

Enviropreneurial orientation in SME supply chains: construct measurement development

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Abstract

Purpose – The purpose of this paper is to propose a new model that is inclusive and practical because of the deficiencies in models for construct measurement. Further, the authors demonstrate the value of the proposed model by describing its application to the development and validation of a multi-dimensional construct, enviropreneurial orientation. Although used in the literature, enviropreneurial orientation had not been developed nor tested as a construct. The paper provides detailed explanation of development and validation processes exemplified by experiences of research into the factors that motivate individual enviropreneurial orientation among owner/managers in supply chains.

Design/methodology/approach – The authors review models of construct development and propose an eight step model to overcome the deficiencies in the existing models. The eight steps are: defining the construct; identifying its dimensions; generating measurement items for each dimension; pretesting the measurement items; collecting data; constructing scales; analysing reliability; and evaluating the relationships. Each step is explained through examples based on the authors' experience in using the model to develop the new construct – enviropreneurial orientation.

Findings – All correlation results were positive and significant as were the multiple regression results with one exception, competitive aggressiveness.

Originality/value – The authors provide a practical model to guide new construct measurement development which can be used by researchers and research students for multi-dimensional constructs, especially they are constrained by time and financial resources. By using an example to demonstrate the applicability of the model, the authors go beyond the usual description of construct development models to make the proposed model more comprehensible and thus useful.

Keywords Sustainability, Entrepreneurship, SMEs, Supply chain

Paper type Research paper

1. Introduction

The primary goal of measurement development is to create dimensions that measure the underlying construct. Measurement development may involve revising dimensions for an old construct or generating dimensions for a new construct (Churchill, 1979; DeVellis, 1991). Development of measures for new constructs, especially multi-dimensional constructs, can be problematic because the researcher does not have existing measures to build upon. Although measurement development for constructs is a common process in quantitative research, a well-established framework to guide researchers through the various stages of measurement development is lacking, so the efforts to develop new constructs are often fragmented and incomplete (Hinkin, 1995). Thus the aim of our paper is to propose a framework for measuring new constructs and demonstrate how it was applied to the development of a new multi-dimensional construct, enviropreneurial orientation in supply chains. Although the need for the development of the measures for enviropreneurial orientation was recommended 20 years ago by Varadarajan (1992), no such measures have been developed. We proceed with an evaluation of existing measurement models before suggesting an eight step model based primarily on the strengths of similar models proposed by Bollen (1989), Schwab (1980) and DeVellis (1991, 2003). This is followed by an example of the model's application to the development of enviropreneurial orientation. Our contribution lies in providing a comprehensive but practical model to guide researchers in the definition and measurement development of



new constructs. Because our example construct, enviropreneurial orientation, is in a supply chain context, the paper has particular relevance to supply chain management literature and researchers.

2. Models of construct measurement development

Measurement models guide researchers in the measurement development process for new constructs. Measurement “consists of rules for assigning symbols to objects so as to (1) represent quantities of attributes numerically (scaling) or (2) define whether the objects fall in the same or different categories with respect to a given attribute (classification)” (Nunnally and Bernstein, 1994, p. 3). Five commonly used measurement models are: Churchill’s (1979) eight stage model; Schwab’s (1980) three stage model; Bollen’s (1989) four stage model; DeVellis’s (1991, 2003) eight stage model and Mackenzie *et al.* (2011) ten stage model. We evaluate each of these models and propose a combined model primarily based on Bollen (1989); Schwab (1980) and Devillis (2003).

First, Churchill’s (1979) measurement model involves eight stages: specifying the domain of the construct; generating the sample of items; collecting (pilot) data; purifying through conducting reliability and factor analysis; collecting data; assessing reliability; assessing validity; and lastly developing norms. This model is commonly used in marketing research (see Mackenzie *et al.*, 2011; Churchill, 1979). It provides an ordered set of activities to guide researchers in developing and evaluating measurement scales for multi-dimensional constructs (Mackenzie *et al.*, 2011). The model has two weaknesses. It fails to provide clarity on sample size required to test constructs (Flynn and Percy, 2001) and the recommended use of internal consistency to purify a measure without focus on the respondents may result in deletion of important items for a construct (Smith, 1999).

Second, Schwab’s (1980) three stage model includes: item generation; scale construction; and scale evaluation. While Schwab’s (1980) stages are common in organisational research (see Chen and Chen, 2012; Hinkin, 1995; Mohamad *et al.*, 2014), multiple tasks are required in a single stage (Hensley, 1999; Hinkin, 1995). For example, stage one involves developing a definition of the construct, generating dimensions and then measurement items for the dimensions. The model does not specify whether this applies to first order reflective constructs or second order formative constructs or both. However, the measurement model is simple, suitable for data collection at single a point in time and can be used for either a deductive or an inductive approach during construct measurement development (see Hinkin, 1995).

Third, Bollen’s (1989) model has four stages: developing a definition for the concept; identifying dimensions for a concept; developing measurement items for the dimensions; and developing a measurement model that involves specification of relationships between measurement items and the construct. Although Bollen’s (1989) model overcomes the problem of reducing multiple activities into one stage, the model concludes with the need to test for relationships but without specific mention of validity or reliability measures (see Hu and Bentler, 1999; Lin, 2013).

Fourth, DeVellis (1991, 2003) suggests eight stages: determining what is to be measured; generating the item pool; determining the format for measurement; reviewing initial items with a panel of experts; considering inclusion of validation items; administering items to an administrative sample; evaluating the items; and optimising scale length. Whereas DeVellis’s model is one of the commonly used models, focus is placed on reflective constructs and fails to provide guidelines for testing the temporal stability of a measure (Dahly and Adair, 2007). Nevertheless, the model may be applied under circumstances where a researcher is constrained by time.

The final model, Mackenzie *et al.* (2011), involves ten stages: developing a conceptual definition of the construct; generating items to represent the construct; assessing the content

validity of the construct; formally specifying the measurement model; collecting data to conduct a pre-test; undertaking scale purification and refinement; gathering data from a new sample and re-examining scale properties; assessing scale validity; cross-validating the scale; and developing norms for the scale plus discussing the first order and second order constructs. While the model can be used for both first order and second order measurement development, the measurement stages may not be appropriate for measurement development activities that have a time constraint. Related to this, three of the ten steps refer to pre-test and re-test which makes it an unnecessarily complex process, especially if retests cannot be done and content validity is not established before the pre-test. Importantly, the model ignores the creation of dimensions prior to item generation, or assumes it as part of the same process. Furthermore, the model is limited to a deductive research approach.

To overcome the weaknesses in each of the models, we developed an eight step model based on the combined strengths of Bollen (1989), Schwab (1980) and DeVellis (1991; 2003). We separated Bollen's (1989) first stage into more manageable components, included the second and third stages of Schwab's (1980) model, dividing them into distinct stages to suit a restricted research time frame, and we included DeVellis's (1991, 2003) fourth and sixth stages. The proposed model consists of eight steps: defining the construct; identifying dimensions for the construct; generating measurement items for the dimensions; pretesting the measurement items; collecting data; constructing scales; analysing reliability; and evaluating the relationships. A combination of the three models provides a more explicit process overlooked in previous models that is time efficient, multi-dimensional, allowing for both reflective and formative construct development, and suited to both inductive and deductive approaches.

3. Application of measurement model to development of a new construct

This section provides a practical example of how our eight step model was used to develop dimensions for a new multi-dimensional construct within a supply chain context, enviropreneurial orientation.

3.1 Step one: construct definition

In order to develop a definition for the construct, enviropreneurial orientation, we traced the use and meanings of the term to provide a workable definition for research within the context of green supply chain practices adoption.

The term, enviropreneurial orientation, was first used by Varadarajan (1992) in a conceptual paper arguing the importance of research that combines the elements of entrepreneurship with attitudinal concern for the environment. The combination requires an innovative business focus with a simultaneous concern for environmental protection (Keogh and Polonsky, 1998). While Varadarajan (1992) distinguishes among a range of related terms: enviropreneurs; enviropreneurial managers; enviropreneurial firms; and enviropreneurial marketing; (see the list below), it fails to provide a clear definition of enviropreneurial orientation. However, Varadarajan's distinctions among the terms are important for clarifying concepts and the questions posed are especially relevant for guiding future research. Among the four questions raised by Varadarajan (see the list below), the second question concerns the motivation of individuals/managers/firms to adopt an "enviropreneurial orientation". Unfortunately, Varadarajan saw no further need to define the term enviropreneurial orientation. Despite the potential appeal of the question on motivation, it was the third and fourth questions on enviropreneurial marketing strategies that attracted the greatest interest, predominantly among marketing researchers who in turn promoted the idea of enviropreneurial orientation as a strategy before it was began to be redefined as motivation or attitude.

Varadarajan (1992) explanation of enviropreneurship.
Enviropreneurship: an idea whose time has come:

SME supply
chains

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(1) Key terms

- entrepreneur: a person who organises, manages, and assumes the risks of a business enterprise;
- enviropreneur: a person who in organising and assuming the risks of, and managing the activities of a business enterprise, pursues environmentally responsible (environmentally friendly) policies, procedures, and practices. (adj: enviropreneurial. adv: enviropreneurship);
- enviropreneurial firms: Organisations that pursue environment- friendly policies, procedures, and practices in the conduct of business activities;
- enviropreneurial managers: Executives who champion the adoption of environment- friendly policies, procedures, and practices by one or more organisational units of firms;
- enviropreneurial marketing: Environment-friendly marketing policies, strategies, and tactics initiated by a firm in the realm of marketing:
 - to achieve a competitive differentiation advantage for the firm's offerings *vis-à-vis* competitor's offerings; and
 - influenced by the firm's views on the duties and the responsibilities of a corporate citizen.

(2) Plausible factors underlying the enviropreneurial initiatives of firms:

- potential for achieving a competitive advantage;
- basis for achieving a differentiation advantage in an era of me-too products;
- to neutralise the differentiation advantage achieved by a competitor pursuing environment-friendly policies and practices;
- genuine concern for the wellness of the environment;
- recognition of pending threats (economic, legal, regulatory, societal, etc.) due to growing concerns regarding the impact of the firm's product offerings on the environment;
- transfer of organisational learning from geographic markets (both intra-and international) where the firm faces more stringent environmental protection regulations;
- government mandate;
- economic considerations; and
- other : moral high ground /opportunism/fad (the green marketing bandwagon)/ marketing ploy/gimmick.

(3) Some key questions:

- What are the hallmarks/distinctive characteristics of:
 - enviropreneurs;
 - enviropreneurial firms; and
 - enviropreneurial managers?

- What factors motivate individuals, managers, and/or firms to adopt an enviropreneurial orientation?
- What kinds of enviropreneurial strategies would enable a firm to achieve a competitive advantage in the market place?
- To what extent should achieving a competitive advantage be a (major) consideration in regard to organisational actions that concern the wellness of the environment? (Varadarajan (1992, p. 342).

The term enviropreneurial gained attention through a seminal paper on green marketing strategy advocating the importance of enviropreneurial strategies within the context of green marketing (Menon and Menon, 1997). In this paper, Menon and Menon refer to enviropreneurial marketing as a “process for formulating and implementing entrepreneurial and environmentally beneficial marketing activities with the goal of creating revenue by providing exchanges that satisfy a firm’s economic and social performance objectives”(Menon and Menon, 1997, p. 54). This definition was taken up in a range of literatures, predominantly marketing, where it was further developed (see Baker and Sinkula, 2009; D’Souza *et al.*, 2006; Miles and Covin, 2000; Zwerg-Villegas, 2012). Hence the term “enviropreneurial” had become synonymous with marketing strategy, despite the broader questions and conceptualisation suggested by Varadarajan (1992), including motivations for becoming enviropreneurial. In the earliest reference to “enviropreneurial orientation” in a value addition or supply context, Hartman and Stafford (1998) applied Porter’s (1985) value chain framework to develop enviropreneurial strategies within the value chain with specific reference to enviropreneurial orientation. The definition implies the construct is type of motivation rather than strategy:

An entrepreneurial orientation is at the heart of enviropreneurship, integrating economic, environmental, and social objectives. Problems are solved through innovation and technology rather than through reactive compliance to government mandates and public pressure (Hartman and Stafford, 1998, p. 63).

In a discussion of enviropreneurial orientation in a supply chain context, Paulraj (2011) employs the Hartman and Stafford definition, however, interprets “enviropreneurial orientation” to be a firm attribute rather than an individual or management motivation or attitude. A more common reading of the word “orientation” would relate it to an attitude. Hence, enviropreneurial orientation is without a clearly stated and agreed definition.

If the word orientation is defined as an attitude, then enviropreneurial orientation may be viewed as an second order attitude composed of a range of specific attitudes towards the environment and business such as risk taking, innovation and environmental protection. Such an attitude must commence with an individual or group of individuals, owner/s or manager/s, prior to being accepted by employees and forming part of firm culture. Based on these assumptions, we developed the following definition of enviropreneurial orientation:

An owner/manager’s attitude toward business and the environment that integrates economic and environmental objectives and motivates innovative formulation and implementation of ecologically beneficial firm policies and activities that simultaneously advance market positions and create revenue

3.2 Step two: identify dimensions for the construct

Dimensions may be developed using a deductive or inductive approach. Deductive reasoning involves developing dimensions through a review of the literature while inductive reasoning involves entering into a dialogue with practitioners or professionals so as to obtain the factors from which the dimensions are developed (Hinkin, 1995). We adopted the former approach because the dimensions of our construct, enviropreneurial

orientation, were well researched, albeit across different fields of research. The development of dimensions for enviropreneurial orientation was based on theories related to attitudes and literatures from environmental management and entrepreneurship. Since we defined enviropreneurial orientation as an attitude, attitudinal theories were used to identify the factors from which the measurement dimensions were developed because they provide a clear understanding of attitudinal constructs and compositions. As a combination of entrepreneurship and environmentally friendly activities, enviropreneurial orientation is a second order multi-dimensional construct made of first order unidimensional constructs (Menon and Menon, 1997).

To generate the first order dimensions, we searched the two literatures for attitudinal factors leading to engagement in environmental management behaviour and entrepreneurial behaviour. Given the large number of factors identified in the literature, we compared the factors to find those with characteristics common to both literatures and grouped them together to form nine dimensions. Common characteristics included the context to which the factors were applied and the outcome of the factors. For example, the dimension of risk taking propensity contained six factors, three of which (management openness to experiences; managerial attitudes towards the environment; and managerial strategic creative intentions) were common to both environmental management and entrepreneurship research and three of which (management support; environmental social responsibility; and managerial perceptions of environmental issues) could be found only in the environmental management literature (see Table I for a list of the nine dimensions, their component factors and source literature). Environmental management and entrepreneurship were the source literatures because enviropreneurial research suggests that enviropreneurialism is a combination of entrepreneurship and environmental management (see Menon and Menon, 1997; Keogh and Polonsky, 1998; Silajdžić *et al.*, 2015). Selection of the component factors that formed the enviropreneurial orientation dimensions from the source literature was guided by considerations that included the link between the component factor and managerial attitudes and component factor availability in both literatures. Only component factors that had a link with managerial attitudes and were present in both the environmental and entrepreneurial literature were selected.

3.3 Step three: generating measurement items for the dimensions

Measurement items may be developed through adapting measurement items from previous research, soliciting suggestions from experts in the field or undertaking interviews or focus group discussions with a representative sample for the population (Mackenzie *et al.*, 2011). For our study, we adopted measurement items that were well tested in previous research. We selected items and scales that had been used in both environmental management and entrepreneurship research (see Table II). Adopting items from previous studies helps ensure their content validity (Lin *et al.*, 2014; Hyman *et al.*, 2006) and provides indications of reliability measures for the items (Savundranayagam *et al.*, 2005).

Before adopting the items, we considered the extent to which they precisely measured the constructs under study. First, we compared the items for each dimension that were common to both literatures to ascertain which items had been applied in the two different fields. We found similar items had been used in both literatures for five dimensions (innovativeness; proactiveness; employee empowerment; competitive aggressiveness; and risk taking propensity). Although four dimensions related to perceived pressures (social network pressure; consumer pressure; pressure from environmental regulations; and local community pressure) were identified, but not tested, in entrepreneurship literature as drivers of entrepreneurial activity, measurement items for these four dimensions were adapted from environmental management research where they had been tested. Following the comparison, each item was assessed in line with the context in which the

Table I.
Enviropreneurial
orientation
measurement model
(first order constructs)

Construct	Factors	Sources Entrepreneurship	Environmental management
Innovativeness	Creativity Experimentation Tolerance for ambiguity Inclination to innovation Technology orientation	Wiklund (1999) and Rauch <i>et al.</i> (2009)	Ehrenfeld (2004), Karagozoglu and Lindell (2000), Janicke (2008), Khanna and Anton, (2002), Plouffe <i>et al.</i> (2011), Salavou (2005) and Ziegler and Nogareda (2009)
Risk taking propensity	Management support (middle and top management) Managerial attitudes towards the environment Environmental responsibility Managerial perceptions on environmental issues Managerial strategic creative intentions Management openness to environmental experiences	Anderson and Paine (1975), Burgelman (1983), Kor <i>et al.</i> (2007), Carraher <i>et al.</i> (2006), Zahra <i>et al.</i> (2000) and Zhao and Seibert (2006)	Burstroem von Malmborg (2002), Chen and Paulraj (2004), Cramer (1998), Jain and Sharma (2014), Lee <i>et al.</i> (2013), Pålsson and Kovács (2014), Park (2009) and Thun and Müller (2010)
Competitive aggressiveness	Competitiveness/response to competition Company market position Low customer switching costs The need to attract stake holder attention Innovation speed Green training	Covin and Covin (1990), Dess and Lumpkin (2005), Lumpkin and Dess (1996) and Knight (2000).	Hofer <i>et al.</i> (2012), Kessler and Chakrabarti (1996), Walker <i>et al.</i> (2008) and Wu <i>et al.</i> (2012)
Employee empowerment	Knowledge sharing among firm members Appraisal of performance and reward systems Green team work/cross-functional cooperation Autonomy	Bratnicki <i>et al.</i> (2007), Minett and Ellis (1997) and Zellweger and Sieger (2012)	Dangelico (2014), Daily <i>et al.</i> (2012), Disterheft <i>et al.</i> (2012), Dues <i>et al.</i> (2013), Jabbour <i>et al.</i> (2013), Kessler and Chakrabarti (1996), Rivera and Delmas (2004), Tseng <i>et al.</i> (2014) and Tseng <i>et al.</i> (2009)
Proactiveness	Managerial entrepreneurial alertness Top management's vision in tapping potential opportunities Managerial locus of control Environmental social responsibility (determined by managerial values towards the environment) Knowledge of the natural environment Weight attached to environmental issues based on managerial values Conformity to group norms	Covin and Covin (1990), Dess and Lumpkin (2005), Lumpkin and Dess (1996) and Weerawardena and Mort (2006)	Brust and Liston-Heyes (2010), Fraj-Andrés <i>et al.</i> (2009), Gaglio and Katz (2001), González-Benito and González-Benito (2006), Kumar <i>et al.</i> (2012), Jain and Sharma (2014), Martín-Tapia <i>et al.</i> (2010), Pålsson and Kovács (2014) and Papagiannakis and Lioukas (2012)
Perceived pressure from external social networks	Acquisition of environmental management knowledge Acquisition of entrepreneurial knowledge Acquisition of financial capital	Greve and Salaff (2003), Linan (2008), Malebana (2014), Mahmoud <i>et al.</i> (2015) and Robledo <i>et al.</i> (2015)	Fraj-Andrés <i>et al.</i> (2009), González-Benito and González-Benito (2006), Jack and Anderson (2002), Jansen <i>et al.</i> (2006) and Leyden <i>et al.</i> (2014)

(continued)

Construct	Factors	Sources Entrepreneurship	Environmental management
Perceived consumer pressure	Managerial environmental commitment		
	Managerial environmental values and beliefs		
	Changes in customer tastes and preferences	Balan and Lindsay, 2009; Hill <i>et al.</i> , 1990 and Kemp and Hanemaaijer (2004)	Fraj-Andrés <i>et al.</i> , (2009), González-Benito and González-Benito, (2006), Gualandris and Kalchschmidt (2014), Mathiyazhagan <i>et al.</i> (2013) and Wu <i>et al.</i> (2013)
Perceived regulatory pressure	Customer demand for environmentally friendly products		
	Managerial environmental commitment		
	Managerial environmental values and beliefs	Atherton <i>et al.</i> (2008) and Veciana and Urbano (2008)	Fraj-Andrés <i>et al.</i> (2009), González-Benito and González-Benito (2006), Jain and Sharma (2014) and López-Gamero <i>et al.</i> (2010)
Perceived community pressure	Birth of new businesses		
	Compliance to environmental regulations		
	Managerial environmental commitment		
Perceived community pressure	Managerial environmental values and beliefs		
	Conformity to society norms	Bruton <i>et al.</i> (2010) and Malebana and Swanepoel (2014)	Fraj-Andrés <i>et al.</i> (2009), González-Benito and González-Benito (2006), Liu <i>et al.</i> (2010) and Wing-Hung Lo <i>et al.</i> (2010)
	Environmental concern by the local community		
Perceived community pressure	Managerial environmental commitment		
	Managerial environmental values and beliefs		

Table I.

Table II.Sources for adapted
measurement items

Measurement dimension	Source for adapted items
Innovativeness	Panayides (2006)
Risk taking propensity	Wagener <i>et al.</i> (2010)
Employee empowerment	Hughes and Morgan (2007)
Proactiveness	Lotz and Van der Merwe (2013)
Competitive aggressiveness	Dess and Lumpkin (2005)
Perceived pressure from social networks	Lu <i>et al.</i> (2005) and San Martín and Herrero (2012)
Perceived pressure from environmental regulations	Epstein and Wisner (2005), Fraj-Andrés <i>et al.</i> (2009) and López-Gamero <i>et al.</i> (2010)
Perceived local community pressure	Liu, <i>et al.</i> (2010) and Wing-Hung Lo <i>et al.</i> (2010)
Perceived consumer pressure	Khanna and Speir (2013) and Mathiyazhagan <i>et al.</i> (2014)

items were to be administered. Because most items were developed in Western nations and our research was in Uganda, we deleted or adapted some items to ensure understanding by Ugandan respondents. Items that required a higher level of abstraction to distinguish among them were deleted so as not to confuse respondents. For instance, Lotz and Van der Merwe's (2013) item for proactiveness – our business is very often the first to introduce new products/services/processes – was deleted because of its similarity to another of Lotz and Van der Merwe's items – our business continuously seeks out new products/processes/services.

3.4 Step four: pretesting the measurement items

Pretesting is commonly applied to ensure the content validity of a research instrument (Papachristos, 2014). Conflicting arguments around the different values and uses of a pre-test compared to a pilot study. While in some research a pilot study is the same as a pre-test (see Mackenzie *et al.*, 2011), others distinguish between the two (see Colton and Covert, 2007). For the purposes of our study, we followed the latter and distinguished the pre-test from a pilot study. In a pre-test, the content validity of the measurement items is obtained using a sample of respondents other than those from study population. Once we had developed the dimensions and items into an instrument with a seven point Likert scale, we pre-tested the instrument on an expert panel. In total, 11 Ugandan academics from the disciplines of logistics and entrepreneurship were asked to assess the quality of the measurement items and the degree to which they related to the measurement dimensions. We considered that these academics had the required research expertise and cultural knowledge to feel confident that their feedback would ensure the content validity of the measurement items. Because we were constrained by time, geography, technology and cost, a pilot study was not feasible. Furthermore, in recognition of constraints, some models recommend pretesting with an expert panel only (see DeVellis, 1991, 2003).

3.5 Step 5: data collection

Data collection involves determining the sample size, selecting a sampling technique and administering the questionnaire. The research was undertaken in the context of Ugandan SME manufacturing firms. The unit of analysis was the firm and the unit of inquiry were the owner/managers of the firms. The population consisted of 50,873 SME firms on the 2011 Ugandan Bureau of Statistics Business Register. The majority (90 per cent) of SME manufacturing firms are individually owned with most SME manufacturing firms located in the capital, Kampala (Uganda Bureau of Statistics, 2011). No distinction was made between owners and managers because they are usually the same persons in SME firms (Hoogendoorn *et al.*, 2015). A sample size of 300 was determined using Roscoe's (1975) rule of thumb that a sample size should be ten times or more than the number of variables

being studied. Although, with nine variables, a minimum sample size of 90 was required, larger sample sizes of between 100 and 500 are more appropriate for measurement development (Mackenzie *et al.*, 2011). For example, exploratory factor analysis requires a minimum sample size of 150 while confirmatory factor analysis (CFA) requires a minimum of 200 (Hensley, 1999; Hinkin, 1995). Hence, we decided to distribute invitations to participate in the research to the owner/managers of 300 firms because 300 seemed a more than adequate number. A simple random sampling method was employed to generate the sample from the Ugandan Bureau of Statistics Business Directory of SME manufacturing firms using the RAND () function in an Excel work sheet. The random number generator (rand () function) was used to generate random values for each SME manufacturing firm located in Kampala (Quirk *et al.*, 2013). To avoid social desirability bias and encourage honest answers, the questionnaire was anonymous and it was made clear that the researchers were from a university, not from government, and the research had been approved under the Australian government guidelines. Because of poor internet and postal services, a drop off and pick up method was used to distribute and collect the questionnaire. From the 300 survey questionnaires distributed, 200 responses were returned resulting in a response rate of 67 per cent which was in line with the minimum required sample size for a factor analysis.

3.6 Step six: scale construction

The data were cleaned and entered into a spreadsheet in order to conduct tests for common method variance, normality, validity and later factor analysis. Validity tests included convergent and discriminant validity tests using Partial Least Squares (PLS) software. Convergent validity exists when average variance extracted (AVE) is above 0.40 and composite reliabilities are higher than 0.70 (Xu and Fox, 2014; Zaheer *et al.*, 2010). Additionally, Aziz *et al.* (2014) argue that an AVE of 0.40 or more shows the existence of an adequate level of convergent validity. The AVE values for all the constructs were above the minimum value of 0.40 and ranged between 0.41 and 0.75 (see Table III).

In order to test for discriminant validity, Fornell-Larcker's criterion was used. In the case of discriminant validity, the square root of the AVE should be higher than the correlations between a given construct with all other constructs (Jabbour *et al.*, 2015). Fornell-Larcker's criterion was met as all correlations between constructs were lower than the square root of the AVE for a given construct (see Table IV).

For purposes of scale construction, a CFA was carried out. The maximum likelihood estimation method is most appropriate where data are normally distributed and the analysis of the results relies on sample data (Cho and Hong, 2013). Both conditions were satisfied. One item, item 2 for perceived local community pressure, had an item loading below 0.30 and was subsequently dropped (see Table V). Fit indices for all the entrepreneurial orientation

Variables	Convergent validity (AVE)
Innovativeness	0.66
Risk taking propensity	0.62
Proactiveness	0.75
Competitive aggressiveness	0.55
Employee empowerment	0.67
Perceived social networks pressure	0.52
Perceived consumer pressure	0.46
Perceived local community pressure	0.41
Perceived pressure from environmental regulations	0.63

Table III.
Convergent validity
test results

Table IV.
Discriminant validity;
Fornell-Larcker
criterion

Enviropreneurial orientation dimensions	1	2	3	4	5	6	7	8	9
Competitive aggressiveness(1)	$\sqrt{\text{AVE}} = 0.74$								
Employee empowerment(2)	0.51	$\sqrt{\text{AVE}} = 0.82$							
Innovativeness(3)	0.54	0.57	$\sqrt{\text{AVE}} = 0.81$						
Perceived consumer pressure(4)	0.38	0.3	0.36	$\sqrt{\text{AVE}} = 0.68$					
Perceived local community pressure(5)	0.29	0.27	0.2	0.36	$\sqrt{\text{AVE}} = 0.63$				
Perceived pressure from environmental regulations(6)	0.45	0.46	0.37	0.49	0.53	$\sqrt{\text{AVE}} = 0.79$			
Perceived pressure from social networks(7)	0.43	0.49	0.45	0.54	0.33	0.55	$\sqrt{\text{AVE}} = 0.72$		
Proactiveness(8)	0.63	0.5	0.58	0.36	0.33	0.52	0.49	$\sqrt{\text{AVE}} = 0.86$	
Risk taking propensity(9)	0.44	0.31	0.34	0.32	0.18	0.3	0.27	0.4	$\sqrt{\text{AVE}} = 0.79$

Construct	Items	Standardised loadings	Fit indices
Proactiveness	I believe my firm typically initiates environmental management actions that competitors respond to	0.80	GFI = 1.000; CFI = 1.000; NFI = 1.000; RMSEA = 0.000
	I believe my firm continuously seeks out environmentally friendly new products/processes/services	0.80	
	I believe my firm continuously monitors market trends and identifies future environmental needs of customers	0.77	
Innovativeness	I believe my firm frequently tries out new environmental management ideas	0.92	GFI = 0.998; CFI = 1.000; NFI = 0.998; RMSEA = 0.000; AGFI = 0.981; CMIN (χ^2), p -value = 0.383; CMIN/df = 0.762
	I believe my firm seeks out new ways to do environmentally friendly activities	0.88	
	I believe my firm is creative in its environmental management operation methods	0.80	
Risk taking propensity	I believe my firm is often the first to market with new environmentally friendly products and services	0.30	GFI = 1.000; CFI = 1.000; NFI = 1.000; RMSEA = 0.000
	I believe my firm regularly takes calculated environmental management risks in order to obtain a potential advantage	0.64	
	I believe my firm will seize any opportunity, regardless of the consequences	0.69	
	I believe my firm is prepared to invest much of its own capital to take a chance	0.66	
Competitive aggressiveness	I believe my firm effectively uses an aggressive posture to combat industry trends that may threaten its environmental competitive position	0.61	GFI = 1.000; CFI = 1.000; NFI = 1.000; RMSEA = 0.000
	I believe my firm enhances its competitive position by responding to environmental competition with new environmentally friendly product introductions, announcements of new environmentally friendly products or technologies	0.79	
	I believe my firm knows when it is in danger of acting overly aggressive and avoids such actions which can lead to erosion of firm reputation and retaliation by competitors	0.40	
Employee empowerment	I believe employees in my firm are permitted to act and think without interference on environmental management issues	0.64	GFI = 0.995; CFI = 1.000; NFI = 0.996; RMSEA = 0.000; RMSEA = 0.038; AGFI = 0.928; CMIN (χ^2), p -value = 0.829; CMIN/df = 0.473

(continued)

Table V.
Standardised item loadings

Table V.

Construct	Items	Standardised loadings	Fit indices
Perceived external social networks pressure	I believe employees in my firm perform environmental management jobs that allow them to make and instigate changes in the way they perform their environmental management work tasks	0.75	GFI = 0.998; CFI = 1.000; NFI = 0.996; RMSEA = 0.000; AGFI = 0.984; CMIN (χ^2), p -value = 0.431; CMIN/df = 0.619
	I believe employees in my firm are given freedom and independence to decide on their own on how to go about doing their work	0.54	
	I believe employees in my firm are given freedom to communicate environmental issues without interference	0.88	
	I believe employees in my firm have access to all vital environmental information	0.93	
	I believe employees in my firm are given authority and responsibility to act alone if they think it will be in the best interest of the business	0.86	
	Members of my external social network think that I should engage in environmentally friendly management innovations	0.43	
Perceived pressure from environmental regulations	Owner/managers who engage in innovative environmentally friendly practices have a high profile	0.75	GFI = 0.995; CFI = 1.000; NFI = 0.994; RMSEA = 0.000; RMR = 0.027; AGFI = 0.973; CMIN (χ^2), p -value = 0.448; CMIN/df = 0.884
	Engagement in environmentally friendly practices is seen as a status symbol among the members of my external social network	0.57	
	Members of my social network whose opinions I value, think engaging in innovative environmentally friendly practices is useful	0.63	
	Stricter environmental regulations drive environmental management decision making in my firm	0.75	
	The imposition of fines, penalties or legal costs drives compliance to environmental regulations decisions in my firm	0.78	
	Environmental regulations establish rigid restrictions on the adoption of new environmentally friendly products and technological processes	0.75	
	Environmental regulations generate the incentive to innovate, as they encourage the adoption of the best environmental management practices available	0.68	
	Environmental regulations modify market demand by introducing new assessment criteria through consumer awareness raising mechanisms	0.70	

(continued)

Construct	Items	Standardised loadings	Fit indices
Perceived consumer pressure	Environmental decision making in my firm is driven by the willingness to pay higher prices for environmentally friendly products/services	0.64	GFI = 0.995; CFI = 1.000; NFI = 0.994; RMSEA = 0.062; AGFI = 0.973; CMIN (χ^2), <i>p</i> -value = 0.448; CMIN/df = 0.884
	Decisions by my firm to engage in the production of environmentally friendly products and services are driven by the need to earn public recognition and customer goodwill	0.66	
	Environmental decision making in my firm is driven by my customers' expectations to meet environmental protection requirements	0.36	
	Environmental decision making in my firm is driven by my customers' demand for environmentally friendly products	0.42	
Perceived consumer pressure	Environmental decision making in my firm is driven by the willingness to pay higher prices for environmentally friendly products/services	0.64	GFI = 0.995; CFI = 1.000; NFI = 0.994; RMSEA = 0.062; AGFI = 0.973; CMIN (χ^2), <i>p</i> -value = 0.448; CMIN/df = 0.884
	Decisions by my firm to engage in the production of environmentally friendly products and services are driven by the need to earn public recognition and customer goodwill	0.66	
	Environmental decision making in my firm is driven by my customers' expectations to meet environmental protection requirements	0.36	
	Environmental decision making in my firm is driven by my customers' demand for environmentally friendly products	0.42	

Table V.

dimensions and their measurement items demonstrated good fit. Any four of the fit indices adequately enable model fit (Kline, 2005). A good fit exists when the: goodness of fit index is larger than 0.90; Root Mean Square Residual (RMR) is ≤ 0.05 ; root mean square error of approximation (RMSEA) is $0.05 < \text{RMSEA} < 0.08$; comparative fit index is > 0.9 ; normed fit index is > 0.9 ; adjusted goodness of fit in index is > 0.9 ; CMIN (χ^2), p -value is > 0.05 ; CMIN/df is < 5 and Tucker Lewis Index (TLI) > 0.9 (Dattalo, 2013; Narasimham et al, 2012; Regnault *et al.*, 2012). There was a good fit for all nine dimensions and their measurement items (see Table VI) with all four indices greater than 0.9; the RMRs less than 0.05; the RMSEAs less than 0.08; CMIN (χ^2), p -values greater than 0.05; and CMIN/dfs were less than the maximum value of 5. These results indicate good fit between the theorised dimensions for enviropreneurial orientation and the observed data (see Table V).

3.7 Step 7: reliability analysis

Reliability is a necessary pre-condition for validity (Nunnally and Bernstein, 1978). Assessing reliability is carried out on a set of measurement items at a construct level (Mackenzie *et al.*, 2011). Estimation of internal consistency reliability of the measurement items for first order constructs with reflective indicators are undertaken in this stage (Mackenzie *et al.*, 2011). Reliability results for the measurement items were obtained using the internal consistency method because a single measurement instrument was being administered at a single point in time. Cronbach α was the model used for obtaining the reliability of the measurement items. The reliability values ranged between 0.85 and 0.88 which are above 0.70 recommended by Nunnally and Bernstein (1994) to be considered reliable (see Table VI).

3.8 Step eight: relationship evaluation

Relationship evaluation involves examining relationships between the measures and the construct. Hypothesised relationships between a measure and a construct may be confirmed through correlation, regression analysis or structural equation modelling (Hinkin, 1995). We used correlation analysis to examine the relationships between measures for enviropreneurial orientation and a multiple regression analysis to determine whether the dimensions significantly predicted enviropreneurial orientation. All measures were positively related to the multi-dimensional construct, enviropreneurial orientation (see Table VII).

Nominological validity requires testing for relationships between the construct and its dimensions. Evidence of relationships support the predictive validity of the new measures (Bollen, 1989; Bollen and Lennox, 1991; Hinkin, 1995). Multiple regression analysis found all dimensions were significantly related to enviropreneurial orientation except the competitive aggressiveness dimension (see Table VIII). Although dimensions with insignificant statistical coefficients may be eliminated, a dimension may be kept if its removal jeopardises the breadth of coverage of the construct's content (Carneiro *et al.*, 2007). The competitive aggressiveness

Table VI.
Reliability test results

Variables	Reliability
Innovativeness	0.85
Risk taking propensity	0.86
Proactiveness	0.85
Competitive aggressiveness	0.86
Employee empowerment	0.85
Perceived social networks pressure	0.85
Perceived consumer pressure	0.86
Perceived local community pressure	0.86
Perceived pressure from environmental regulations	0.85

dimension was retained for two reasons. One, it had a correlation co-efficient of 0.631 which according to Evans' (1996) categorisation rule indicates a strong relationship between enviropreneurial orientation and competitive aggressiveness. And two, owners/managers for SME firms may be forced out of the market due to their inability to further invest in risky environmental management innovations while others may decide to keep their resources rather than undertaking environmental management innovations when the competition intensifies (Zahra, 1993). Hence, we considered it important to retain this dimension.

Overall, our aim was to ascertain whether the dimensions were related to the construct they were measuring. A correlation analysis tested for the relationships while a multiple regression analysis tested the degree of prediction the dimensions had on the construct. All correlations were positive and significant as were the results of the multiple regression analysis results with one exception. An r squared of 0.92 for the model indicates that the developed dimensions adequately measure the new construct, enviropreneurial orientation (Bewick *et al.*, 2005).

4. Conclusion

In response to a range of inadequate models to guide new construct development, we have proposed a simple but rigorous model to assist researchers in developing new constructs. Further, we demonstrated the value of the model by describing how it was applied to the development of a new multi-dimensional construct, enviropreneurial orientation. In doing so, we show how nine dimensions were derived from two literatures and appropriate scales developed to measure the nine dimensions and the overall construct. The dimensions and their items were tested for validity, reliability and their relationship with the new construct, enviropreneurial orientation. Our aim has been to assist researchers who struggle to find a relevant and practical model for developing new multi-dimensional constructs and/or who work in situations constrained by financial and time resources.

Variables	Correlation values
Proactiveness	0.697
Innovativeness	0.661
Risk taking propensity	0.473
Competitive aggressiveness	0.631
Employee empowerment	0.722
Perceived external social networks pressure	0.669
Perceived consumer pressure	0.600
Perceived pressure from environmental regulations	0.738
Perceived local community pressure	0.443

Note: All correlations significant at $p < 0.000$

Table VII.
Zero-order correlations
between
“enviropreneurial
orientation” and its
dimensions

Predictors	Standardized coefficients	p -values
Proactiveness	0.138	0.000
Innovativeness	0.144	0.000
Risk taking propensity	0.095	0.000
Competitive aggressiveness	0.035	0.219
Employee empowerment	0.344	0.000
Perceived external social networks pressure	0.118	0.000
Perceived consumer pressure	0.154	0.000
Perceived pressure from environmental regulations	0.234	0.000
Perceived local community pressure	0.145	0.000

Table VIII.
Multiple regression
results for
relationships between
enviropreneurial
orientation dimensions
and “enviropreneurial
orientation”

References

- Anderson, C.R. and Paine, F.T. (1975), "Managerial perceptions and strategic behavior", *Academy of Management Journal*, Vol. 18 No. 4, pp. 811-823.
- Atherton, A., Frith, K., Price, L., Gatt, M., Rae, D. and Director, E. (2008), "The 'problem' with regulation: systemic constraints to effective implementation of new legislation", paper presented at the 31st ISBE Conference, Belfast.
- Aziz, A.A., Nordin, N.I.F., Noor, N.M. and Isa, S.N.I. (2014), "Psychometric properties of the 'Skala Kepuasan Interaksi Perubatan-11' to measure patient satisfaction with physician-patient interaction in Malaysia", *Family Practice*, Vol. 31 No. 2, pp. 236-244.
- Baker, W.E. and Sinkula, J.M. (2009), "The complementary effects of market orientation and entrepreneurial orientation on profitability in small businesses", *Journal of Small Business Management*, Vol. 47 No. 4, pp. 443-464.
- Balan, P. and Lindsay, N.J. (2009), "Innovation capability and entrepreneurial orientation dimensions for Australian hotels", *Cooperative Research Centre for Sustainable Tourism*, pp. 1-59.
- Bewick, V., Cheek, L. and Ball, J. (2005), "Statistics review 14: logistic regression", *Crit Care*, Vol. 9 No. 1, pp. 112-118.
- Bollen, K. and Lennox, R. (1991), "Conventional wisdom on measurement: a structural equation perspective", *Psychological Bulletin*, Vol. 110 No. 2, pp. 305-314.
- Bollen, K.A. (1989), *Structural Equations with Latent Variables*, Wiley, New York, NY.
- Bratnicki, M., Marzec, I., Zabierowski, P. and Kulikowska-Mrozek, M. (2007), "Empowerment and entrepreneurship: conceptual issues and empirical tests", *Journal of Economics and Management*, Vol. 3, pp. 35-54.
- Brust, D.A.V. and Liston-Heyes, C. (2010), "Environmental management intentions: an empirical investigation of Argentina's polluting firms", *Journal of Environmental Management*, Vol. 91 No. 5, pp. 1111-1122.
- Bruton, G.D., Ahlstrom, D. and Li, H.L. (2010), "Institutional theory and entrepreneurship: where are we now and where do we need to move in the future?", *Entrepreneurship Theory and Practice*, Vol. 34 No. 3, pp. 421-440.
- Burgelman, R.A. (1983), "Corporate entrepreneurship and strategic management: insights from a process study", *Management Science*, Vol. 29 No. 12, pp. 1349-1364.
- Burström von Malmberg, F. (2002), "Environmental management systems, communicative action and organizational learning", *Business Strategy and the Environment*, Vol. 11 No. 5, pp. 312-323.
- Carneiro, J.M., Silva, J. d., Rocha, A. d. and Dib, L. d. R. (2007), "Building a better measure of business performance", *RAC-Eletrônica*, Vol. 1 No. 2, pp. 114-135.
- Carraher, S.M., Parnell, J.A., Carraher, S.C., Carraher, C.E. and Sullivan, S.E. (2006), "Customer service, entrepreneurial orientation, and performance: a study in health care organizations in Hong Kong, Italy, New Zealand, the United Kingdom, and the USA", *Journal of Applied Management and Entrepreneurship*, Vol. 11 No. 4, pp. 33-48.
- Chen, C.-F. and Chen, S.-C. (2012), "Scale development of safety management system evaluation for the airline industry", *Accident Analysis & Prevention*, Vol. 47, pp. 177-181.
- Chen, I.J. and Paulraj, A. (2004), "Towards a theory of supply chain management: the constructs and measurements", *Journal of Operations Management*, Vol. 22 No. 2, pp. 119-150.
- Cho, Y. and Hong, S. (2013), "The new factor structure of the Korean version of the difficulties in emotion regulation scale (K-DERS) incorporating method factor", *Measurement and Evaluation in Counseling and Development*, Vol. 46 No. 3, pp. 192-201.
- Churchill, G.A. Jr (1979), "A paradigm for developing better measures of marketing constructs", *Journal of Marketing Research*, Vol. 16 No. 2, pp. 64-73.
- Colton, D. and Covert, R.W. (2007), *Designing and Constructing Instruments for Social Research and Evaluation*, John Wiley & Sons, Jossey-Bass, San Francisco, CA.

- Covin, J.G. and Covin, T.J. (1990), "Competitive aggressiveness, environmental context, and small firm performance", *Entrepreneurship: Theory and Practice*, Vol. 14 No. 4, pp. 35-50.
- Cramer, J. (1998), "Environmental management: from 'fit' to 'stretch'", *Business Strategy and the Environment*, Vol. 7 No. 3, pp. 162-172.
- D'Souza, C., Taghian, M. and Lamb, P. (2006), "An empirical study on the influence of environmental labels on consumers", *Corporate Communications: An International Journal*, Vol. 11 No. 2, pp. 162-173.
- Dahly, D.L. and Adair, L.S. (2007), "Quantifying the urban environment: a scale measure of urbanicity outperforms the urban-rural dichotomy", *Social science & medicine*, Vol. 64 No. 7, pp. 1407-1419.
- Daily, B.F., Bishop, J.W. and Massoud, J.A. (2012), "The role of training and empowerment in environmental performance: a study of the Mexican maquiladora industry", *International Journal of Operations & Production Management*, Vol. 32 No. 5, pp. 631-647.
- Dangelico, R.M. (2014), "Improving firm environmental performance and reputation: the role of employee green teams", *Business Strategy and the Environment*, Vol. 24 No. 8, pp. 735-749.
- Dattalo, P. (2013), *Analysis of Multiple Dependent Variables*, Oxford University Press, New York, NY.
- Dess, G.G. and Lumpkin, G.T. (2005), "The role of entrepreneurial orientation in stimulating effective corporate entrepreneurship", *The Academy of Management Executive*, Vol. 19 No. 1, pp. 147-156.
- DeVellis, R.F. (1991), *Guidelines in Scale Development. Scale Development: Theory and Applications*, Sage, Newbury Park, CA, p. 5191.
- Devillis, R. (2003), *Scale Development: Theory and Applications. Applied Social Research Methods Series*, Sage Publications, Thousand Oaks, CA.
- Disterheft, A., da Silva Caeiro, S.S.F., Ramos, M.R. and de Miranda Azeiteiro, U.M. (2012), "Environmental management systems (EMS) implementation processes and practices in European higher education institutions – top-down versus participatory approaches", *Journal of Cleaner Production*, Vol. 31, pp. 80-90.
- Dües, C.M., Tan, K.H. and Lim, M. (2013), "Green as the new Lean: how to use Lean practices as a catalyst to greening your supply chain", *Journal of cleaner production*, Vol. 40, pp. 93-100.
- Ehrenfeld, J. (2004), "Industrial ecology: a new field or only a metaphor?", *Journal of Cleaner Production*, Vol. 12 No. 8, pp. 825-831.
- Epstein, M.J. and Wisner, P.S. (2005), "Managing and controlling environmental performance: evidence from Mexico", *Advances in Management Accounting*, Vol. 14, pp. 115-137.
- Evans, J.D. (1996), *Straight Forward Statistics for the Behavioural Sciences*, Brooks/Cole Publishing, Pacific Grove, CA.
- Flynn, L.R. and Percy, D. (2001), "Four subtle sins in scale development: some suggestions for strengthening the current paradigm", *International Journal of Market Research*, Vol. 43 No. 4, pp. 409-423.
- Fraj-Andrés, E., Martínez-Salinas, E. and Matute-Vallejo, J. (2009), "A multidimensional approach to the influence of environmental marketing and orientation on the firm's organizational performance", *Journal of Business Ethics*, Vol. 88 No. 2, pp. 263-286.
- Gaglio, C.M. and Katz, J.A. (2001), "The psychological basis of opportunity identification: Entrepreneurial alertness", *Small Business Economics*, Vol. 16 No. 2, pp. 95-111.
- González-Benito, J. and González-Benito, Ó. (2006), "A review of determinant factors of environmental proactivity", *Business Strategy and the Environment*, Vol. 15 No. 2, pp. 87-102.
- Greve, A. and Salaff, J.W. (2003), "Social networks and entrepreneurship", *Entrepreneurship Theory and Practice*, Vol. 28 No. 1, pp. 1-22.
- Gualandris, J. and Kalchschmidt, M. (2014), "Customer pressure and innovativeness: their role in sustainable supply chain management", *Journal of Purchasing and Supply Management*, Vol. 20 No. 2, pp. 92-103.
- Hartman, C.L. and Stafford, E.R. (1998), "Crafting "enviropreneurial" value chain strategies through green alliances", *Business Horizons*, Vol. 41 No. 2, pp. 62-72.

- Hensley, R.L. (1999), "A review of operations management studies using scale development techniques", *Journal of Operations Management*, Vol. 17 No. 3, pp. 343-358.
- Hill, C.W., Hwang, P. and Kim, W.C. (1990), "An eclectic theory of the choice of international entry mode", *Strategic Management Journal*, Vol. 11 No. 2, pp. 117-128.
- Hinkin, T.R. (1995), "A review of scale development practices in the study of organizations", *Journal of Management*, Vol. 21 No. 5, pp. 967-988.
- Hofer, C., Cantor, D.E. and Dai, J. (2012), "The competitive determinants of a firm's environmental management activities: evidence from US manufacturing industries", *Journal of Operations Management*, Vol. 30 No. 1, pp. 69-84.
- Hoogendoorn, B., Guerra, D. and van, d. Z. (2015), "What drives environmental practices of SMEs?", *Small Business Economics*, Vol. 44 No. 4, pp. 759-781, available at: <http://dx.doi.org.ezproxy.newcastle.edu.au/10.1007/s11187-014-9618-9>
- Hu, L. t. and Bentler, P.M. (1999), "Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives", *Structural Equation Modeling: a Multidisciplinary Journal*, Vol. 6 No. 1, pp. 1-55.
- Hughes, M. and Morgan, R.E. (2007), "Deconstructing the relationship between entrepreneurial orientation and business performance at the embryonic stage of firm growth", *Industrial Marketing Management*, Vol. 36 No. 5, pp. 651-661.
- Hyman, L., Lamb, J. and Bulmer, M. (2006), "The use of pre-existing survey questions: implications for data quality", *Proceedings of Q2006 European Conference on Quality in Survey Statistics*, Cardiff (April 2006), available at: <http://eprints.port.ac.uk/4300/>
- Jabbour, C.J.C., de Sousa Jabbour, A.B.L., Govindan, K., Teixeira, A.A. and de Souza Freitas, W.R. (2013), "Environmental management and operational performance in automotive companies in Brazil: the role of human resource management and lean manufacturing", *Journal of Cleaner Production*, Vol. 47, pp. 129-140.
- Jabbour, C.J.C., Jugend, D., de Sousa Jabbour, A.B.L., 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*, Vol. 87, pp. 442-451, available at: <http://dx.doi.org/10.1016/j.jclepro.2014.09.036>
- Jack, S.L. and Anderson, A.R. (2002), "The effects of embeddedness on the entrepreneurial process", *Journal of Business Venturing*, Vol. 17 No. 5, pp. 467-487.
- Jain, V. and Sharma, S. (2014), "Drivers affecting the green supply chain management adaptation: a review", *IUP Journal of Operations Management*, Vol. 13 No. 1, pp. 54-63.
- Jänicke, M. (2008), "Ecological modernisation: new perspectives", *Journal of Cleaner Production*, Vol. 16 No. 5, pp. 557-565.
- Jansen, J.J., Van Den Bosch, F.A. and Volberda, H.W. (2006), "Exploratory innovation, exploitative innovation, and performance: effects of organizational antecedents and environmental moderators", *Management science*, Vol. 52 No. 11, pp. 1661-1674.
- Karagozoglu, N. and Lindell, M. (2000), "Environmental management: testing the win-win model", *Journal of Environmental Planning and Management*, Vol. 43 No. 6, pp. 817-829.
- Kemp, R. and Hanemaaijer, J. (2004), "Perception of competition", white paper, Scales, Zoetermeer.
- Keogh, P.D. and Polonsky, M.J. (1998), "Environmental commitment: a basis for environmental entrepreneurship?", *Journal of Organizational Change Management*, Vol. 11 No. 1, pp. 38-49.
- Kessler, E.H. and Chakrabarti, A.K. (1996), "Innovation speed: a conceptual model of context, antecedents, and outcomes", *Academy of Management Review*, Vol. 21 No. 4, pp. 1143-1191.
- Khanna, M. and Anton, W.R.Q. (2002), "Corporate environmental management: regulatory and market-based incentives", *Land Economics*, Vol. 78 No. 4, pp. 539-558.
- Khanna, M. and Speir, C. (2013), "Motivations for proactive environmental management", *Sustainability*, Vol. 5 No. 6, pp. 2664-2692.

-
- Kline, T. (2005), *Psychological Testing: A Practical Approach to Design and Evaluation*, SAGE Publications, Thousand Oaks, CA.
- Knight, G. (2000), "Entrepreneurship and marketing strategy: the SME under globalization", *Journal of International Marketing*, Vol. 8 No. 2, pp. 12-32.
- Kor, Y.Y., Mahoney, J.T. and Michael, S.C. (2007), "Resources, capabilities and entrepreneurial perceptions*", *Journal of Management Studies*, Vol. 44 No. 7, pp. 1187-1212.
- Kumar, S., Teichman, S. and Timpernagel, T. (2012), "A green supply chain is a requirement for profitability", *International Journal of Production Research*, Vol. 50 No. 5, pp. 1278-1296.
- Lee, S.M., Rha, J.S., Choi, D. and Noh, Y. (2013), "Pressures affecting green supply chain performance", *Management Decision*, Vol. 51 No. 8, pp. 1753-1768.
- Leyden, D.P., Link, A.N. and Siegel, D.S. (2014), "A theoretical analysis of the role of social networks in entrepreneurship", *Research Policy*, Vol. 43 No. 7, pp. 1157-1163.
- Lin, R.-J., Chen, R.-H. and Huang, F.-H. (2014), "Green innovation in the automobile industry", *Industrial Management & Data Systems*, Vol. 114 No. 6, pp. 886-903.
- Lin, S. (2013), "Measuring marketing constructs: a comparison of three measurement theories", Doctoral dissertation, Norwegian School of Economics, Bergen Norway.
- Linan, F. (2008), "Skill and value perceptions: how do they affect entrepreneurial intentions?", *International Entrepreneurship Management*, Vol. 4, pp. 257-272, doi: 10.1007/s11365-008-0093-0.
- Liu, X., Wang, C., Shishime, T. and Fujitsuka, T. (2010), "Environmental activism of firm's neighboring residents: an empirical study in China", *Journal of Cleaner Production*, Vol. 18 No. 10, pp. 1001-1008.
- López-Gamero, M.D., Molina-Azorín, J.F. and Claver-Cortés, E. (2010), "The potential of environmental regulation to change managerial perception, environmental management, competitiveness and financial performance", *Journal of Cleaner Production*, Vol. 18 No. 10, pp. 963-974.
- Lotz, H. and Van der Merwe, S. (2013), "An investigation of the influence of entrepreneurial orientation on the perceived success of agribusinesses in South Africa", *South African Journal of Business Management*, Vol. 44 No. 1, pp. 15-32.
- Lu, J., Yao, J.E. and Yu, C.-S. (2005), "Personal innovativeness, social influences and adoption of wireless internet services via mobile technology", *The Journal of Strategic Information Systems*, Vol. 14 No. 3, pp. 245-268.
- Lumpkin, G.T. and Dess, G.G. (1996), "Clarifying the entrepreneurial orientation construct and linking it to performance", *Academy of management Review*, Vol. 21 No. 1, pp. 135-172.
- MacKenzie, S.B., Podsakoff, P.M. and Podsakoff, N.P. (2011), "Construct measurement and validation procedures in MIS and behavioral research: integrating new and existing techniques", *MIS Quarterly*, Vol. 35 No. 2, pp. 293-334.
- Mahmoud, M.A., Muharam, F.M. and Mas'ud, A. (2015), "Factors that influence the entrepreneurial intention of nigerian postgraduates: preliminary analysis and data screening", *Asian Social Science*, Vol. 11 No. 4, pp. 180-189.
- Malebana, M.J. (2014), "Entrepreneurial intentions and entrepreneurial motivation of south african rural university students", *Journal of Economics and Behavioral Studies*, Vol. 6 No. 9, pp. 709-726.
- Malebana, M.J. and Swanepoel, E. (2014), "The relationship between exposure to entrepreneurship education and entrepreneurial self-efficacy", *Southern African Business Review*, Vol. 18 No. 1, pp. 1-26.
- Martin-Tapia, I., Aragón-Correa, J.A. and Rueda-Manzanares, A. (2010), "Environmental strategy and exports in medium, small and micro-enterprises", *Journal of World Business*, Vol. 45 No. 3, pp. 266-275.
- Mathiyazhagan, K., Govindan, K. and Noorul Haq, A. (2013), "Pressure analysis for green supply chain management implementation in Indian industries using analytic hierarchy process", *International Journal of Production Research*, Vol. 52 No. 1, pp. 188-202, doi: 10.1080/00207543.2013.831190.

- Mathiyazhagan, K., Govindan, K. and Noorul Haq, A. (2014), "Pressure analysis for green supply chain management implementation in Indian industries using analytic hierarchy process", *International Journal of Production Research*, Vol. 52 No. 1, pp. 188-202.
- Menon, A. and Menon, A. (1997), "Enviropreneurial marketing strategy: the emergence of corporate environmentalism as market strategy", *The Journal of Marketing*, Vol. 61 No. 1, pp. 51-67.
- Miles, M.P. and Covin, J.G. (2000), "Environmental marketing: a source of reputational, competitive, and financial advantage", *Journal of Business Ethics*, Vol. 23 No. 3, pp. 299-311.
- Minnett, S. and Ellis, S. (1997), "Using empowerment to turn employees into entrepreneurs-an internalization too far?", *Training for Quality*, Vol. 5 No. 2, pp. 78-83.
- Mohamad, A., Hussin, M. and Buang, N.A. (2014), "Exploring dimensions of entrepreneurial skills among student enterprise at higher learning institution in Malaysia: a case of student enterprise of university Utara Malaysia", *International Multilingual Journal of Contemporary Research*, Vol. 2 No. 2, pp. 37-51.
- Narasimham, V., Venkatasubbaiah, K. and Avadhani, P.S. (2012), "Identification of critical SSCM activities through confirmatory factor analysis", *International Journal for Quality Research*, Vol. 7 No. 2, pp. 239-248.
- Nunnally, J.C. and Bernstein, H. (1978), *Psychometric Theory*, McGraw-Hill, New York, NY.
- Nunnally, J.C. and Bernstein, I. (1994), *Psychometric Theory*, 3rd ed., McGraw-Hill, New York, NY.
- Pålsson, H. and Kovács, G. (2014), "Reducing transportation emissions: a reaction to stakeholder pressure or a strategy to increase competitive advantage", *International Journal of Physical Distribution & Logistics Management*, Vol. 44 No. 4, pp. 283-304.
- Panayides, P. (2006), "Enhancing innovation capability through relationship management and implications for performance", *European Journal of Innovation Management*, Vol. 9 No. 4, pp. 466-483.
- Papachristos, G. (2014), "Transition inertia due to competition in supply chains with remanufacturing and recycling: a systems dynamics model", *Environmental Innovation and Societal Transitions*, Vol. 12, pp. 47-65.
- Papagiannakis, G. and Lioukas, S. (2012), "Values, attitudes and perceptions of managers as predictors of corporate environmental responsiveness", *Journal of Environmental Management*, Vol. 100, pp. 41-51.
- Park, J. (2009), "The relationship between top managers' environmental attitudes and environmental management in hotel companies", doctoral dissertation, Virginia Polytechnic Institute and State University, Blacksburg.
- Paulraj, A. (2011), "Understanding the relationships between internal resources and capabilities, sustainable management and organizational sustainability", *Journal of Supply Chain Management*, Vol. 47 No. 1, pp. 19-37.
- Plouffe, S., Lanoie, P., Berneman, C. and Vernier, M.F. (2011), "Economic benefits tied to ecodesign", *Journal of Cleaner Production*, Vol. 19 No. 6, pp. 573-579.
- Porter, M.E. (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, Free Press, New York, NY.
- Quirk, T.J., Quirk, M. and Horton, H.F. (2013), *Excel 2010 for Physical Sciences Statistics: A Guide to Solving Practical Problems*, Springer International Publishing Switzerland, doi: 10.1007/978-3-319-00630-7-1.
- Rauch, A., Wiklund, J., Lumpkin, G.T. and Frese, M. (2009), "Entrepreneurial orientation and business performance: an assessment of past research and suggestions for the future", *Entrepreneurship theory and practice*, Vol. 33 No. 3, pp. 761-787.
- Regnault, A., Balp, M.-M., Kulich, K. and Viala-Danten, M. (2012), "Validation of the treatment satisfaction questionnaire for medication in patients with cystic fibrosis", *Journal of Cystic Fibrosis*, Vol. 11 No. 6, pp. 494-501.

- Rivera, J. and Delmas, M. (2004), "Business and environmental protection: an introduction", *Human Ecology Review*, Vol. 11 No. 3, pp. 587-604.
- Robledo, J.L.R., Arán, M.V. and Pérez-Aranda, J. (2015), "Gestión del conocimiento y orientación al marketing interno en el desarrollo de ventajas competitivas en el sector hotelero", *Investigaciones Europeas de Dirección y Economía de la Empresa*, Vol. 21 No. 2, pp. 84-92.
- Roscoe, J.T. (1975), *Fundamental Research Statistics for the Behavioural Sciences (by) John T. Roscoe*, Holt, Rinehart and Winston, New York, NY.
- Salavou, H. (2005), "Do customer and technology orientations influence product innovativeness in SMEs? Some new evidence from Greece", *Journal of marketing management*, Vol. 21 Nos 3-4, pp. 307-338.
- San Martín, H. and Herrero, Á. (2012), "Influence of the user's psychological factors on the online purchase intention in rural tourism: integrating innovativeness to the UTAUT framework", *Tourism Management*, Vol. 33 No. 2, pp. 341-350.
- Savundranayagam, M.Y., Hummert, M.L. and Montgomery, R.J. (2005), "Investigating the effects of communication problems on caregiver burden", *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, Vol. 60 No. 1, pp. S48-S55.
- Schwab, D.P. (1980), "Construct validity in organizational behavior", *Research in organizational behavior*, Vol. 2 No. 1, pp. 3-43.
- Silajdžić, I., Kurtagić, S.M. and Vučijak, B. (2015), "Green entrepreneurship in transition economies: a case study of Bosnia and Herzegovina", *Journal of Cleaner Production*, Vol. 88, pp. 376-384.
- Smith, A.M. (1999), "Some problems when adopting Churchill's paradigm for the development of service quality measurement scales", *Journal of Business Research*, Vol. 46 No. 2, pp. 109-120.
- Thun, J.H. and Müller, A. (2010), "An empirical analysis of green supply chain management in the German automotive industry", *Business Strategy and the Environment*, Vol. 19 No. 2, pp. 119-132.
- Tseng, M.L., Lin, Y.H. and Chiu, A.S. (2009), "Fuzzy AHP-based study of cleaner production implementation in Taiwan PWB manufacturer", *Journal of Cleaner Production*, Vol. 17 No. 14, pp. 1249-1256.
- Tseng, M.-L., Lin, R.-J., Lin, Y.-H., Chen, R.-H. and Tan, K. (2014), "Close-loop or open hierarchical structures in green supply chain management under uncertainty", *Expert Systems with Applications*, Vol. 41 No. 7, pp. 3250-3260.
- Uganda Bureau of Statistics (2011), "Census business establishments report 2010/2011", Kampala Uganda, available at: www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/2010%20COBE%20Report.pdf/ (accessed 21 August 2014).
- Varadarajan, P.R. (1992), "Marketing's contribution to strategy: the view from a different looking glass", *Journal of the Academy of Marketing Science*, Vol. 20 No. 4, pp. 335-343.
- Veciana, J.M. and Urbano, D. (2008), "The institutional approach to entrepreneurship research. introduction", *International Entrepreneurship and Management Journal*, Vol. 4 No. 4, pp. 365-379.
- Wagener, S., Gorgievski, M. and Rijdsdijk, S. (2010), "Businessman or host? Individual differences between entrepreneurs and small business owners in the hospitality industry", *Service Industries Journal*, Vol. 30 No. 9, pp. 1513-1527, doi: 10.1080/02642060802624324.
- Walker, H., Di Sisto, L. and McBain, D. (2008), "Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors", *Journal of Purchasing and Supply Management*, Vol. 14 No. 1, pp. 69-85.
- Weerawardena, J. and Mort, G.S. (2006), "Investigating social entrepreneurship: a multidimensional model", *Journal of World Business*, Vol. 41 No. 1, pp. 21-35.
- Wiklund, J. (1999), "The sustainability of the TQ; entrepreneurial orientation-performance relationship", available at: https://scholar.google.com.au/scholar?q=The+Sustainability+of+the+TQ%3B+Entrepreneurial+Orientation+%E2%80%94+Performance+Relationship&btnG=&hl=en&as_sdt=0%2C5/ (accessed 20 March 2015).

- Wing-Hung Lo, C., Fryxell, G.E. and Tang, S.-Y. (2010), "Stakeholder pressures from perceived environmental impacts and the effect on corporate environmental management programmes in China", *Environmental Politics*, Vol. 19 No. 6, pp. 888-909.
- Wu, G.-C., Ding, J.-H. and Chen, P.-S. (2012), "The effects of GSCM drivers and institutional pressures on GSCM practices in Taiwan's textile and apparel industry", *International Journal of Production Economics*, Vol. 135 No. 2, pp. 618-636.
- Xu, F. and Fox, D. (2014), "Modelling attitudes to nature, tourism and sustainable development in national parks: a survey of visitors in China and the UK", *Tourism Management*, Vol. 45, pp. 142-158.
- Zaheer, A., Rehman, K.U. and Khan, M.A. (2010), "Development and testing of a business process orientation model to improve employee and organizational performance", *African Journal of Business Management*, Vol. 4 No. 2, pp. 149-161.
- Zahra, S.A. (1993), "Environment, corporate entrepreneurship, and financial performance: a taxonomic approach", *Journal of Business Venturing*, Vol. 8 No. 4, pp. 319-340, doi: [http://dx.doi.org/10.1016/0883-9026\(93\)90003-N](http://dx.doi.org/10.1016/0883-9026(93)90003-N).
- Zahra, S.A., Neubaum, D.O. and Huse, M. (2000), "Entrepreneurship in medium-size companies: exploring the effects of ownership and governance systems", *Journal of Management*, Vol. 26 No. 5, pp. 947-976.
- Zellweger, T. and Sieger, P. (2012), "Entrepreneurial orientation in long-lived family firms", *Small Business Economics*, Vol. 38 No. 1, pp. 67-84.
- Zhao, H. and Seibert, S.E. (2006), "The big five personality dimensions and entrepreneurial status: a meta-analytical review", *Journal of Applied Psychology*, Vol. 91 No. 2, pp. 259.
- Ziegler, A. and Nogareda, J.S. (2009), "Environmental management systems and technological environmental innovations: exploring the causal relationship", *Research Policy*, Vol. 38 No. 5, pp. 885-893.
- Zwerg-Villegas, A.M. (2012), "Incidences and analyses of green marketing strategy in colombian exports", *AD-minister*, Vol. 13 No. 2, pp. 9-19.

Further reading

- Gualandris, J. and Kalchschmidt, M. (2013), "How does innovativeness foster sustainable supply chain management? A multiple case analysis", *Academy of Management Proceedings*, Vol. 2013 No. 1, p. 12064.
- Gualandris, J. and Kalchschmidt, M. (2015), "How does innovativeness foster sustainable supply chain management?", *Sustainable Operations Management*, pp. 103-129.
- Huntgeburth, J., Förderer, J. and Veit, D. (2013), "Up in the cloud: understanding the chasm between expectations and reality", *Thirty Fourth International Conference on Information Systems, Milan*, pp. 1-12.
- Nunnally, J.C., Bernstein, I.H. and Berge, J.M. (1967), *Psychometric Theory*, Vol. 226, McGraw-Hill, New York, NY.

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