individual Environmental Concern: the Role of Knowledge, Gender, and Background Variables,' *Environment and Behavior*, 22, 767-786.

Schwartz, J., and Miller, T. (1991), 'The earth's best friends,' American Demographics, 13, 26-35.

Spector, P.E., and Fox, S. (2005), 'A stressor-emotion model of counterproductive work behavior In S. Fox, & P. E. Spector (Eds.), Counterproductive work behavior: Investigations of actors and targets, Washington, DC: American Psychological Association, 151−176.

Shamdasani, P., Chon-Lin, G., and Richmond, D. (1993), 'Exploring Green Consumers in an Oriental Culture: Role of Personal and Marketing Mix,' *Advances in Consumer Research*, 20, 488-493.

Shen, J., and Saijo, T. (2008), 'Reexamining the Relations between Socio-demographic Characteristics and Individual Environmental Concern: Evidence from Shanghai Data,' *Journal of Environmental Psychology*, 28, 42-50.

Siemens. (2012), 'Sustainable City,' at: http://w1.siemens.com.cn/sustainable-city-en/sustainable-city.html?stc=cnccc020909 (accessed, January 12, 2013).

Srinivasan, A., Kurey, B. (2014). Creating a culture of quality. *Harvard Business Review*. Apr, 92(4): 23-25.

Straughan, R.D., and Roberts, J.A. (1999), 'Environmental Segmentation Alternatives: A Look at Green Consumer Behavior in the new Millennium,' *Journal of Consumer Marketing*, 16, 6, 558-575.

Sun, J., and Wilson, V.L. (2008), 'Assessing General and Specific Attitudes in Human Learning Behavior: An Activity Perspective and a Multilevel Modelling Approach,' *Educational and Psychological Measurement*, 66, 245-261.

Sweetman, P. (2007), 'Engage employees in green issues,' *People Management*, September, 42-43.

Tan, 2011 B.C. (2011a), 'The Roles of Knowledge, Threat and PCE on Green Purchase Behavior,' *International Journal of Business and Management*, 6, 12, 14-27.

Tan, B.C. (2011b), 'The Role of Perceived Consumer Effectiveness on Value-Attitude-Behavior Model in Green Buying Behavior Context,' *Australian Journal of Basic and Applied Sciences*, 5, 12, 1766-1771.

Tan, B.C., and Lau, T.C. (2010), 'Attitude towards the Environment and Green Products: Consumers' Perspective,' *Management Science and Engineering*, 4, 2, 27-39.

Tan, B.C., and Lau, T.C. (2011), 'Green Purchase Behavior: Examining the Influence of Green Environmental Attitude, Perceived Consumer Effectiveness and Specific Green Purchase Attitude,' *Australian Journal of Basic and Applied Sciences*, 5, 8, 559-567.

Tanner, C., and Kast, S.W. (2003), 'Promoting Sustainable Consumption: Determinants of Green Purchases by Swiss Consumers,' *Psychology & Marketing*, 20, 10, 883-902.

Tantawi, P., O'Shaughnessy, N., Gad, K., and Ragheb, M.A.S. (2009), 'Green Consciousness of Consumers' in a Developing Country: A Study of Egyptian Consumers,' *Contemporary Management Research*, 5, 29-50.

TIME, (2007), at: http://content.time.com/time/specials/2007/article/0,28804,1661031_1661028,00.html (accessed, 30, November 2014).

Vadiati, N., and Kashkooli, A.M.S. (2011), 'Environmental Sustainability of Newly Developed City Squares in Historic Cities: Case Study of Isfahan-Iran,' *Procedia Engineering*, 21, 829-837.

Wagner, M. (2013), "'Green' Human Resource Benefits: Do they Matter as Determinants of Environmental Management System Implementation? ' *J Bus Ethics*, 114, 443–56.

Wagner, M. (2014) 'A European perspective on country moderation effects: Environmental management systems and sustainability-related human resource benefits,' *Journal of World Business*, doi: http://dx.doi.org/10.1016/j.jwb.2014.08.005.

Wang, P., Liu, Q., and Qi, Y., (2014), 'Factors influencing sustainable consumption behaviors: a survey of the rural residents in China,' *Journal of Cleaner Production*, 63, 152-165.

Wang, P., Qian, L., and Yu, Q. (2013), 'Factors influencing sustainable consumption behaviors: a study of rural residents in China,' *Journal of Cleaner Production*, 1-14.

Weigel, R.H. (1983), *Environmental Attitudes and Prediction of Behavior*, In: Feimer, N.R., and Geller, E.S. ed. *Environmental Psychology: Directions and Perspectives.* New York: Praeger.

Wood, R.C. (1997), *Working in Hotel and Catering*, 2nd ed., London, International Thomson Business Press.

World Commission on Environment and Development, (1987), 'Sustainable development Features Definition,' at: http://www.gdrc.org/sustdev/definitions.html [Last accessed 10 December 2012.]

Xiang, W.N., Stuber, R.M.B., and Meng, X. (2011), 'Meeting Critical Challenges and Striving for Urban Sustainability in China,' *Landscape and Urban Planning*, 100, 418-420.

Yang, C., Lin, S., Chan, Y., and Sheu, C. (2010), 'Mediated effect of environmental management on manufacturing competitiveness: an empirical study,' *International Journal of Production Economics*, 123, 210-220.

Yeung, S.P. (2004), 'Teaching Approaches in Geography and Students' Environmental Attitudes,' *The Environmentalist*, 24, 101-117.

Zhao, H.-H., Gao, Q., Wu, Y.-P., Wang, Y., and Zhu, X.-D. (2014), 'What affects green consumer behavior in China? A case study from Qingdao,' *Journal of Cleaner Production*, 63, 143-51.

Zopiatis, A. (2010), 'Is It Art or Science? Chef's Competencies for Success,' *International Journal of Hospitality Management*, 29, 459–467.

Zsóka, Á., Szerényi, Z. M. S., Széchy, A., and Kocsis, T. (2013), 'Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior and everyday pro-environmental activities of Hungarian high school and university students,' *Journal of Cleaner Production*, 48, 126-38.

Appendix A: Summary of the various measurement scales used

Factor	Notation	Variables	Authors
Socio-demographic characteristics		Effect of: age, income, sex ,education and location	Gendall, 1995; Shen and Saijo, 2008; Lee, 2009; Tan, 2011
Environmental Knowledge (EK)	EK1	I know that I buy products and packages that are environmentally safe.	Gendall, 1995; Tan,2011; Mostafa, 2008
	EK2	I know how to select products and packages that reduce the amount of waste ending up in landfills.	
	EK3	I understand the environmental phrases and symbols on product package.	
	EK4	I am very knowledgeable about environmental issues.	
Environmental Concern (EC)	EC1	I am extremely worried about the state of the world's environment and what it will mean for my future.	Shen and Saijo, 2008; Mostafa, 2008; Fraj and Martinez, 2006; Kim and Choi, 2005; Straughan, 1999
	EC2	Mankind is severely abusing the environment.	
	EC3	When humans interfere with nature it often produces disastrous consequences.	
	EC4	The balance of nature is very delicate and easily upset.	
	EC5	Humans must live in harmony with nature in order to survive.	
Green Purchase Behaviour (GPB) (Ecological consumer behavior)	GPB1	I am willing to pay more for green products than other products	Fraj and Martinez, 2007; Fraj and Shen and Saijo 2008; Fryxell and Lo, 2003; Kim and Choi, 2005
	GPB2	I often buy products that are labeled as environmentally safe.	
	GPB3	I often buy products that use recycled or recyclable packaging	
	GPB4	When I have a choice between two equal products, I purchased the one less harmful to other people and the environment.	
	GPB5	I make a special effort to buy household chemicals such as detergents and cleansing solutions that are environmentally-friendly.	
Green Purchase Intention (GPI)	GPI1	I am willing to change my current products into a green version of the same products.	Fraj and Martinez, 2007; Mostafa, 2008; Shen and Saijo 2008
	GPI2	I will persuade my family and friends to buy more green products.	
	GPI3	When I consider buying a product, I will look for a certified environmentally-safe or organic stamp	
Green Purchase Attitude (GPA)	GPA1	I have a favorable attitude towards the idea of purchasing a green version of a product.	Mostafa, 2008; Shen and Saijo 2008; Fraj and Martinez 2007
	GPA2	I think green purchasing is a good idea.	
	GPA3	I will engage more in such behavior and hope more and more people will do so as well	

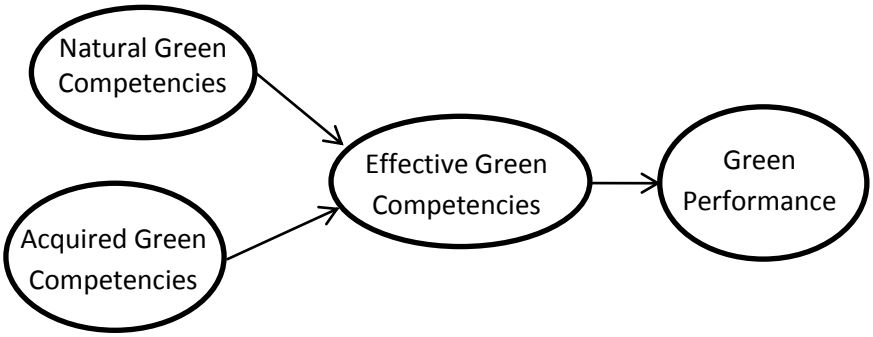

Figure 1: Green competencies conceptual model

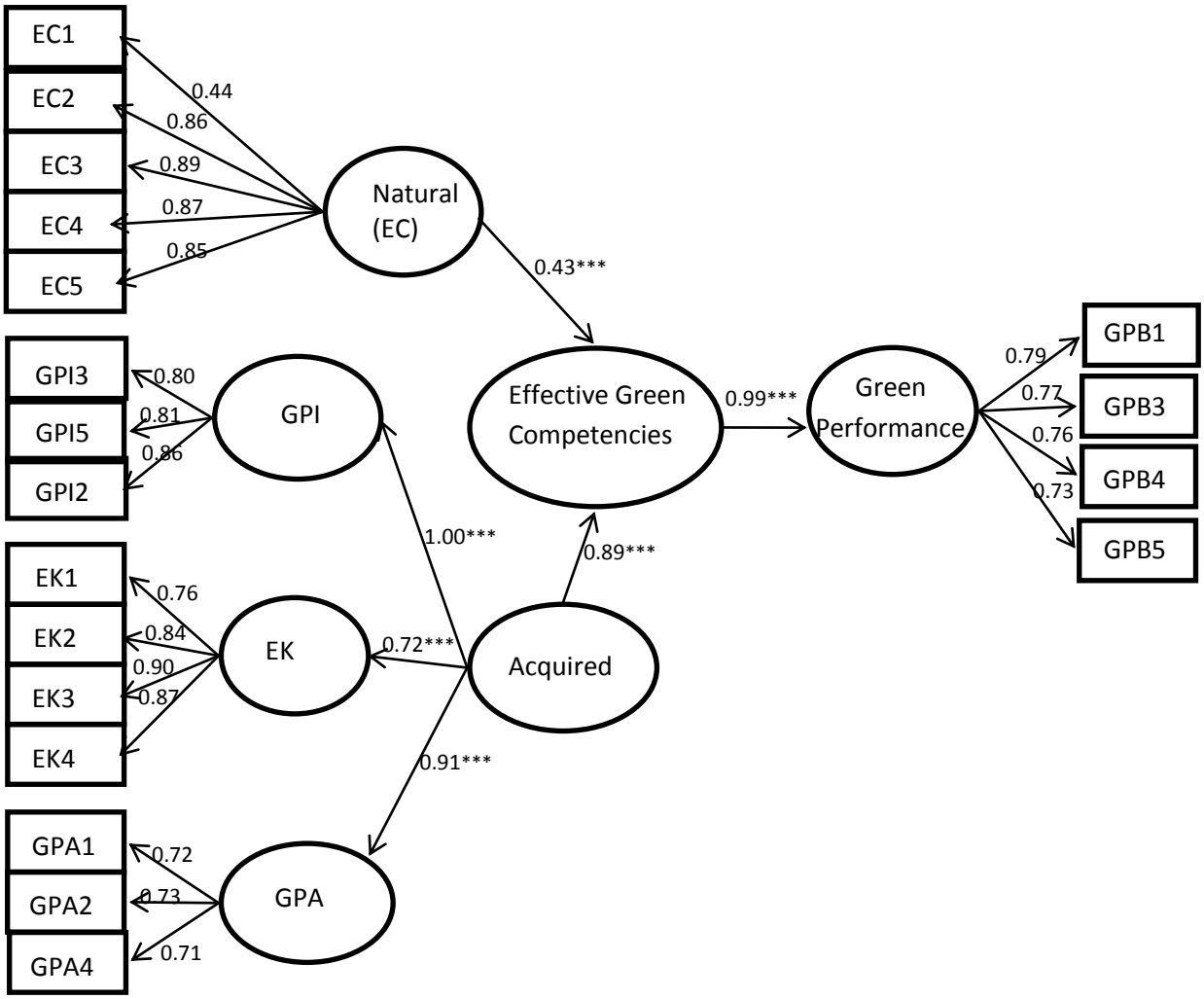

Figure 2: Structural equation path model

Table 1: Definition of constructs

Construct	Definition	Source
Natural green competencies	The natural green competencies (NGC) are defined as individuals' underlying traits and personality dimensions derived from observations and mentoring received at the formative stages on the dominant green behavior of their immediate social groups.	Yeung (2004); Kim and Choi (2005); Roberts (1997)
Acquired green competencies	Acquired green competencies are the green knowledge and skills that an individual has accumulated through previous experiences on environmental issues that leads to individual's strong conviction and feeling towards acting in an environmentally friendly manner.	Cousins, et al. 2008; Fryxell and Lo 2003; Roberts (1997)
Effective green competencies	The combination of natural and acquired green competencies of people.	Roberts (1997)
Green performance	Green performance is the final output or observable behavior resulting from the combination of natural, acquired and adapting competencies.	Follows and Jobber, 2000; Tan, 2011b; Mainieri et al., 1997; Kaufmann, Panni and Orphanidou 2012

Table 2: Socio -Demographics characteristics of the respondents

Respondent Characteristics	Frequency	Percentage
Level of Education		
Below high school	218	17.7
High school	325	26.4
College degree	396	32.2
Master's degree	194	15.8
Above Master's degree	97	7.9
Sector of Employment		
Automotive	475	38.6
Extractive industries	349	28.4
IT	274	22.3
Others	132	10.7
Income (RMB)		
< 2000	346	28.1
2000 - 3500	393	32.0
3500 - 5000	279	22.7
> 5000	212	17.2
Age		
< 20	140	11.4
20 - 30	308	25.0
30- 50	585	47.6
> 50	197	16.0
Total	1230	100

Table 3: Convergent validity and reliability

Constructs	Label	Standardized Loading	Cronbach's Alpha	Composite Reliability
Environmental Concern (EC)	EC1	0.749	0.92	0.91
	EC2	0.858		
	EC3	0.855		
	EC4	0.847		
	EC5	0.854		
Green Purchase Intention (GPI)	GPI3	0.791	0.77	0.70
	GPI5	0.695		
	GPI2	0.710		
Environmental Knowledge (EK)	EK1	0.817	0.90	0.88
	EK2	0.851		
	EK3	0.805		
	EK4	0.769		
Green Purchase Attitude (GPA)	GPA1	0.645	0.73	0.71
	GPA2	0.794		
	GPS4	0.675		
Green Purchase Behavior (GPB)	GPB1	0.617	0.85	0.80
	GPB3	0.795		
	GPB4	0.749		
	GPB5	0.703		

All loadings are significant at $p < 0.05$

Table 4: Fit indices of structural equation path model

Model	x^2(df)	Normed x^2	CFI	RMSEA(% CI)	IFI
Green competencies conceptual model	590.562(150)	1.23	0.951	0.064	0.840

Table 5: Description of Fit indices (Source: Shah and Goldstein, 2006)

Fit index	Description	Suggested cut-off
x^2/df	Normed chi-square: chi-square divided by degree of freedom	(0.002,4.80)
CFI	Comparative fix index: compares the model fit with a baseline model	(0.88,1.00)
IFI	Incremental fit index: group of goodness of fit indices that assesses how well a specified model fits relative to some alternative baseline model	(0.88,0.98)
RMSEA	Root mean square error of approximation	(0.00,0.13)