

Sustainable operations management

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Abstract

Purpose

Sustainable operations management (OM) has been of increasing interest to businesses and governments in recent years. This paper considers how operations practice and research has responded to demands to address sustainability.

Approach

In this paper, we consider how the field of sustainable OM is developing, and has responded to recent business trends. We consider how the research published in the *International Journal of Operations and Production Management* has evolved since the last sustainability special issue published in 2001.

Findings

Of the total number of articles published in IJOPM since 2001, only 3.3% have investigated some aspect of sustainable OM. Of these sustainable OM articles, 64% are environmental articles, and there is an emerging trend for social articles, or articles that address the triple bottom line. We distinguish between studies that focus on internal operations, and articles that explore sustainability between organisations in supply chains. We briefly describe each paper in the special issue, and give an overview of how the papers address different aspects of sustainability.

Research limitations/implications

This paper analyzes articles in IJOPM, and it would be interesting to investigate whether similar trends are identifiable in other OM journals.

Practical implications

This paper provides a useful overview of sustainable OM for practitioners, identifying sustainability research within and between organisations, and shows how the nature of sustainable OM research has changed in recent years.

Social implications

This paper highlights the recent trend in articles that address social issues in OM, such as employee well-being, health and safety, and the triple bottom line of sustainability.

Originality/value

This is the first special issue on sustainable OM in 13 years in IJOPM. We conclude with thoughts about future research directions, and expect the proportion of sustainable OM papers to increase in years to come.

Keywords

Sustainability, social, environmental, triple bottom line, operations management, supply chain management

Introduction

Increasingly, organisations are interested in managing corporate social responsibility (CSR) and sustainability as part of their operations management (OM). OM practices and research must respond to demands to address sustainability. This response is triggered by climate change and other environmental concerns, the well-being of workers and communities, and other broad social demands. We define sustainable OM as the pursuit of social, economic and environmental objectives – the triple bottom line [TBL] – within operations of a specific firm and operational linkages that extend beyond the firm to include the supply chain and communities. Many different aspects of OM can be considered from a sustainability perspective. These aspects encompass product design and eco-design, adoption of environmental and social standards, process improvement and lean operations, purchasing, supply chain management (SCM), logistics including recycling and closed-loop systems, performance measurement, and risk management.

Given the growth, importance and pervasiveness of OM sustainability concerns, a special issue focusing on these efforts is overdue. This need for currency is a reason for this special issue in the *International Journal of Operations and Production Management* (IJOPM). In this introduction we first provide an overview how the sustainable OM field is evolving, especially since the last IJOPM special issue that appeared over a decade ago in 2001. This evolutionary overview includes both general literature and the literature specifically in IJOPM. The special issue is then introduced summarizing the select articles that are included. Finally, perspectives on future research directions and concluding thoughts complete this introduction to the special issue.

How the sustainable OM field is evolving

In the last twenty years, sustainable OM research has been burgeoning, a reflection of numerous changes in business and society. In the 1990s, there was a focus on resource productivity, and the need to reduce the consumption of resources and to use them more efficiently. The underlying concern was that if we continue to consume resources at current rates, we would need over three planets worth of resources (Weizsacker et al. 1997). An interest in resource productivity was typified by the desire to be green and competitive, to make a profit or gain competitive advantage by improving environmental performance (Porter and Van de Linde 1995). Interest in environmental performance has continued, with a focus on green products and processes, reducing waste and CO₂ emissions, recycling and reverse logistics or closed-loop supply chains.

In parallel, a broader and deeper examination of social and humanitarian issues in operations has complemented this environmental research. For example, there has been increasing interest in the CSR behaviour of firms, and voluntary initiatives such as the Global Reporting Initiative have reflected this extension. Also, more research on health and safety and employee welfare, particularly along global supply chains has dovetailed with the

introduction of standards and codes of conduct within and between firms. Studies of ethical products and fair trade reflect increasing consumer interest in how products are sourced. The (un)ethical buying behaviour of purchasers within organisations has come under scrutiny. There is also an attendance to the behavioural and psychological aspects of OM (Croson et al. 2013). Humanitarian aid is a burgeoning aspect of logistics research, considering the supply of products to communities in emergency situations. More recently, studies have sought to investigate social, economic and environmental issues in combination, allowing examination of the triple bottom line of sustainability.

Unfortunately, the last decade has endured a global recession, linked in part to dubious ethical practices in the banking industry. Simultaneously, with the expansion of social media, high profile cases of companies 'behaving badly' (Amaeshi et al. 2008) have been amplified through media reporting and social media commentary. Consumers have a platform to raise concerns, and companies are being pressured to respond. This situation has been reflected in an increasing number of studies exploring risk management and sustainable OM and SCM.

Previous literature reviews suggested that sustainability research has tended to be atheoretical (Seuring and Müller 2008, Carter and Rogers 2008). Some research has attempted to address this potential shortcoming, either through theory development or theory testing. Some studies take established theories and explore sustainability issues through those theoretical lenses (Sarkis et al. 2011). Examples include the resource based view of the firm (Barney 1991), which has been adopted to explore aspects of sustainable supply chain management (Shi et al. 2012, Paulraj 2011) and transaction cost economics (Williamson 1985), which has helped to illuminate remanufacturing (Martin et al. 2010). Alternatively, recent studies seek to develop conceptual frameworks in order to explain sustainable OM and SCM (Carter and Easton 2011).

Developments in the sustainable OM literature: an IJOPM perspective

We can also identify recent trends in sustainability articles in IJOPM. The last special issue on sustainability in IJOPM was in 2001 (Wilkinson et al. 2001). The special issue was entitled 'The sustainability debate'. The contents of the special issue included an article exploring the linkages between ISO9000 systems, TQM and ISO14001 (Daily and Huang 2001). Other papers explored corporate architectures for sustainability (Griffiths and Petrick 2001), and how environmental performance relates to operations performance (Jiménez and Lorente 2001). The final two papers considered reducing greenhouse gas emissions. One study explores product and process development in consumer automotive transport (Byrne and Polonsky 2001), and the other focused on how the Kyoto Protocol influences commercial incentives and process innovation (Hill 2001).

Of significant note, this earlier special issue and one the previous year (Angell 2000) focused exclusively upon environmental issues. The introduction to the special issue did, however, acknowledge economic, social and human sustainability issues (Wilkinson et al. 2001), but these were considered at the organisational level rather than along supply chains. For example:

'For true corporate sustainability, an organisation must recognise, value and promote the capability of its people. For human resource sustainability to be achieved,

therefore, the HR policies and practices need to be integrated for sustained business performance and positive employee outcomes of equity, development and well-being' (p.1497)

and

'To what extent do corporations need to exercise social responsibility as well as economic responsibility?' (p.1498)
(Wilkinson et al. 2001)

The researchers whose research was published in the special issues in 2000 and 2001 were amongst the sustainable OM vanguard, pioneering research in environmental OM issues. Within *IJOPM*, the nature of sustainability articles has evolved since the last special issue in 2001. Whilst environmental research is still strong, there are more studies that explore social sustainability concerns and the triple bottom line of sustainability. The focus has also broadened from operations management within an organisation to the supply chain.

We now analyze the articles appearing in *IJOPM* since the 2001 special issue on sustainability. Articles were identified by keywords: green, environmental, social, ethical, economic or sustainable. To be conservative, we excluded articles that were marginally relevant, such as those articles that used 'sustainability' in a different context (e.g., Bateman 2005, Bateman and David 2002). Twenty-eight *IJOPM* articles were identified in the period 2002-2014. These articles are categorized in Table 1 according to their environmental or social focus, some of which also considered economic outcomes. A final category considers two or more joint TBL outcomes. The number of articles published in *IJOPM* each year is shown in Figure 1, showing social, economic, environmental, and TBL papers.

Of all the *IJOPM* articles published since 2001, only 3.3% are sustainability articles. When we consider the aspects of sustainability, it is clear that the majority of sustainability research published in *IJOPM* still focuses on environmental issues (64%). Social issues in OM have seen a recent increase since 2010. Economic sustainability studies are rare, and tend to explore the link between environmental OM or SCM and firm performance. There is a gap in research investigating the economic aspects of sustainability, both from a firm and a supply chain perspective. It would be useful to explore how economic value (as well as social and environmental value) is shared along the sustainable supply chain, and to assess who accrues the benefits and costs of sustainability initiatives.

Table 1 also shows that *IJOPM* has published a similar number of articles addressing internal and between-firm sustainability. Since 2001, articles focused on internal operations have looked at human factors, environmental production, environmental management systems (EMS), and their effect on environmental, financial and TBL performance. Studies with an inter-firm focus have explored socially responsible and values based SCM, and ethical issues between buyers and suppliers. A number of studies have examined environmental SCM, and the effect it has on performance. Triple bottom line studies have considered sustainable procurement in the public sector, and within the current special issue there is an emergence of SCM studies that incorporate the triple bottom line of sustainability, termed sustainable SCM.

Aspect Topics	Social issues	Environmental issues	Social or environmental issues, combined with the economic bottom line	Triple bottom line	N <i>(including this special issue)</i>
Internal operation	Human factors and OM (Neumann and Dul 2010)	Environmental production (Rao 2004, González et al. 2003) Environmental management (systems) (González et al. 2008, Heras-Saizarbitoria et al. 2011, Paulraj and Jong 2011, Ronnenberg et al. 2011, Viadiu et al. 2006) & <i>(Prajogo et al. 2014)</i> Environmental performance (Daily et al. 2012, Zailani et al. 2012)	Impact of environmental management on firm performance (Burgos-Jiménez et al. 2013)	Environmental management and the triple bottom line (Giovanni 2012) Sustainable OM (Jeffers 2010)	13 <i>(14)</i>
Between firms (i.e., supply chain)	Socially responsible SCM (Awaysheh and Klassen 2010, Hoejmose et al. 2013) & <i>(Stevenson et al. 2014)</i> Values based SCM (Pullman and Dillard 2010) Unethical buyer supplier practices (Eckerd and Hill 2012)	Environmental SCM (Rao 2002, Simpson et al. 2007, Cousins et al. 2004, Vachon and Klassen 2006, Rao and Holt 2005) & <i>(Petkova and Dam 2014)</i>	Impact of green SCM on firm performance (Zhu et al. 2005)	Sustainable procurement (Brammer and Walker 2011) Sustainable SCM (Blome et al. 2014, Fabbe-Costes et al. 2014, Roehrich et al. 2014)	11 <i>(16)</i>
N <i>(including this special issue)</i>	5 <i>(6)</i>	14 <i>(16)</i>	2 <i>(2)</i>	3 <i>(6)</i>	24 <i>(30)</i>

Table 1: Sustainable OM and SCM articles in IJOPM published since 2001 (*articles in this special issue shown in italics*)

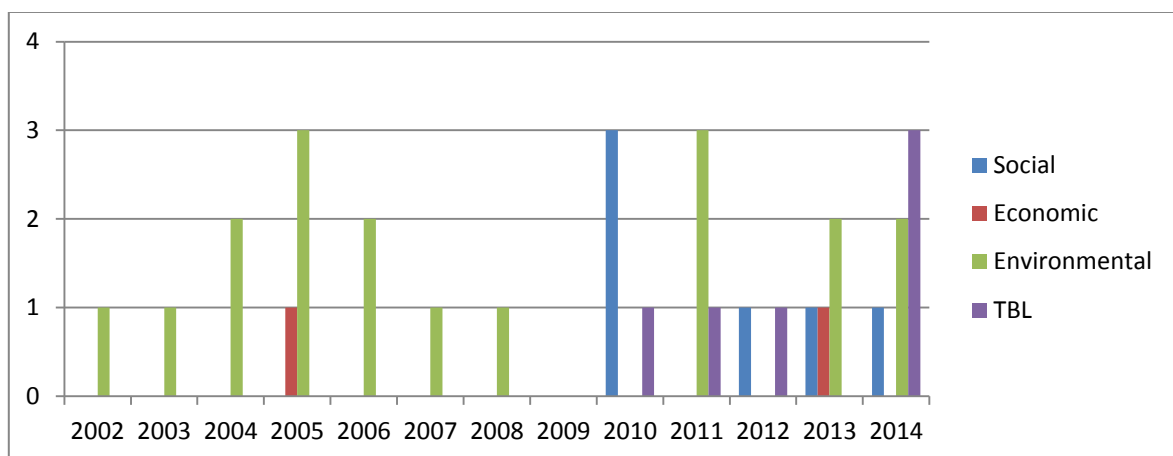


Figure 1: Papers published in IJOPM since 2001, focusing on social, economic, environmental and triple bottom line issues.

Papers in the current special issue: a brief description

In *The diffusion of environmental management system and its effect on environmental management practices*, Daniel Prajogo, Ailie Tang, and Kee-Hung Lai surveyed 286 companies in Australia to examine the diffusion of environmental management systems (EMS) across the organisational functions of production, procurement, sales, logistics and R&D. In general, EMS diffusion has a positive effect on green products, processes and SCM. The deeper the EMS diffusion, the more embedded environmental management practices are in organisational routines.

In *The impact of environmental supply chain sustainability programs on shareholder wealth*, Boyana Petkova, and Lammertjan Dam studied environmental supply chain sustainability programmes, and how the stock price fluctuates when a firm announces its commitment to such a programme. They conducted an event study of 66 companies that committed to the Carbon Disclosure Project. Rather surprisingly, they found that the market reacted negatively to such announcements, and that industries that face consumer pressure are less likely to announce their participation.

In *Social sustainability in developing country suppliers: An exploratory study in the ready-made garments industry of Bangladesh*, Mark Stevenson, Fahian Huq and Marta Zorzini illuminated through four case studies in Bangladesh why developing country suppliers are adopting socially sustainable practices. Higher labour retention motivates companies to implement social standards. More open dialogue between buyers and suppliers aids implementation.

In *Supply Chain Collaboration and Sustainability: A profile deviation analysis*, Constantin Blome, Anthony Paulraj and Kai Schuetz surveyed 259 German firms to investigate sustainable supply chain collaboration. They have developed an ideal profile on eight sustainability indicators from top performing companies. Based on the extent of deviation from their ideal type, it was found that firms lacked internal capabilities to benefit from sustainability collaboration with suppliers and customers and improve firm performance.

In *Sustainable Supply Chains: a Framework for Environmental Scanning Practices*, Nathalie Fabbe-Costes, Christine Roussat, Margaret Taylor and Andrew Taylor explored environmental scanning practices in sustainable SCM contexts through 45 interviews and a focus group. Scanning was found to be undertaken at all levels, from the society in which the organization operates, through its network and chain to the firm, its function and people. Scanning practices are also bounded by factors such as geography, the activities of similar companies and industries, and time scales. The study highlights the need for a multi-level framework for such scanning activities.

Finally, in *Reputational Risks and Sustainable Supply Chain Management: Decision Making under Bounded Rationality*, Jens Roehrich, Johanne Grosvold and Stefan Hojmoser focus on approaches that managers use in sustainable supply chain management (SSCM) to protect their company's reputation. However, because managers face bounded rationality, which constrains their decision-making, they balance the cost of implementing SSCM with the risk of exposure. Managers might make sub-optimal choices with respect to their engagement in socially and environmentally responsible SCM practices. Collaboration with suppliers can help spread the costs of sustainable SCM.

Overview of the special issue

The papers in the special issue focus on different aspects of sustainability. Three papers have a predominantly environmental focus, looking at green products, processes and SCM (Prajogo et al. 2014), and reductions in pollution, waste, and energy (Petkova and Dam 2014, Blome et al. 2014). One paper focuses on social sustainability in Bangladesh (Stevenson et al. 2014), which is encouraging given the paucity of research on developing countries. The final two papers investigate a broad range of sustainability issues (Roehrich et al. 2014, Fabbe-Costes et al. 2014).

Of the six papers, three papers consider the impact of SSCM on performance, including environmental and market performance (Blome et al. 2014), productivity (Stevenson et al. 2014) and financial performance (Petkova and Dam 2014).

Several different theories contribute to the framing of sustainable OM/SCM problems in this special issue. Relational theory (Dyer and Singh 1998) was adopted to explore collaboration in sustainable SCM (Blome et al. 2014). The implementation of socially sustainable practices was explored (Stevenson et al. 2014) using a transaction cost economics lens (Williamson 1985). The theory of constraints (Gupta and Boyd 2008) was used to explore decision-making in sustainable SCM (Roehrich et al. 2014). Another study tests and extends a conceptual framework of environmental scanning (Fabbe-Costes et al. 2014).

Future research directions

This special issue presents the most recent exemplary research on sustainable OM. Current research topics in IJOPM are summarized in Figure 1, along with future research opportunities shown in *italics*.

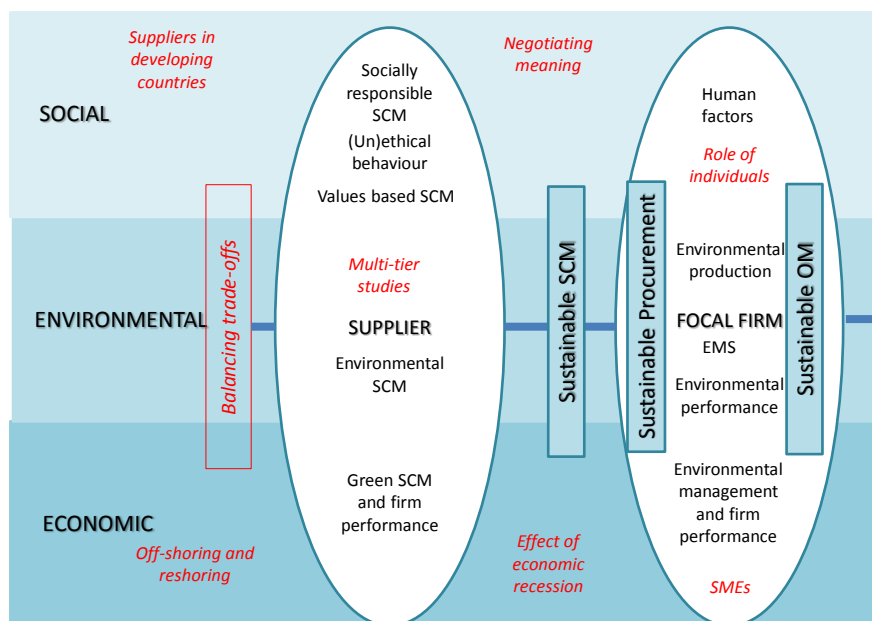


Figure 1: Current research in sustainable OM, with future research opportunities shown in *italics*

The number of studies that incorporate the triple bottom line of sustainability in this special issue is particularly welcome. Balancing trade-offs between the different aspects of sustainability is a fruitful direction for future research (Wu and Pagell 2011). There are still many gaps that need addressing in this emerging field. There is significant opportunity for more studies that develop or test theories to help understand sustainable OM. Particularly, in-depth case studies might contribute to new theory development. A further link would extend this work to aspects of sustainability performance. Managing sustainability performance along the supply chain will necessarily consider a wider set of trade-offs, particularly in social-environmental and social-economic intersections.

A further line of research along a behavioural and human factors vein could usefully explore the role of individual managers and employees in influencing sustainable OM. It would be helpful to explore different views of sustainability along supply chains, whether the view of one individual, firm or country dominates, and whether the meaning of sustainability may need to be negotiated and socially constructed within and between organisations.

Another avenue for research is to explore the impact of recent business trends on sustainable OM. Retrospective studies could explore the effects of economic recession or growth on sustainable OM. It would also be helpful to understand how sustainable OM is affected by off-shoring and re-shoring. More research is needed in the developing and low-income countries at the Base-of-the-pyramid (Gold et al., 2013). Given that the majority of the world population lives in these countries under severe social conditions, OM research on sustainability can potentially make a significant contribution.

Research has tended to investigate sustainable OM from a focal firm perspective, often conducting research in the context of large private sector manufacturing firms. It would be interesting to explore how small businesses can improve sustainable OM, and to encourage an increase in studies in the service and public sectors. Furthermore, expanding the OM/SCM boundary to go beyond internal and dyadic organizational investigations to multi-tier investigations is an important direction for more holistic explanation of sustainability. Investigations along this stream become more complex, especially broad-based empirical studies, and methodological advances may be required. Multiple levels of analysis, simultaneously, can prove useful for further insights into the congruency and fit issues within and between organizations.

Final thoughts

In the last 20 years, the pioneers of sustainable OM have made significant contributions to the field. There has been an increase in the number of papers on different topics in recent years, and our understanding of sustainable OM has broadened and deepened. Milton Friedman (1970) argued that ‘the business of business is business’, and that the foremost concern of organisations should be profit, and not CSR and sustainability issues. However, many CEOs reported that sustainability issues are rising on their agendas (Anonymous 2010). It would seem that much sustainable OM research is still driven by the profit paradigm, linking sustainability with organisational and financial performance. Are sustainability initiatives only of value if they lead to a profit or competitive advantage? Or are responsible business practices a worthwhile endeavour regardless of profits? There seems to be a groundswell of concern within society of the power of multinational firms, and the pursuit of profit at the

expense of sustainability issues. This interest shows no sign of abating, and we may see interesting studies in the future that are less concerned with shareholder value and more concerned with stakeholder values (Freeman 1984).

The co-editors have been in a privileged position to evaluate fifty-eight manuscripts addressing a myriad of sustainability topics for this special issue. There were many interesting papers submitted that did not make it into the final six selected papers. This number of interesting and potentially novel works is encouraging. We believe that many of these submitted manuscripts, although not appearing in this special issue, will contribute to the sustainability literature. Best wishes to these researchers with their ongoing research as their contributions to the field continue. We would like to thank the many reviewers who contributed their time to reviewing the manuscripts submitted to this special issue.

The OM discipline is in a position to lead other business disciplines in sustainability research and practice. This special issue continues the sustainability leadership position of OM. Given this situation, we look forward to seeing the next exciting developments in sustainable OM being published in IJOPM.

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