



Green sourcing: Taking steps to achieve sustainability management and conservation of resources



1. Background

Cannibalization of resources due to increasing contemporary globalization and industrialization has urged researchers and practitioners to concentrate on formulating sustainability improvement strategies in their processes and operations. Many tactical decisions were made among practitioners that pressured researchers to rethink existing systems. A decade ago, a new strategy was formed with the aim of sustainability called green supply chain management (GSCM) to address an essential pillar of sustainability (Mudgal et al., 2009; Salimifard and Raeesi, 2014; Alzaman, 2014; Santos et al., 2013; Nigam, 2014; Tyagi et al., 2015), which includes green design, green manufacturing, green packaging, green purchasing, and others. Hence many studies (Diabat and Govindan, 2011; Mathiyazhagan et al., 2013; Govindan et al., 2014a, 2014b; Shen et al., 2013; Muduli et al., 2013a, 2013b; Mathiyazhagan et al., 2014; Govindan et al., 2013; Xu et al., 2013; de Sousa Jabbour et al., 2013; Jabbour et al., 2014; Tian et al., 2014; Rostamzadeh et al., 2015) started to explore the GSCM, however, under the umbrella term GSCM, green purchasing gained an optimistic welcome from researchers and practitioners due to the importance of sourcing, which demands a major portion of a firm's capital. Green purchasing assists industries to retain their reputation in business; it balances pressures from stakeholders including governmental regulations and it contributes to the industrial manager's actions for effective reuse, recycling, and disassembly (Carter et al., 2000). Green sourcing not only keeps a firm's reputation high, but also balances the shortfall of future resources as mentioned by the Non-renewable Natural Resources (NNR), where it is revealed that by 2030 there will be permanent scarcity. In addition, existing studies prove that there is a positive relation between a firm's overall performance and their green purchasing intentions. Due to the countless benefits, many studies started to extend the green purchasing context to include the evolution of supply chains, which led, in turn, to green supplier selection and resulted in abundant studies within the concept. Note that many definitions can be seen for green purchasing in existing literature, but the general term is nothing but purchasing with a green concern. However, in recent trends, sourcing with this green concern does not serve all beneficiaries unless the shortfall in the path to sustainability is addressed. Table 1 reveals the existing literature focused on the concept of green purchasing/sourcing (without considering green supplier selection themes), where it is evident that most

studies focus on customer intentions with green purchasing behaviors of different origins; they do not focus on sustainability. This review establishes that there is ample room present in the integration of sustainability concepts in green purchasing to achieve sustainable management. Hence, with these concerns, this SI of *Resources, Conservation and Recycling* seeks to address the gap in the existing literature and to bridge the void between state-of-the-art research and the virtual world. This SI motivates prominent researchers to disseminate their research relevant to achieving sustainable management and conserving resources through green sourcing. This SI aims to explore new strategies, models, tools, conceptualizations of green sourcing concerned with sustainability, and resources conservation that can be realized through the contributions of researchers. This special issue covers a wide range of issues intertwined with sustainability and resources conservation through green sourcing/purchasing.

In this special issue, eight articles selected for sustainable management and resources conservation through green sourcing were included. These selections clearly reveal the problems related to and the opportunities that exist in the implementation of focal sustainable strategies. After careful investigation of all submitted papers, these eight articles were selected and each is revised.

In the paper, "Green decision making model in reverse logistics using Fuzzy-VIKOR method," Vahabzadeh, Asiaei and Zailani addressed the issues involved in green decisions on reverse logistics by identifying the essential environmental factors which influence RL recovery options. The study was made with the assistance of academicians and industrialists through the Fuzzy-VIKOR approach. Finally, the study revealed that disposing of returns and reselling of returns are the best and worst recovery options of RL, respectively.

The paper, "Risk and benefits brought by formal sustainability programs on fashion enterprises under market disruptions" by Li, Choi and Chow, explored the relation and influence between sustainability programs with market disruption focusing on the fashion industry by answering the research question, "how do formal sustainability programs affect fashion enterprises under market disruption?". An empirical study was undertaken with the assistance of the annual reports of 45 fashion enterprises globally which revealed that formal sustainability programs are not recognized well in fashion industry under market disruptions.

Tao, Guang, Hao and Song, in their paper "Multi-period closed loop supply chain network equilibrium with carbon emission constraints," considered carbon emission constraints in

Table 1
Literatures emerged in green sourcing/purchasing.

S. no.	Source	Type of study	Problem addressed	Solution methodology	Origin of the study
1	Moser (2015)	Survey	Identified the major antecedents and determined the relative importance of everyday green purchasing behavior in German context	Structural equation modeling	Germany
2	Wambui Rujema et al. (2015)	Survey	Explored relationship between sustainable supply chain performances with green purchasing strategies helped by Unilever Tea Kenya Limited case	Descriptive and inferential statistics	Kenya
3	Blome et al. (2014)	Survey	Proposed a model by integrating antecedents like market performance, top management commitment, financial performance, green procurement, and green supplier development to explore the concept of green purchasing in European consulting firms	Structural equation modeling	Europe
4	Hasnah Hassan (2014)	Survey	Analyzed the drivers which influence the Muslim community to engage in green purchasing in a Malaysian context	Partial Least Square (PLS) - Structural equation modeling	Malaysia
5	Huang et al. (2014)	Survey	Proposed a model to examine the relationship between the factors, green brand positioning, attitude toward green brand knowledge and green purchase intentions in a Taiwan scenario	Structural equation modeling	Taiwan
6	Ji et al. (2014)	Case study	Proposed an evolutionary game theory model to explore the relationship of green purchasing in the manufacturing industry with a case in Hong Kong	Game theory	Hong Kong
7	Kanchanapibul et al. (2014)	Survey	Explored the intentions of the young generation with green purchase behavior through descriptive analysis, where participants are between the ages 18 to 30	Structural equation modeling	General
8	Knez et al. (2014)	Survey	Analyzed the factors which influence low emission cars purchase decisions in a Slovenian context.	SPSS and Cluster analysis	Slovenia
9	Wang (2014)	Survey	Analysed the correlation of green purchasing intentions with consumer characteristics and social influence factors in a Taiwanese context	Structural equation modeling (SEM)	Taiwan
10	Lee Weisstein et al. (2014)	Survey	Examined the customer behavior based on the different levels of greenness correlating with the impact of price promotion presentation formats	Analysis of variance (ANNOVA)	General
11	Wuet al. (2014)	Survey	Correlated the green purchase intentions in Taiwan's electric motorcycle market with factors, image, risk, value, and perceived usefulness	SEM and fuzzy set qualitative comparative analysis	Taiwan
12	Albayrak et al. (2013)	Survey	Examined the relationship between customer's scepticism of green behavior with their environmental concern based on the Theory of Planned Behaviour	Factor analysis	Turkey
13	Dubey et al. (2013)	Survey	Analyzed the drivers and recent trends of green procurement with their strategic framework through the empirical study in an Indian context	Partial least square regression analysis	India
14	Cuenther et al. (2013)	Case study	Analyzed the barriers to green purchasing and developed the hypothesis based on the barriers, which tested answers to the question "Why do organizations not implement green purchasing?"	Pearson Correlation	Europe
15	Paladino and Ng (2013)	Survey	Examined the determinants involved in purchasing intentions of eco-friendly electronic products, especially mobile phones among young students of an Australian university	Correlation and Regression	Australia
16	Akehurst et al. (2012)	Survey	Intertwined three concepts, ecologically conscious consumer behavior (ECCB), green purchase behavior (GPB) and green purchase intentions (GPI), to explore the determinants of ECCB with the concerns of GPB and GPI	Multiple linear regression, Structural equation modelling	Portugal
17	Chairy (2012)	Survey	Explored the relation between green purchase intentions among undergraduate students of Indonesia's Tarmanagara University with spirituality and self-transcendence	Regression analysis	Indonesia
18	Chen and Chang (2012)	Survey and Conceptualization	Proposed a framework to analyze the relationship between green purchase customer intentions with green risk, green trust, and green perceived value	Structural equation modeling	Taiwan
19	Tate et al. (2012)	Review and Survey	Analyzed the gap between current state of art and practice on environmental purchasing and supplier management (EPSM) with the assistance of a literature review and survey among the industries rated in the Global Environmental Manufacturing Initiative (GEMI)	ANNOVA	General
20	Yen and Yen (2012)	Survey	Explored the influence of top level management commitment in the adoption of green purchasing standards with Taiwanese electronics firms	Confirmatory factor analysis	Taiwan
21	Björklund (2011)	Survey	Explored the drivers and barriers to green purchasing in Swedish transportation services with particular focus on the firm's business environment	Factor analysis	Sweden
22	Brusco and Ogg (2010)	Conceptualization	Supported the green purchasing decisions in health care management to reduce health care waste	–	General
23	Carter et al. (2010)	Survey	Analyzed the relationship between the environmental purchasing natures with the firm's performance through an empirical study	Regression	United States
24	Khidir ElTayeb et al. (2010)	Survey	Analyzed the motivating factors of green purchasing in Malaysian companies with a special focus on EMS 14001 certified firms	Factor analysis	Malaysia
25	Hwang et al. (2010)	Survey	Explored the improvement opportunities of green purchasing through analyzing the relationship between supply chain operations reference (SCOR) and Plan-do-study-act (PDSA)	Structural equation modeling	Taiwan

Table 1 (Continued)

S. no.	Source	Type of study	Problem addressed	Solution methodology	Origin of the study
26	Lee (2010)	Survey	Analyzed the factors which affect the green purchasing behavior in Hong Kong among young consumers	Factor analysis	Hong Kong
27	Ramayah et al. (2010)	Survey	Examined the green purchase intentions of customers in a cloth diapers case, based on the theory of reasoned action with the impacts of individual values with their attitudes	Structural equation modeling	Malaysia
28	Lee (2009)	Survey	Explored the influences of gender difference in green purchasing, environmental responsibility, and environmental protection	Multiple regressions	Hong Kong
29	Varnäs et al. (2009)	Survey	Examined recent trends, practices and problems encountered in green consideration in procurement in the Swedish construction sector through direct interviews with participants	Interview	Sweden
30	Brown (2008)	Review and Survey	Correlated factors, consumer influence, investor opinions and green corporate accountability with the assistance of data gathered from The Black Book of Outsourcing, by Douglas Brown and Scott Wilson, to establish influencing business decisions on outsourcing	–	General
31	Johnson et al. (2008)	Survey	Explored the importance of green purchasing practices with the case of coal-fired power plants to prevent mercury emission	Descriptive statistics	United States
32	Mostafa (2006)	Survey	Analyzed the green purchase intentions of Egyptian consumers built on several attitudes and psychographic factors	Hierarchical regression analysis	Egypt
33	Pearce (2006)	Conceptualization	Explored the effect of green purchasing in solar photo voltaic cells industry with a focus on catalysing the mass production	–	General
34	Chen (2005)	Conceptualization	Proposed a guideline framework for green purchasing in addition to establishing the importance of green purchasing and ISO 14001 certification in sustainable development	–	General
35	Chan and Lau (2002)	Survey	Examined the behaviour of Chinese and American cultural settings under green purchasing through the application of Theory of Planned Behavior	Structural equation modeling	U.S. and China
36	Min and Galle (2001)	Survey	Explored the variables which promote or slow down green purchasing practices implementation and analyzing the relationship of green purchasing with supplier selection, packaging, regulatory compliance and waste management	SPSS and Exploratory factor analysis	United States
37	Legarth (2001)	Conceptualization	Explored the concept of internet assisted green purchasing and further shedding light on environmental product declaration, as the future of green purchasing	–	Denmark
38	Chan and Lau (2000)	Survey	Examined the behavior of Chinese customer perceptions of green purchasing based on the influencing factors like cultural values, ecological effects, and ecological knowledge	Structural equation modeling and ANNOVA	China
39	Gordon Murray (2000)	Case study	Explored the green purchasing strategies in the Belfast City Council against the local government background to satisfy the objectives of economic development and environment in purchasing	–	United Kingdom
40	Green et al. (1998)	Conceptualization and Case study	Analyzed the conceptualization between the green purchasing change with the firm's supply chain network's environmental performance and transformation of sustainability with the assistance of a UK hardware retailer	–	United Kingdom
41	Min and Galle (1997)	Survey and Conceptualization	Addressed the key issues of green purchasing strategies which includes environmental partnerships, purchasing professionals and supplier collaborations, green packaging materials, reduction and waste management, environmental regulations, and knowledge of purchasing professionals in green concerns	Statistical Packages for Social Sciences (SPSS)	North America
42	Schlegelmilch et al. (1996)	Survey	Analyzed the significance between the consumers' environmental consciousness of their purchasing decisions with the help of data collected from marketing students and the general public of the UK	Regression analysis	United Kingdom

manufacturing/remanufacturing among the closed-loop supply chain network equilibrium which included manufacturers, retailers, demand marketers and recyclers in a multi-period planning horizon, where all manufactures make homogenous products. This study observed the various players in the network with focus on their optimal behaviours, variational inequality and complement theory and their equilibrium conditions through the proposed governing network equilibrium model. Numerical illustrations are provided to validate the proposed model with the assistance of modified projection and contraction algorithms.

Jabbour, Frascareli and Jabbour, in their paper, “Green supply chain management and firm's performance: understanding the potential relationships and role of green sourcing and some other green practices,” examined the environmental and operational performance indicators with certain green supply chain management practices. This was achieved through a multiple-case study made in a Brazilian context among firms which hold

a high position in corporate sustainability ranking. It is clearly evident that “internal environmental management” and “cooperation with customer” has great positive impact on environmental performance indicators and operational performance indicators, respectively.

In the paper, “Risk analysis in green supply chain using fuzzy AHP approach: a case study,” Mangla, Kumar and Baura explored the risks involved in the adaption and effective implementation of green supply chain practices in Indian industries with a focus on the poly-product manufacturing sector. Initially, the 25 risks associated with GSCM were collected from literature and categorized into six groups, which analyzed both qualitative and quantitative methods helped by the case industry expert's opinion through fuzzy AHP. The study concluded that operational category risk is needed to implement GSCM with high robustness.

Ayvaz, Bolat and Aydin, in their paper, “Stochastic reverse logistics network design for waste of electrical and electronic

equipments,” proposed a multi-echelon, multi-product two stage stochastic programming to analyze the reverse logistics network design problem under uncertainty to maximize profit for a third party’s waste of electrical and electronic equipment recycling companies in Turkey.

The paper, “Risk evaluation for recycled aggregate according to deleterious impurity content considering deconstruction scenarios and production methods” by Noguchi, Park and Kitagaki, assessed the risks involved in the recycled aggregate concerned with the impurity residue and the effects of its properties. In the paper, they developed a risk assessment model based on the type of recycled aggregate production from which the practitioner can estimate the risk associated with each type of impurity.

In the paper “Re-use assessment of thermoset composite wastes as aggregate and filler replacement for concrete-polymer composite materials: A case study regarding GFRP pultrusion wastes” by Ribeiro, Meira-Castro, Silva, Santos, Meixedo, Fiúzaa, Dinis and Alvim, assessed a recycling approach for thermoset based GFRP pultrusion wastes.

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Further reading

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Available online 21 November 2015