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The Impact of External Pressure and Sustainable Management Practices on Manufacturing Performance and Environmental Outcomes

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Review

The Impact of External Pressure and Sustainable Management Practices on Manufacturing Performance and Environmental Outcomes

Purpose: The study investigates the direct effect of external pressure on environmental outcomes and manufacturing performance and examines –the mediating effect of sustainable management practice.

Design/methodology/approach: This study draws upon Institutional Theory and Resource Based View to understand how factors such as external pressure and sustainable management relate with environmental outcomes and manufacturing performance. The model specifies previously unexplored direct and mediating relationships between external pressure, sustainable management, environmental outcomes and manufacturing performance. The empirical analysis is based on data collected from the sixth edition of the International Manufacturing Strategy Survey (IMSS). The research hypotheses are tested using Structural Equation Modelling.

Findings: Results show that while there is a significant direct and mediating relationship between external pressure, adoption of formal sustainability programs and environmental outcomes, such significant relationships do not exist with manufacturing performance.

Practical implications: The study shows that external pressure can influence adoption of sustainable practices but this does not necessarily lead to an improvement in manufacturing performance. As such managers need to identify the actual benefits of sustainability and weigh them up against costs of implementing such programs.

Originality/value: The relationship between the adoption of sustainable practices and organisational performance is a complex one. In contrast to previous studies, this study found that while external pressure and sustainable management relate positively with environmental

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3 outcomes, no such relationship exists with manufacturing performance. This raises a number of
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6 question marks over naive implementation of sustainable strategies.
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11 **Keywords:** Sustainable Management, environmental, manufacturing performance, survey
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14 **Article Classification:** Research Paper
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For Peer Review

Introduction

Adoption of sustainable management practices is becoming increasingly important for organisations worldwide. Several studies have examined sustainable practices and their impact on organisational performance. A significant body of the literature has focused on green supply chain management (GSCM) with the primary argument that supply chain partners, particularly customers, drive organisations to adopt sustainable management practices (Diabat and Govindan, 2011; Wu *et al.*, 2011). Nevertheless, the pressure to be sustainable can come from a number of different sources, including supply chain partners as well as other stakeholders such as competitors, society and regulators (Walker *et al.*, 2008; Zhu and Sarkis, 2007). Walker *et al.* (2008) also identify social drivers such as consumer criticism and pressure from the public and environmental groups. However, there is a lack of understanding of the impact of the combined effect of such external pressure on organisational performance. According to Zhu and Sarkis (2007), the ability of production managers, particularly those in developing countries, to manage economic and environmental performance in a more strategic manner can be improved by having an understanding of the effects of environmental pressure.

This study, based on manufacturers in three Asian countries – Malaysia, India and China – examines the impact of external pressure on environmental outcomes and manufacturing performance. In particular, it investigates the direct effect of external pressure on environmental outcomes and manufacturing performance and the mediating effect of formal sustainable management practice. In other words, does external pressure on its own affect environmental outcomes and manufacturing performance or is its impact mediated through other relationships.

Focus on manufacturing performance is an important dimension of this study. Several studies have examined the effect of GSCM on organisational performance from the perspective

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3 of economic outcomes by examining factors such as profitability, market share, waste reduction
4 and productivity (e.g. De Giovanni, 2012; Eltayeb *et al.*, 2011). However, the impact on
5 manufacturing performance is less well understood. For many companies, manufacturing
6 performance is an important measure of their success and cost base, making it important to
7 understand how the pressure to be more sustainable in their operations impacts their
8 manufacturing performance.
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These issues are examined through the lens of two theoretical perspectives – Institutional Theory and Resource Based View (RBV). In effect, this study examines if institutional forces can solely be responsible for improved environmental and manufacturing performance or if it is necessary to adopt a resource based strategy as a mediating factor to achieve improved performance. An understanding of such relationships is important in enabling manufacturers to strategically manage external pressure. Zhu *et al.* (2005) argued that organisations need to understand the importance of gaining competitive advantage by changing in accordance to external pressure for sustainable practices. The authors of this paper agree and extend this perspective in suggesting that external pressures from various stakeholders may become so overwhelming that organisations become reactive or simply crumble and consequently, fail to turn the pressure into an advantage.

The study is organised as follows: the next section presents a review of the literature and the study's hypotheses. Thereafter, the research methodology is described and followed by the findings and discussion. Finally the study's conclusions are presented.

Literature review and hypotheses

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3 The development of sustainable practices within supply chains has generated much debate within
4 the academic literature as well as among industry practitioners. Seuring and Muller (2008, p.
5 1700) defined sustainable supply chain management as “the management of material,
6 information and capital flows as well as cooperation among companies along the supply chain
7 while taking goals from all three dimensions of sustainable development, i.e., economic,
8 environmental and social, into account which are derived from customer and stakeholder
9 requirements”. This perspective emphasises two key issues that are relevant to this study. First is
10 the specification that customers and other stakeholder requirements are important in the pursuit
11 of sustainability. Second is the identification of the potential links between sustainable practices
12 and different dimensions of development – economic, environmental and social. These
13 dimensions of development have also been identified in different studies as important
14 measurement areas where organisations need to focus their sustainable practices (Green *et al.*,
15 2012; Zailani *et al.*, 2012). The implication is that organisations that adopt sustainable practices
16 can expect such practices to have an impact on their performance.
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36 Evidence concerning the potential impact that sustainable practices have on performance
37 is mixed. Rao and Holt (2005) and Green *et al.* (2012) suggested that organisational performance
38 can be positively impacted by the adoption of sustainable practices, but studies by De Giovanni
39 and Vinzi (2012) and Huang *et al.* (2012) failed to find such relationships. Another set of studies
40 including Azevedo *et al.* (2011) and Wu and Pagell (2011) suggested that the relationships
41 between sustainable practices and organisational performance were part positive. These studies
42 indicated that the nature of the relationship was dependent on the particular performance
43 measures considered.
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Theoretical perspectives

The issues relating to the influence of supply chain partners and other stakeholders as well as the potential impact of sustainable practices raises interesting questions about the imperative for organisations to adopt such practices. This study examines these questions from two theoretical perspectives – Institutional Theory and Resource Based View (RBV).

Institutional Theory suggests that organisations are subject to three types of forces - normative, mimetic and coercive (DiMaggio and Powell, 1983; Meyer and Rowan, 1977). Normative forces refer to the pressure placed on organisations by market forces, such as customers, to adopt certain practices (Scott, 1995). Such pressure can be important as organisations need to find legitimacy in the eyes of important commercial partners. On the other hand, organisations operate in a competitive environment and need to be aware of the activities of their competitors. This can create pressure to copy or ‘mimic’ the activities of more successful competitors. This pressure encapsulates the essence of mimetic forces. Coercive forces refer to the pressure to conform or adopt certain practices based on the demands from regulatory authorities or other pressure groups. Within the context of sustainability, Zhu and Sarkis (2007) asserted that organisations are subject to all three forces. In addition, they noted that manufacturers are considered to be greater polluters and responsible for higher depletion of resources than others and are therefore are subject to greater pressure. Similarly, Hsu *et al.* (2013) found that manufacturers in Malaysia were compelled by institutional forces to become more environmentally responsible in their operations. Their study found that competitor pressure and regulatory pressure were particularly strong in this respect. The study by Zhu *et al.* (2007) also confirmed that manufacturers in China are faced by increasing institutional pressure to become sustainable in their operations. This study therefore adopts a view that manufacturers operate in

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3 an environment where they are subject to external pressure from different external stakeholders
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5 to be sustainable in their operations. The key issue is developing an understanding of what is the
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7 impact of such intense pressure.
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10 RBV suggests that organisations are able to develop certain resources and competencies
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12 that can be used to improve their level of performance and competitiveness (Halley and Beaulieu,
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14 2009). According to RBV, the resources and competencies to be leveraged can be considered to
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16 be valuable, rare, inimitable and non-substitutable and the ability to effectively leverage these
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18 resources is what leads to competitive advantage (Barney and Griffin, 1992). Within the context
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20 of sustainability, Shang *et al.* (2010) and Menguc and Ozanne (2005) suggested that RBV theory
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22 is a relevant theory with respect to gaining competitive advantage. Within the context of
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24 implementation of green practices, Shang *et al.* (2010) highlighted the applicability of RBV in
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26 understanding the relationship between GSCM capability and organisational performance. In
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28 addition, Shi *et al.* (2012) noted that RBV theory had been used in several studies in order to
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30 understand the link between GSCM and organisational performance improvement. Shi *et al.*
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32 (2012) further suggested there needed to be better understanding of the role of RBV in GSCM
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34 development.
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40 In a study of GSCM boundaries and flow, Sarkis (2012) suggested that both Institutional
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42 Theory and RBV are applicable in understanding relationships and performance. Sarkis
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44 suggested that Institutional Theory is relevant in understanding the adoption of green practices
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46 due to external pressure whilst RBV is relevant to understanding the impact of the development
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48 of internal capabilities and resources. Given that manufacturers may be driven by institutional
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50 forces to implement sustainable practices and at the same time are constrained by their RBV-led
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52 resources and competencies, it is unclear how these two dimensions not only relate to each other
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3 but what performance outcomes of this interaction are for the organisation. Are both dimensions
4 necessary for competitive advantage, or is one more dominant than the other? Given the
5 ambiguity of the findings of previous studies regarding the relationship between sustainability
6 and economic performance, and the suggestion by Zhu and Sarkis (2007) that manufacturers
7 typically consider economic performance to be a key priority, this study examines economic
8 performance from a set of variables that specifically relate to manufacturing performance. Not
9 only has manufacturing performance not been studied from a sustainability perspective, it is
10 important to note that for manufacturers, the actual performance of their manufacturing
11 operations is one of the most important, if not the most important economic measure. It is also a
12 direct outcome of their core competencies.
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29 *The effect of External Pressure*

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31 Diabat and Govindan (2011) and Lee (2008) noted the importance of external pressure with
32 regards to implementing sustainable practices and suggested that such pressure is increasingly
33 becoming dominant. This perspective was also identified by Linton *et al.* (2007) who noted that
34 organisations worldwide are increasingly subject to legislation that encourages them to reduce
35 the polluting effects of product and process activities. The increasing awareness of consumers in
36 addition to other external pressures to be sustainable were identified by Diabat and Govindan
37 (2011) when they identified customers, investors and non-governmental organisations as drivers
38 of sustainability. In addition, Lee (2008) identified the effect of suppliers in driving sustainability.
39 However, it has been suggested that external pressure also includes social pressure and ethical
40 conduct as important dimensions of sustainability (Baden *et al.*, 2009; Ciliberti *et al.*, 2008;
41 Faisal, 2010). This suggests organisations face significant external pressure to be sustainable.
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3 However, Zhu *et al.* (2008) argued that organisations need to turn the pressure that they face into
4 an advantage. One such potential advantage is environmental outcomes experienced by the
5 organisation. Therefore, the following is proposed.
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12 *H1. External pressure will lead directly to an improvement in environmental outcomes.*
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17 However, for manufacturers, economic performance is also important, particularly
18 manufacturing performance. Manufacturing performance with respect to sustainability refers to
19 the ability of manufacturers to reduce waste, reduce the use of resources/energy and improve
20 productivity (Eltayeb *et al.*, 2011; Theyel, 2000; Zhu and Sarkis, 2004). Therefore, it is proposed
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32 *H2. External pressure will lead directly to an improvement in manufacturing performance.*
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36 However, the goal of external pressure may not necessarily be related to organisational
37 performance of the focal firm. Indeed many external stakeholders are not particularly driven by
38 the performance imperatives of the organisation. For example, regulatory agencies may drive
39 reduction of pollution and promote recycling, irrespective of whether or not this leads to
40 improved economic performance for the organisation, while customers may be driven by a need
41 to conform to their own sustainability agenda (Laosirihongthong *et al.*, 2013). Similarly, social
42 pressures may simply be to encourage responsible corporate citizenship (Awaysheh and Klassen.,
43 2010; Baden *et al.*, 2009). Therefore, the direct effect of external pressure can drive
44 implementation of visible and demonstrable sustainability management initiatives.
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6 *H3. External pressure will lead to an increased emphasis on sustainable management initiatives.*
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The effect of Sustainable Management Initiatives

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12 Sustainable management initiatives have been the focus of several studies – primarily in the
13 Corporate Social Responsibility (CSR), Business Ethics and GSCM fields. While the GSCM
14 literature has been mainly concerned with environmental sustainability (e.g. Laosirihingthong *et*
15 *al.*, 2013; Zhu and Sarkis, 2004), the CSR and Business ethics literature has also considered
16 social sustainability (e.g. Awaysheh and Klassen., 2010; Tsoi, 2010). There has been
17 considerable attention paid to the need to manage sustainability by launching formal programmes
18 through adoption of international standards. For example, Tsoi (2010) alludes to the pressure on
19 organisations to attain Social Accountability (SA 8000) standards, and Vachon (2007) notes the
20 increasing pressure to adopt formal environmental standards, such as ISO 14001. In addition,
21 Tsoi (2010) identified the importance of having formal training programmes for sustainability
22 management. Clearly there is pressure on organisations to implement some form of
23 Environmental Management System (Large and Thomsen, 2011; Sarkis, 2012; Zhu *et al.*, 2005).
24 However, the implementation of such programmes requires the injection of resources and the
25 acquisition of new knowledge or skills. From a RBV perspective, the availability of such
26 resources, knowledge and skills could lead to competitive advantage. There is an expectation that
27 the implementation of such formal initiatives will lead to some benefits for organisations,
28 including environmental outcomes such as environment friendly products and processes,
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53 Therefore, the following hypothesis is proposed:
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3 *H4: Improvement in sustainable management practices will lead to an improvement in*
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6 *environmental outcome*
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11 There has been considerable debate about the potential for sustainability programmes to lead to
12 improved economic outcomes. Wittstruck and Teuteberg (2012) and Zailani *et al.* (2012) found
13 that implementation of sustainable management can have positive economic outcomes. While the
14 specific impact on manufacturing performance has not been clarified, there has been some
15 suggestion that sustainable management can have a positive impact on aspects of manufacturing
16 performance, such as energy consumption, material usage (Rao, 2002; Zhu *et al.*, 2012) and
17 improved product design. Therefore, the following hypothesis is proposed.
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29 *H5: Improvement in sustainable management practices will lead to an improvement in*
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31 *manufacturing performance.*
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37 Though not initially considered or hypothesised, this study later considered the ability of
38 sustainable management to mediate the relationship between external pressure and
39 environmental outcomes. External pressure to consider environmental and social issues could
40 lead firms to adopt formal sustainable management programmes, and lead to the achievement of
41 improved environmental results. In effect, can institutional pressure to consider environmental
42 and social impact lead to competence building strategies based on RBV to create competitive
43 advantage with respect to environmental outcomes.
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3 *H6: Sustainable management practices will mediate the relationship between external pressure*
4 *and environmental outcomes.*
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10 ***The Asian Context***

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12 This study is based on data collected from three Asian countries – China, India and Malaysia.
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14 Increasing outsourcing of global manufacturing to these Asian countries makes this a topical
15 study and a particularly relevant region to study. The increasing external pressure on Asian
16 manufacturers to adopt environmental and social practices is well documented in literature (e.g.
17 Eltayeb *et al.*, 2011; Tsoi, 2010; Zhu and Sarkis, 2007). However, the cost of adopting such
18 practices has been identified as a major barrier in such countries (Gulger and Shi, 2009; Lund-
19 Thomsen and Nadvi, 2010). In these countries, manufacturing performance is an important
20 outcome that needs to be measured in its own right because they characterised by intense
21 competition based on low-cost value proposition. If there are clear links between adoption of
22 environmental and social practices with manufacturing performance, the drive to adopt such
23 practices could become self-propelling.
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41 **Research Methodology**

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43 Data for this study were collected from the sixth round of the International Manufacturing
44 Strategy Survey (IMSS) (The International Manufacturing Strategy Survey, 2014). IMSS-VI was
45 carried out in 23 countries between July 2013 and June 2014. This global project collected data
46 from plant, production or operations manager of manufacturing firms listed in the International
47 Standard Industrial Classification (ISIC) codes ranging from 25, 26, 27, 28, and 29 to 30. IMSS-
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3 VI used a self-administered survey questionnaire and the research was centrally coordinated to
4 ensure consistency in data collection procedures across different countries.
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8 IMSS-VI data collection used two sampling methods, namely convenience and random
9 sampling. For random sampling, each country coordinator was required to establish a sampling
10 frame of the population of the companies in the respective country using national databases. The
11 selection was restricted to companies with the six ISIC codes (i.e., 25, 26, 27, 28, 29 and 30) and
12 with more than 50 employees (per company). Next, each country coordinator randomly selected
13 and contacted the companies from the sampling frame. For convenience sampling, country
14 coordinators directly contacted companies that participated in previous IMSS editions or that
15 researchers know previously. Given that IMSS is a longitudinal project, country coordinators
16 who participated in IMSS I, II, III, IV and/or V were advised to invite all the companies that
17 were in the database in the previous releases, in order to maximize the overlap between the
18 samples. For both convenience and random sampling, country coordinators were advised to first
19 contact the potential respondents and check for their availability for research participation, prior
20 to survey distribution.
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38 Non-response bias and late-respondent bias test were performed and validated before
39 compilation of IMSS-VI dataset. For non-response bias test, each country coordinator was
40 required to run *t*-test and Chi-square test using the figures of sales, number of employees and
41 SIC code for respondents and non-respondents. For late- response bias, each coordinator was
42 required to run *t*-test and Chi-square test using the figures of sales, number of employees and
43 SIC code for early-respondents and late-respondents. Therefore, all three country samples used
44 in this study were checked and validated for non-response bias and late-response bias before
45 being added to the IMSS dataset.
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3 Data were systematically compiled in electronic spreadsheets by country coordinators.
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5 The central coordination at Politecnico di Milano (Italy) performed quality checks and released
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7 the final pooled data to the research network in September 2014.
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10 For the purpose of this study, a total of 159 datasets were analysed. The responses
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12 included 56 (35.2%) from China, 90 (56.6%) from India, and 13 (8.2%) from Malaysia. The
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14 three selected countries are emerging economy countries in Asia. The breakdown of companies
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16 with ISIC code is as follows: 23 (14.5%) with ISIC 25, 42 (26.4%) with ISIC 26, 27 (17%) with
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18 ISIC 27, 29 (18.2%) with ISIC 28, 30 (18.9%) with ISIC 29 and remaining 8 (5%) with ISIC 30.
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24 **Measures**

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26 The survey items are detailed in Table 1. We used a two-item scale from Sarkis *et al.*
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28 (2010) and Porter and Kramer (2002) to measure the level of external pressure. The two survey
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30 items were assessed using five-point Likert scale where 1 represents very low and 5 represents
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32 very strong. Sustainable management was measured using five items adapted from Kitazawa and
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34 Sarkis (2000), Longo *et al.* (2005), Daily and Huang (2001), Sarkis (1998), and Klassen and
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36 Whybark (1999). The question for sustainable management (i.e., effort put in the last three years
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38 into implementing) was evaluated on a five-point Likert scale where the anchors were 1=none
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40 and 5=high. A four-item scale was adapted from past studies (i.e., Ferdows and De Meyer, 1990;
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42 Pagell and Gobeli, 2009; Woo *et al.*, 2001) to measure the level of manufacturing performance.
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44 All responses for manufacturing performance (i.e., compared to three years ago) were captured
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46 using a five-point Likert scale where 1 represents decrease (-5% or worse), 2 represents stayed
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48 about the same (-5%/+5%), 3 represents slightly increased (+5 to +15%), 4 represents increased
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50 (+15% to 25%), and 5 represents strongly increased (+25% or better). The scale of
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3 environmental outcomes was measured using three items adapted from Gimenez *et al.* (2012),
4 and Maxwell and van der Vorst (2003). These items were assessed using a Likert scale where
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6 anchors ranging from 1 (not important) to 5 (very important).
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10 [Place Table 1]
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13 14 15 ***Scale validation*** 16

17 Table 2 shows the studied variables and their factor loadings. All the items of each scale had
18 high factor loadings between 0.779 and 0.875, meeting the desirable value of 0.50 (Hair *et al.*,
19 2010). Table 3 presents the results of descriptive, reliability and validity analyses. In this study,
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21 internal reliability and validity of the constructs were validated by examining the values of
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23 Cronbach's Alpha, composite reliability and the average variance extracted. As shown in Table 3,
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25 all variables had Cronbach's Alpha ranging from 0.700 to 0.898. The reliability was validated as
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27 the Cronbach Alpha was greater than the threshold of 0.70 (Hair *et al.*, 2010). Composite
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29 reliability values ranging from 0.867 to 0.925 were greater than the desirable threshold of 0.60
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31 recommended by Bagozzi and Yi (1988). In terms of validity analysis, the resulting average
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33 variance extracted for each scale ranged from 0.689 to 0.766, meeting the requirement for
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35 convergent validity. In addition, the values of square roots of average variance extracted were
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37 greater than the off-diagonal measures in the corresponding rows and columns in the correlation
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39 matrix, indicating that discriminant validity was established (Fornell and Larcker, 1981).
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50 [Place Table 3]
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53 The study used the SPSS and AMOS programs to analyse the data (see Figure 1). The
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55 hypothesized model was tested using SEM. There are several distinguished characteristics of
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3 SEM (also known as covariance structure analysis and latent variable analysis) which support the
4 use of SEM in this study. According to Hair *et al.* (2010) and Kline (2005), SEM has three main
5 characteristics: (1) ability to perform estimation of multiple and interrelated dependence
6 relationships; (2) represent unobserved concepts in the dependence relationships and account for
7 measurement error in the estimation process; and (3) construct a model to predict a full set of
8 relationships. In this study, the use of SEM provided an excellent way to (1) concurrently
9 analyse the multiple and interrelated dependence relationships; (2) accommodate measurement
10 errors directly in the estimation of a series of direct and mediating relationships (Hoyle and
11 Smith, 1994); (3) provide overall model fit indices to examine if the hypothesised models are
12 correctly specified (Peyrot, 1996). Using SEM, we ran a bootstrap of 600 samples with each
13 sample having 159 data points. In this study, the model fit was assessed using seven common
14 measures including normed chi square (χ^2), goodness-of-fit (GFI) index, adjusted goodness-of-fit
15 (AGFI) index, root mean square error of approximation (RMSEA), normed fit index (NFI),
16 Tucker Lewis index (TLI), and comparative fit index (CFI). Our hypothesized model fit the data
17 well with normed chi square (χ^2) = 1. 535, GFI = 0. 912, AGFI = 0. 868, RMSEA = 0. 058, NFI
18 = 0. 910, TLI = 0. 956, and CFI = 0. 966.

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3 As shown in Table 4 and Figure 2, the hypothesis testing results of the model indicated external
4 pressure ($\beta=0.410$; p-value < 0.001) was reported to have a significant and positive relationship
5 with environmental outcomes. External pressure ($\beta=0.335$; p-value < 0.01) was also found to
6 have a significant and positive relationship with sustainable management. Sustainable
7 management ($\beta=0.450$; p-value < 0.01) was positively related to environmental outcomes.
8 Interestingly, there were no significant relationships between external pressure and
9 manufacturing performance ($\beta=-0.114$; p-value > 0.05), and between sustainable management
10 and manufacturing performance ($\beta=0.182$; p-value > 0.05). As a result, hypotheses H1, H3 and
11 H4 were empirically supported. The findings did not support H2 and H5.
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24 [Place Figure 2]

25 [Place Table 4]

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29 The bootstrap approach introduced by Preacher and Hayes (2004) has been recognised as one of
30 the most widely used methods to test the mediation hypotheses. Therefore, the mediation
31 hypotheses in this paper were analysed using the bootstrap approach. As shown in Table 5, the
32 indirect effect of sustainable management on environmental outcomes was calculated as the
33 product of the path coefficients between external pressure and sustainable management ($\beta =$
34 0.335), and between sustainable management and environmental outcomes ($\beta = 0.450$). This
35 indirect effect coefficient was equal to 0.151, which can be tested for significance using the
36 bootstrap approach (Preacher and Hayes 2004). The results of bootstrapped tests are shown in
37 Table 6. The indirect effects were significant as the lower confidence interval of the bias
38 corrected bootstrap does not contain zero. Given that both direct and indirect effects were
39 significant, the mediating effects were supported for sustainable management. In other words,
40 H6 was supported.
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[Place Table 5]

[Place Table 6]

Discussion

There can be little doubt that organisations worldwide are facing increasing pressure to be more sustainable in their practices. The imperative to be more sustainable requires organisations to make changes or adopt practices that require resource allocation. The question that many organisations ask is whether adopting sustainable practices will lead to organisational improvement or not, and what is the nature and magnitude of improvement. This study provides new and significant insight into this on-going debate by examining whether the external pressure to be sustainable can enhance directly or indirectly two important dimensions of performance – environmental outcomes and manufacturing performance. The study has shown that external pressure has a significant direct and positive relationship with environmental outcomes. However, external pressure does not have a significant relationship with manufacturing performance. With respect to the mediating effect of sustainable management, the study finds sustainable management can mediate positively between external pressure and environmental outcomes but does not mediate between external pressure and manufacturing performance. In effect the study identifies a clear distinction in the relationships between environmental outcomes and manufacturing performance.

With respect to environmental outcomes, the study shows a significant relationship between external pressure and environmental outcomes. The findings from this study concur with those of Zailani *et al.* (2012) who found external pressure from regulation and customers to have a significant relationship with environmental outcomes. However, their study did not

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3 examine the relationship with manufacturing performance. This study also shows a significant
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5 relationship between external pressure and the adoption of sustainable management practices and
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7 a further significant relationship between the adoption of sustainable practices and environmental
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9 outcomes. This concurs with other studies, such as Testa and Iraldo (2010), Zhu and Sarkis
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11 (2004) and Eltayeb *et al.* (2011) in finding that adoption of sustainable practices leads to
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13 improved environmental outcomes. According to the findings of this study not only is external
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15 pressure is an important driver of the adoption of such sustainable practices but it has a direct
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17 impact on environmental outcomes. Therefore, this study confirms the pre-eminence of external
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19 pressure in driving environmental outcomes, irrespective of whether the relationship is mediated
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21 by the adoption of formal sustainable management programs, such as environmental certification,
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23 training and waste recycling programs. The practical implications of this finding are important. It
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25 suggests that while external pressure can drive organisations to implement formal sustainability
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27 programs and consequently improve environmental outcomes, the pressure on its own can also
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29 drive environmental outcomes even when such formal programs do not intermediate. This may
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31 suggest that informal programs implemented as a direct consequence of external pressure can
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33 also lead to improved environmental outcomes. For organisations in developing countries, where
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35 there may not be the opportunity to be certified to formal programs such as ISO 14001 or where
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37 the cost of such formal programs are prohibitive, this study indicates that it is still possible to
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39 achieve improved environmental outcomes.
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48 From a theoretical perspective, this study suggests institutional pressures can lead directly
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50 to improved environmental outcomes. However, institutional pressures can also lead to
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52 organisations gaining new competencies as a result of the implementation of formal sustainable
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54 practices and consequently improved environmental outcomes. Therefore, while institutional
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3 forces can positively influence environmental outcomes, resources can also act as a mediating
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5 factor to positively influence environmental outcomes. The study by Zhu *et al.* (2005) found that
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7 external pressure to be sustainable led to increased awareness among Chinese organisations, but
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9 did not necessarily translate to the strong adoption of green practices. The findings of this study
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11 suggest adopting a resource based strategy which implies implementing formal programs such as
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13 ISO 14001 and training is more likely to lead to longer term gains in environmental outcomes as
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15 opposed to only reacting to external pressure without formal programs in place. This is more
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17 likely to enable the awareness mentioned by Zhu *et al.* (2005) to be translated into established
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19 practices. In contrast, neither institutional forces nor the mediating factor of sustainable
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21 management relate to manufacturing performance. They suggest that while institutional
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23 pressures and RBV can lead to environmental outcomes, it is not necessary that both are present
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25 for an organisation to achieve positive environmental outcomes. What is unclear, however, is
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27 whether the presence of both external pressure (institutional pressure) and sustainability
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29 competencies (RBV) will lead to relatively better outcomes than the presence of just external
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31 pressure even though both dimensions have positive results.
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41 ***Effect on Manufacturing Performance***

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43 While the impact of external pressure and sustainable practices on environmental outcomes is
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45 important, for many companies, it can be argued that the impact on manufacturing performance
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47 is more important. This is because manufacturing performance, and particularly manufacturing
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49 cost is perhaps the most significant component of the operational cost of manufacturers.
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51 According to Zhu and Sarkis (2007), economic performance is the most important consideration
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53 for manufacturers. While the study by Zhu and Sarkis (2007) did not specifically examine
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3 manufacturing performance, it does conclude that adopting formal programmes, such as ISO
4 14001 improved environmental performance but not economic performance. This study has
5 qualified the findings by Zhu and Sarkis (2007) by finding that neither environmental pressure
6 nor adoption of formal sustainability programs lead to a significant improvement in
7 manufacturing performance – a major component of economic performance. Therefore, external
8 pressure from stakeholders to be sustainable in their operations, can impact organisations in two
9 ways. Firstly, it could make them react by developing a sustainable management program by
10 adopting practices such as ISO 14001, SA 8000 waste recycling and energy reduction. Secondly,
11 external pressure could impact them by encouraging a less formal approach to sustainability.
12 Irrespective of which of the two options is chosen, the ultimate impact will be an improvement in
13 environmental outcomes. However, if there is an expectation that these approaches would also
14 lead to an improvement in manufacturing performance, this study suggests that no such impact
15 exists. This view is partly supported by the finding of Wagner (2005) that there is an inverse
16 relationship between environmental and economic performance, although Wagner (2005) did not
17 specifically study manufacturing performance. This study therefore comes to a conclusion that
18 contrasts with previous of studies by Eltayeb *et al.* (2011), Zhu and Sarkis (2004) and Theyel
19 (2000) who suggest that sustainable activities, such as reduction of energy consumption or waste
20 can lead to productivity improvements. While it can be widely accepted that energy and waste
21 reduction have a direct reduction impact on manufacturing cost, the cost of implementing and
22 maintaining other aspects of a sustainability program (e.g. training, ISO 14001) counteract the
23 benefits of factors such as waste and energy reduction. This is because while the reduction of
24 resources (e.g. energy, water) consumed may reduce the cost of manufacturing, other activities
25 such as implementing a waste recycling programme, training employees and subscribing to
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3 environmental and social certification require significant capital outlay and changes to process
4 (e.g. finding suppliers with the requisite green credentials) or equipment (e.g. replacing old
5 equipment with more environmentally friendly ones). It is important to note that Zhu and Sarkis
6 (2007) found that external pressure to adopt eco-design practices led to deterioration in economic
7 performance because of the significant financial outlay required for such adoption. Therefore, the
8 net effect of adopting formal sustainability programmes could be a failure to reduce
9 manufacturing costs overall.
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20 From the point of view of economic performance, there has been a lack of consensus
21 about whether green practices lead to improved economic performance (Green *et al.*, 2012;
22 Zailani *et al.*, 2012) or otherwise (De Giovanni and Vinzi, 2012; Huang *et al.*, 2012). The
23 authors of this study argue that the findings from the study neither agree nor disagree with either
24 of the opposing views. Rather, it is suggested that the findings put the opposing views into a
25 different perspective. The suggestion is that the lack of a relationship between the adoption of
26 sustainable practices and manufacturing performance implies that the ability to gain improved
27 economic performance from sustainable practices is not related to manufacturing costs but to
28 other factors. For example, this study has confirmed the relationship between such practices and
29 environmental outcomes and it is possible that such positive environmental outcomes may lead
30 to an improvement in product image and market share, and consequently improved economic
31 performance. It may also be that products with a better sustainability credentials can command
32 premium pricing and, therefore, lead to better economic outcomes. Therefore, external pressure
33 and the adoption of sustainable manufacturing may lead to improved economic outcomes if the
34 benefits of factors such as improved product image, market share and premium pricing can
35 exceed the financial outlay to implement the programmes. It is important therefore, for
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3 organisations that are reacting to external pressure to be more sustainable to investigate if
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5 adopting sustainable practices can provide other avenues for economic benefits. The authors
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7 suggest that the ability to do this will depend on various factors including the nature of the
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9 product, the industry, the mind set of their customers and the markets in which they sell their
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11 products. The lack of a relationship between external pressure and manufacturing performance
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13 identified in this study may help to partly explain the finding by Zhu *et al.* (2005) that while
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15 external pressures have increased awareness of GSCM in Chinese companies, this awareness has
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17 not necessarily translated into adoption of sustainable management practices. It suggests that if
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19 organisations do not identify clear linkages between the external pressures they face and
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21 manufacturing performance, they may be reluctant to invest in sustainable initiatives.
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27 From a theoretical perspective and based on the factors examined in this research, the
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29 study has shown that neither institutional pressures nor the attainment of RBV-related
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31 sustainability competencies necessarily lead to improved manufacturing performance. This is
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33 based on the finding that neither external pressure nor sustainable management has a significant
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35 relationship with manufacturing performance. Therefore, manufacturers that face institutional
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37 pressures or are sold sustainability programs on the premise that it will improve manufacturing
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39 performance need to consider these issues carefully.
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45 **Conclusion**

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47 This study set out to investigate the relationship between external pressure to be sustainable,
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49 adoption of formal sustainability programs and manufacturing performance and environmental
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51 outcomes. It has found that while there is a significant relationship between external pressure,
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53 adoption of formal sustainability programs and environmental outcomes, such significant
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3 relationships do not exist with manufacturing performance. It has been also been argued that the
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5 lack of a relationship with manufacturing performance does not necessarily imply that
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7 organisations cannot gain economic benefits from implementation of sustainable practices.
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9 Rather such economic benefits may possibly be derived from other performance dimensions
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11 related to environmental outcomes.
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17 *Study Implications*

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20 This study has important managerial and academic implications. For managers, the study
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22 suggests that in implementing sustainable practices, it is important to understand that the
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24 investment in such practices may not lead to a direct reduction in their manufacturing cost base.
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26 Therefore, while regulatory directives may compel organisations to be more sustainable in their
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28 operations, complying with such directives may not lead to manufacturing cost improvement. It
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30 is therefore important to examine carefully if economic advantage resides elsewhere as a result
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32 of the adoption of such practices. For example, adopting sustainable practices may make their
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34 products ‘greener’ and they may be able to charge a premium price. In addition, it may improve
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36 their market share by attracting environmentally conscious customers. Secondly, managers
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38 should understand the impact that external pressure to be sustainable can have on their
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40 organisation, and therefore the importance of attaining environmental outcomes in order to
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42 satisfy external stakeholders. They could react to these pressures by either adopting formal
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44 programs or by adopting less formal programs. While either approach would lead to improved
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46 environmental outcomes, neither would lead to improved manufacturing performance. Thirdly,
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48 even when formal sustainability programs such as ISO 14001 are not implemented, it is still
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50 possible to attain positive environmental outcomes. In addition, managers need to be aware that
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3 institutional forces can affect environmental outcomes either directly or through mediation with
4 sustainable management. The key decision that managers may need to make is whether to invest
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6 in formal programs in order to achieve the desired environmental outcomes. It may well be that
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8 investment in such programs will serve the purpose of formalising and grounding sustainable
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10 thinking in their organisation in contrast with reacting to external pressure by adopting less
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12 formal approaches..
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17 For academia, this study has shown that the relationship between adoption of sustainable
18 management practices and economic performance is not as simple as 'yes' or 'no' and that a
19 much more complex relationship exists. In addition, the study has shown that institutional
20 pressures have a direct impact on environmental outcomes while adoption of formal sustainable
21 programs can also mediate between institutional pressures and environmental outcomes.
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29 Finally, the study's limitations and suggestions for future studies are presented. Firstly,
30 the study has focused only on external pressures to be sustainable and not on internal pressures.
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32 It is unclear if such internal pressures did exist how their existence would impact adoption of
33 formal environmental practices and environmental outcomes and manufacturing performance.
34
35 This could be a subject for future study. Future studies could also consider if there is a significant
36 difference in outcomes between organisations that implement formal sustainability programs and
37 those that choose less formal routes. Another fruitful avenue would be consider whether the
38 presence of both external pressure and sustainable competencies leads to relatively better
39 outcomes.
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Table 1. Constructs and Survey Items

Constructs	Survey Items	Source
External pressure	<p>How do you perceive the following characteristics of the environment in which your business unit operates?</p> <ol style="list-style-type: none"> 1. Environmental pressure (e.g., stakeholders call for environmentally friendly products and processes) (1= very weak; 5=very strong) 2. Social pressure (e.g. stakeholders pay attention to companies' commitment on ethical issues, human rights respect, labour conditions) (1= very weak; 5=very strong) 	Sarkis <i>et al.</i> (2010), Porter and Kramer (2002)
Sustainable management	<p>Indicate the effort put in the last 3 years into implementing, and the current level of implementation of, action programs related to: (Effort in the last 3 years: 1=none; 5=high)</p> <ol style="list-style-type: none"> 1. Environmental certifications (e.g. EMAS or ISO 14001) 2. Social certifications (e.g. SA8000 or OHSAS 18000) 3. Formal sustainability oriented communication, training programs and involvement 4. Energy and water consumption reduction programs 5. Pollution emission reduction and waste recycling programs 	Kitazawa and Sarkis (2000), Longo <i>et al.</i> (2005), Daily and Huang (2001), Sarkis (1998), Klassen and Whybark (1999)
Manufacturing performance	<p>How has your manufacturing performance changed over the last three years? (Compared to three years ago the indicator has: 1=Decrease (- 5% or worse); 2=stayed about the same (- 5%/+5%); 3=slightly increased (+5- +15%); 4=increased (+15- 25%); 6=strongly increased (+25% or better))</p> <ol style="list-style-type: none"> 1. Unit manufacturing cost 2. Ordering costs 3. Manufacturing lead time 4. Procurement lead time 	Pagell and Gobeli, (2009), Ferdows and De Meyer, (1990), Woo <i>et al.</i> (2001)
Environmental outcomes	<p>Consider the importance of the following attributes to win orders from your major customers: (Importance in the last three years: 1=not important; 5=very important)</p> <ol style="list-style-type: none"> 1. More environmentally sound products and processes 2. Higher contribution to the development and welfare of the society 3. More safe and health respectful processes 	Gimenez <i>et al.</i> (2012), Maxwell and van der Vorst (2003)

Table 2. Variables and Factor Loadings

Variables	No. of Items	Factor Loadings				
		Item 1	Item 2	Item 3	Item 4	Item 5
External pressure	2	0.875	0.875	Nil	Nil	Nil
Sustainable management	5	0.856	0.872	0.873	0.824	0.793
Manufacturing performance	4	0.842	0.844	0.852	0.779	Nil
Environmental outcomes	3	0.806	0.868	0.875	Nil	Nil

Table 3. Scale Validation - Reliability and Validity

	ME	SD	CA	CR	AVE	EP	SM	MP	EO
EP	3.462	0.959	0.700	0.867	0.766	0.875			
SM	3.593	0.958	0.898	0.925	0.713	0.306**	0.844		
MP	2.626	0.861	0.846	0.898	0.689	-0.046	0.133	0.830	
EO	3.650	0.922	0.808	0.887	0.722	0.434**	0.513**	0.068	0.850

Note: ME=Mean; SD= Standard Deviation; CA=Cronbach Alpha; CR= Composite Reliability; AVE= Average Variance Extracted; EP=External pressure; SM=Sustainable management; MP=Manufacturing performance; EO=Environmental outcomes. ** Correlations are significant at the 0.01 level (2-tailed); Bold values in the diagonal row are square roots of the AVE.

Table 4: Results of Structural Equation Modeling Analysis for Emerging Countries

Hypotheses	Causal Path	Path Coefficients	Standard Errors	Critical Ratios	p-value
H1	External pressure → Environmental outcomes	0.410	0.085	3.439	0.000***
H2	External pressure → Manufacturing performance	-0.114	0.056	-1.084	0.278
H3	External pressure → Sustainable Management	0.335	0.082	3.038	0.002**
H4	Sustainable Management → Environmental outcomes	0.450	0.096	4.479	0.000***
H5	Sustainable Management → Manufacturing performance	0.182	0.072	1.816	0.069

Table 5: Mediation Test of Sustainable Management for Emerging Countries

Effects	Hypotheses	Estimate
Direct effect	External pressure → Sustainable Management	0.410
Indirect effect	External pressure → Sustainable Management → Environmental outcomes	0.151
Total effect		0.561

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Table 6. Bootstrap Results for Indirect Effects

Constructs	Estimate	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Sustainable Management	0.151	0.065	0.268

For Peer Review

Figure 1. Research Model

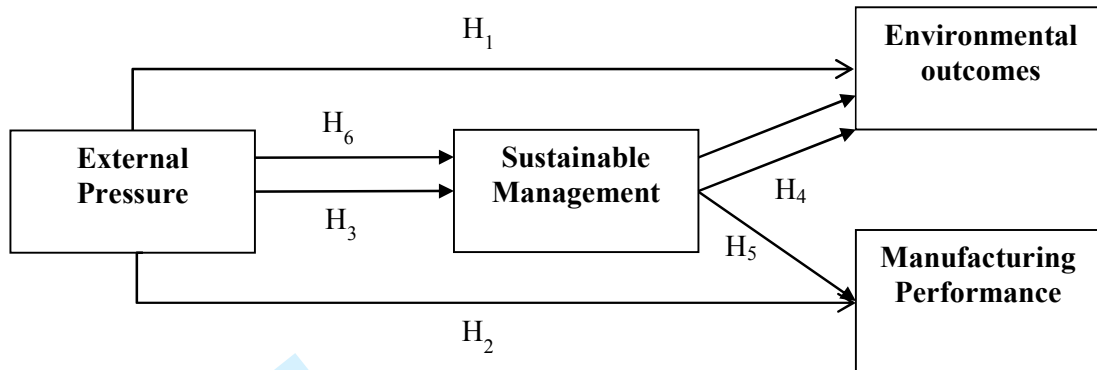
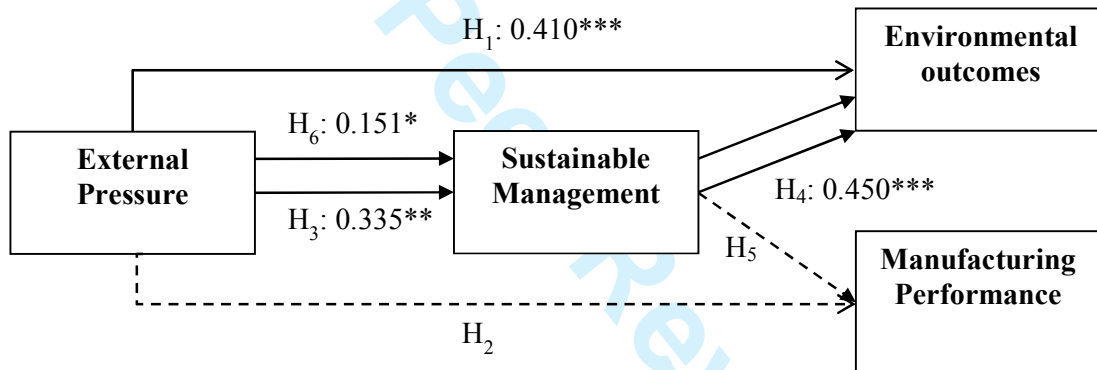


Figure 2. Results of Research Model



Note: Significant relationships are shown as solid lines. Insignificant relationships are shown as dotted lines.