A supply chain practice-based view of enablers, inhibitors and benefits for

environmental supply chain performance measurement

Sarah Shaw (corresponding author)

Hull University Business School,

University of Hull, Hull, UK HU6 7RX

sarah.shaw@hull.ac.uk; +441482347506

ORCID: 0000-0002-6664-7152

LinkedIn: https://www.linkedin.com/in/dr-sarah-shaw-996a812/

David B. Grant

Supply Chain Management and Social Responsibility

Hanken School of Economics, Helsinki, Finland 00101

Centre for Logistics Research

Thammasat University, Bangkok, Thailand 10200

david.grant@hanken.fi; +358503276875

ORCID: 0000-0002-5602-5640

LinkedIn: https://uk.linkedin.com/in/davidbrucegrant

John Mangan

School of Marine Science and Technology

Newcastle University, Newcastle NE1 7RU, UK

john.mangan@ncl.ac.uk; +441912226719

ORCID: 0000-0002-5746-0601

LinkedIn: https://www.linkedin.com/in/john-mangan-4258b5a3/

Abstract

Organizations face ever increasing pressure to deliver triple-bottom-line performance results in their supply chains. Yet despite the importance and complexity associated with environmental supply chain performance measurement (ESCPM), organizations struggle to achieve this. The purpose of this paper is to identify the important enablers, inhibitors and benefits to implementing ESCPM as a practice in firms. Data were collected from three focus groups and an industry survey of 388 UK supply chain professionals in a three-phase empirical study. Eighteen enablers, seventeen inhibitors and eleven benefits were identified and ranked in importance. A supply chain practice-based view was utilized as an overarching theoretical lens to conceptualize the study's findings and propose nineteen antecedents, arranged in a hierarchical framework, to enable practitioners to make effective ESCPM decisions. This paper provides an up-to-date review of the factors which influence ESCPM practice, addressing the need for additional research in this area.

Keywords: Environmental supply chain performance measurement; enablers; inhibitors; benefits; supply chain management.

Article classification: Original Article

Introduction

Environmental supply chain management (ESCM) has grown in interest amongst operations and supply chain researchers and practitioners in recent years due to issues of climate change, diminishing raw materials, cleaner production, excess waste from production, increasing levels of pollution, globalization, and because it is seen as a source of competitive advantage (Srivastava 2007; Diabat, and Govindan 2011; Sarkis, Zhu, and Lai 2011; Lee et al. 2013).

Thus, 'what' environmental measures and 'how' to measure them has led to the emergence of environmental supply chain performance measurement (ESCPM). However, as Mishra et al. (2017, 94) concluded '*the* [ESCM] *literature is growing exponentially, but the literature focusing on the assessment of the green* [or environmental] *supply chain performance* [as a practice] *is still underdeveloped*' and requires further investigation.

ESCPM is important as it enables organizations to measure and externally report their environmental performance and helps them to internally control and analyze such performance to understand their business better and continually improve. Fundamentally, it enables organizations to measure and determine how well they are mitigating their environmental impact on the planet. There is however a need for a 'paradigm shift' which advocates a more proactive stance towards firms prioritizing the natural environment and placing it in front of economic and social dimensions of supply chain sustainability. If firms want to be truly sustainable, they need to focus on what matters and avoid greenwashing (Markman and Krause 2016).

ESCPM represents the planet element of the three triple-bottom line elements that also include people and profits (Carter and Rogers 2008, Carter and Easton 2011, Schaltegger and Burritt 2014, Morana and Gonzalez-Feliu 2015). However, very little work has been published to date on ESCPM adoption or the factors that impact this important business practice. The work that exists is very much in its infancy and requires in-depth exploration (Hervani, Helms, and Sarkis 2005; Shaw, Grant, and Mangan 2010; Olugo, Wong, and Shaharoun 2011; Beske-Janssen, Johnson, and Schaltegger 2015; Mishra et al. 2017). Consequently, little is known about what performance measures exist and what enables, inhibits and benefits organizations from measuring ESCPM or importantly how these three sets of factors are linked. Further, in a

systematic literature review of supply chain performance measures, Maestrini et al. (2017) explicitly call for more research, which address the drivers, enablers and barriers to performance measurement adoption across the supply chain.

However, ESCPM as a practice is fraught with complexity and inconsistency because of the multiple echelons, tiers and dimensions which exist within modern-day global supply chains (Tuni, Rentizelas, and Duffy 2018). This makes performance measurement across and within supply chains problematic both for practitioners and academics (Hassini, Surti, and Searcy 2012). We address these issues in this paper by exploring the important enablers, inhibitors and benefits to implementing ESCPM, in order to guide future research, practice and ESCPM decision making. We utilize a newly developed overarching theory developed by Carter, Kosmol, and Kaufmann (2017) called a supply chain practice view (SCPV), to build understanding in this evolving research area. We thus address a call by Sarkis, Zhu, and Lai (2011, 12) to apply additional prominent [or new] organizational theories '*which are considered valuable for future* [environmental] *SCM research…* [as] *…significant questions still exist that require investigation*'.

SCPV originated from practice-based view (PBV) theory and addresses the shortcomings of utilizing solely firm orientated organizational theories, such as the resource-based view (RBV), which has been extensively used in supply chain management (SCM) research. SCPV acknowledges a relational view in that SCM practices (which maybe inimitable or not), impact performance, often span company boundaries, and extend beyond the dyad to supply chain partners/networks. The utilization of SCPV enables researchers to explicitly consider holistically how SCM practices affect performance from both an individual firm through the

resource-based view, and a relational view perspective i.e. beyond the dyad into the wider supply chain network (Carter, Kosmol, and Kaufmann 2017).

A central tenet of SCPV is that interorganizational practices, such as reducing carbon emissions in an ESCPM landscape, can explain performance differences both within and across organizations. Further, Carter, Kosmol, and Kaufmann (2017, 119) call for researchers to adopt the SCPV to '*investigate under which conditions organizations, dyads, or broader interorganizational networks adopt certain practices or refrain from doing so'*. Importantly, Tuni, Rentizelas, and Duffy (2018) noted that environmental performance can no longer be addressed at a single firm level anymore. It requires a holistic approach, encompassing the entire supply chain.

Thus, SCPV provides a logical, novel and overarching theoretical lens for this study to contextualize how the various enablers, inhibitors and benefits, both in a firm's internal and wider external business environment, impact ESCPM practice. It also allows us to determine under which conditions organizations, dyads and broader supply chain networks adopt or refrain from certain practices such as ESCPM, which itself is an underdeveloped research area (Mishra et al. 2017).

This paper is organized as follows. First, we provide a review of the relevant ESCPM literature and other complementary theories that fit within SCPV, to highlight the key gaps surrounding this research area. Next, we provide an outline of the methodology for our empirical study to explore ESCPM enablers, inhibitors and benefits, before presenting our findings and discussion. The final sections of this paper include conclusions, managerial implications and recommendations for future research.

Literature review, theoretical background and research question development

ESCPM is a key dimension in measuring sustainable supply chain performance (Carter and Rogers 2008; Seuring and Müller 2008; Carter and Easton 2011; Schaltegger and Burrit 2014), enabling organizations to report both internally and externally their environmental performance, for example through public disclosure programs such as the Global Reporting Initiative (GRI) and the British Standards Institute ISO 14031 (Ferreira and Silva 2016) or other accreditation or certifications such as the European Commission's Eco-Management and Audit Scheme or EMAS (Grant and Shaw, 2019). Critically, ESCPM is important for the long-term future of our planet, allowing firms to measure and understand how well they are mitigating their impact on the natural environment. There is an urgent need to generate a paradigm shift from '*a traditional 'do-no-harm* [approach] *to a more proactive do-good'* [approach] amongst the supply chain community to ensure supply chain practices and research prioritize the environment first, society second, and economic third, if firms want to be truly sustainable (Markman and Krause, 2016, 4).

Recent literature reviews conducted by Beske-Janssen, Johnson, and Schaltegger (2015) and Tuni, Rentizelas, and Duffy (2018) have found that ESCPM research has moved on from the measurement of conventional supply chain practices, such as finance and operations, to measures of sustainability and the environment within supply chains. Also, some authors have started to investigate the economic benefits of sustainable or environmental measurement, for example synergies or win-win opportunities between being green and lean (Dües, Tan, and Lim 2013; Sarkis, Zhu, and Lai 2011, Garza-Reyes 2015). However, Markman and Krause (2016) argue this is not sustainability and that research and practice should first and foremost be the environment and not economic gains. Mishra et al. (2017) also found that while ESCM literature is growing exponentially a focus on ESCPM is still underdeveloped and needs further

research. In addition, the most influential studies in this field have been conducted by a few authors, utilizing predominately review based or conceptual papers. Further, there is a significant lack of alternative research approaches, such as case based, action research and ethnographic studies addressing this research area, which are required to move the discipline forward.

In terms of ESCPM reporting and dissemination, Morana and Gonzalez-Feliu (2015) developed a set of 28 sustainable indicators for urban logistics and operations and identified six specific environmental supply chain measures with carbon dioxide emissions ranked as the most important. Other measures discussed in the literature include other greenhouse gas emissions such as methane or nitrous oxide, energy use (i.e. gas and electricity consumption), recycling, fuel use and efficiency, waste, and water use (Hervani, Helms, and Sarkis 2005; Shaw, Grant, and Mangan 2010; Björklund, Martinsen, and Abrahamsson 2012). These studies, like others noted by Mishra et al. (2017) and Tuni, Rentizelas, and Duffy (2018) are based on literature reviews or a *'review of reviews'* (Carter and Washispack, 2018, 5) where measures presented were not empirically developed.

Further, given the importance of ESCPM, few authors have attempted to identify the key enablers, inhibitors and benefits from the ESCPM process itself. Thus, there is a lack of guidance for practitioners on how to implement, prioritise and make effective decisions around the ESCPM process. Finally, ESCPM enablers, inhibitors and benefits have not been investigated simultaneously or using a SCPV lens, to understand how well these three notions are linked nor how these notions may be leveraged, across the supply chain, to achieve sustainable competitive advantage and performance gains (Bharadwaj et al. 1993).

We propose four research questions and discuss them in turn. We use the term enabler in our study rather than the term driver as an enabler is a person or thing that makes something possible (Oxford Dictionary 2017). An enabler is similar to a driver but is a motivational activity or antecedent that prepares for something to take place, whereas a driver as it names suggests is a force or pressure acting upon on a situation to make something happen (Diabat, Kannan, and Mathiyazhagan 2014). This is more than a nuanced point as we argue ESCPM may not happen unless an enabler, which may act as a mediator, is present.

This also links to SCPV, in that we want to understand under what conditions, (internal and external) do organizations, dyads and broader supply chain networks adopt or refrain from certain practices, such as ESCPM (Carter, Kosmol, and Kaufmann 2017). From a theoretical perspective, there are several other complementary theories which help us to understand these conditions and explain resultant firm actions (Sarkis, Zhu, and Lai 2011). The first is institutional theory, often viewed under the relational view and acting as an external pressure exerted upon a firm. The second is complexity theory which pertains to complexity generated from within or external to the firm that makes ESCPM as a practice very challenging. The third is the resource-based view which explains how a firm can leverage its own unique capabilities and resources to sustain competitive advantage, i.e. be able to measure ESCPM. Finally, stakeholder theory particularly instrumental stakeholder theory, can act as a mediating or inhibiting force for ESCPM from either within or outside firm boundaries (Busse 2016).

Existing studies identify a range of potential enablers from institutional pressures, such as governments and regulatory bodies through to reducing costs and meeting customer needs (Lee et al. 2008; Tate et al. 2014). Three influential enablers for sustainable supply chain management from an economic perspective include cost savings, greater efficiencies of

production and operations and increased profit (Diabat, Kannan, and Mathiyazhagan 2014). Walker, Di Sisto, and McBain (2008) found that enablers are both internal and external to an organization, which supports the SCPV. The main categories of intra-organizational factors include organizational culture, employee demands, and leadership (Haigh, and Jones 2006). Other inter-organizational enablers include regulations, customers, competitors and society in general (Chahal and Sharma 2006). Similarly, Saha and Darnton (2005) found a principle reason for going green was not a genuine care for the environment but a reactive response to pressure from government legislation, non-governmental organizations (NGO), customers and stakeholders. It was also seen as a way to gain more business, save costs, and to enhance company image. Thus, institutional theory provides a useful lens through which ESCPM as a practice in a firm's external environment, can be interpreted and understood, explaining the diversity of organizational action (Sarkis, Zhu, and Lai 2011).

DiMaggio and Powell (1983) proposed three forms of institutional pressures that influence organizations: coercive, normative and mimetic. Coercive results from pressures exerted on organizations, such as regulatory bodies, government, customers and suppliers, which in part can be influenced by a countries cultural expectations and political influence. Normative pressures force organizations to conform and have legitimate activities in place. Mimetic on the other hand relate to when organizations imitate the actions of their peers/competitors to replicate success and are seen to be 'doing the right thing' (Sarkis, Zhu, and Lai 2011).

Stakeholder theory also provides a useful lens in which to understand the variety of organizational action in relation to ESCPM. Busse (2016) discussed how instrumental stakeholder theory can explain how stakeholders, such as customers, suppliers, government, even the environment itself, can act as a mediator for change and affect performance

outcomes/actions (Zhu, Sarkis, and Lai 2007; Diabat and Govindan 2011). For example, *'if consumers demand that products have particular attributes (for example, that they are certified as not being produced in 'sweat shops'), then corporations will need to act, else lose the support'* (Deegan and Shelly, 2014, 506). However, there has been little consensus over what enables or mediates firms to implement ESCPM as a practice beyond firm boundaries. Thus, we are first research question is:

RQ1 – What are inter- and intra-organizational enablers for ESCPM practices, and which are important?

ESCPM is also a multidimensional complex business problem. Issues such as non-standardized data, access to data, technology restrictions, stakeholders, culture, products, government regulations, organizational policy, industry sector, country, and company size can all negatively influence or inhibit ESCPM implementation (Sarkis, Zhu, and Lai 2011; Mitra and Datta 2014; Gunasekaran, Hong, and Fujimoto 2014; Ahi and Searcy 2015).

Practitioners are unclear on what ESCM measures exist and how to measure them and this confusion exists because of the heterogeneity and tiers that reside within a global supply chain, making it difficult for organizations to plan and predict ESCM actions (Gunasekaran, Patel, and McGaughey 2004; Hervani, Helms, and Sarkis 2005; Sarkis, Zhu, and Lai 2011). Gunasekaran, Subramanian, and Rahman (2015, 6815) noted *'complexity management at* [a] *supply chain level [*has not received*] enough attention amongst researchers.'* Further, *'…managing supply chain complexity demands innovative solutions by thinking outside the box'* (Gunasekaran, Hong, and Fujimoto 2014,195). In order to tackle complexity, there is a need to view supply chains not as simple linear, dyadic structures, but as complex adaptive

systems (Surana et al. 2005; Hearnshaw and Wilson 2013). Thus, a company's foci should be on practices within and beyond company boundaries and not just within boundaries, which supports the SPBV. Complexity theory therefore plays an important role in understanding what may refrain or inhibit a company from adopting ESCPM.

Overcoming inhibitors to successful ESCM is not trivial and requires significant resources, capabilities and coordination amongst different supply chain actors. This collaborative environmental performance effort requires unique resources in the form of finance, people, systems and processes, which may be readily available in larger, but not necessarily smaller sized organizations (Nawrocka, Brorson, and Lindhqvist 2009; Yu, Chavez, and Feng (2017). This can be explained by the natural resource-based view of the firm, which emerged from resource-based view theory and argues that a firm's resources and capability play an important role in the successful implementation of environmental supply chain practices (Barney 1991, Hart 1995, Hart and Dowell 2011).

Organizations with a strong learning and innovative culture as well as management capabilities and experience could be the first to implement ESCPM, act upon outputs and benefits from it and benchmark their activities against their peers (Genovese et al. 2014; Gunasekaran, Subramanian, and Rahman 2017). By doing so these organizations will generate a rare, valuable, non-substitutable ability to implement, manage and measure their ESCM practices (Barney 1991). From an SCPV, this highlights that intra-organizational conditions and demographics, such as internal resources or company size, play an important role in determining whether ESCPM is adopted or not.

Other factors, such as political instability in developing countries and a weak organizational structure, have been found as major hurdles in implementing sustainable supply chain management (Luthra, Garg, and Haleem 2015). Govindan et al. (2014) identified twenty-six inhibitors and five sub-categories for ESCM, the top three were a lack of technology, outsourcing and cost. However, there is been little consensus or research devoted to what inhibits firms to implement ESCPM as a practice. Thus, we are interested in determining:

RQ2 – What are inter- and intra-organizational inhibitors to ESCPM practices, and which are important?

Very little empirical work exists on the perceived benefits of ESCPM to practitioners, only the linkages between ESCM and performance (Zhu and Sarkis, 2004; Golicic and Smith 2013; Mishra et al. 2017). This lack of quantification and understanding around the perceived and actual benefits explains the confusion, contradiction and inertia, which exists in the background literature. For instance, evidence exists that the adoption of ESCM practices can lead to substantial cost savings, increased market share and greater profit margins (Rao and Holt 2005; Chien and Shih 2007; Golicic and Smith, 2013; Zhu, Sarkis, and Lai 2013). Further, Zhu, Geng, and Lai (2010) indicate that large companies can green their supply chain by establishing win-win relationships with smaller suppliers and customers, which result in environmental and financial performance gains, but not necessarily operational improvements.

Contradictions exist however; for example, Testa and Iraldo (2010) found that cost efficiency appears to be a weak enabler of ESCM because the upfront investments are expensive and largely turn companies off investing in these practices. As a result, ESCM can be deemed an expensive activity and often results in price increases in the short-term. Thus, investment in

ESCM should be viewed by organizations as a long-term strategy as opposed to short-term. While a plethora of work exists on the benefits of ESCM as a practice. There is a dearth of work conducted on drawing together a consensus of what benefits organizations from implementing ESCPM. Thus, we are interested in determining:

RQ3 – What are the inter- and intra-organizational benefits stemming from ESCPM and which are important?

While several established streams of research have explored the enablers and inhibitors of ESCM practices and their effect and relationship on organizational performance over the last two decades, much of existing work has focused on one or two of these three elements for ESCM implementation and not necessarily the ESCPM process itself incorporating all three elements. Thus, there is a need to provide a unique holistic SCPV for both academia and practice, which extends beyond the resource-based view and traditional organizational theories, of the enabling and inhibitors forces affecting ESCPM and the benefits they bring or influence; therefore providing clarity and direction on future implementation, decisions and policy in relation to ESCPM. Finally, we are also interested in determining:

RQ4 – How are the three ESCPM concepts of enablers, inhibitors and benefits linked, and is there any overlap?

As noted in the introduction, the fundamental aim of this paper is to identify the key enablers, inhibitors and benefits of ESCPM, rank them in terms of relative importance, and determine how these three elements are linked. The contribution from this paper will provide direction for organizations to understand the root cause behind ESCPM implementation, and assist in

building theory around ESCPM, and set-out a list of antecedents to assist practitioners embarking upon this transformational journey. This has led to the development of the conceptual model in Figure 1 that is linked to the four research questions.

[Figure 1 about here]

Methodology

Given the exploratory and complex nature of this research issue and research questions, and the need to build theory in this relatively new research area, we employed a multi-method approach that combines both qualitative and quantitative methods. The justification for this approach is based on two key fundamentals: firstly, the majority of ESCPM research has been dominated by few scholars using review and conceptual papers. Thus, there is an urgent need for *'multiple-research methods approach* [to] *take the current research* [on ESCPM] *to the next level* [as it allows researchers to] *shed light upon issues that have not been attended so far'* Mishra et al. (2017, 95-96). Secondly, a multi-method approach enables a clearer and more holistic picture (i.e. embracing the SPBV theme) of the issues being investigated (i.e. using different research angles) and therefore follows the level of rigour and relevance sought after and required in logistics research to build new theory (Mangan, Lalwani, and Gardner 2004; Stock, Boyer, and Harmon 2010; Mishra et al. 2017). As a result, there were three phases to the empirical study.

Phase I involved conducting two focus groups (FG1 and FG2) with nine and ten supply chain managers and directors respectively, to explore the four research questions and identify a list of ESCPM enablers, inhibitors and benefits for survey testing in Phase II. Thus, FG1 and FG2 were used as an exploratory tool (within this preliminary stage of the research design), as a

14

precursor to the design of the questions (i.e. to identify a list of enablers, inhibitors and benefits statements) for testing in the structured online survey. Krueger and Casey (2009, 66) state that a *'focus group is characterized by homogeneity, but with sufficient variation among participants to allow for contrasting opinions.'* Sanchez-Rodrigues et al. (2010, 80) also recommend a *'diversity of background and knowledge"* is required "*to build new ideas and make participants think outside the box.'*

Supply chain managers and directors were short-listed from the UK's Chartered Institute of Logistics and Transport (CILT) membership database and invited to participate in Phase I. This was supported with convenience sampling to ensure sufficient homogeneity and heterogeneity was achieved within each focus group, for instance, inviting supply chain managers and directors from small, medium as well as large organizations to each focus group. There were a total of 19 participants across the two Phase I focus group sessions, ten in FG1 and nine in FG2. Eight sectors from the North American Industrial Classification System (NAICS 2015) were represented across them: seven in the transportation and warehousing sector, four in educational and training services, two each in healthcare and social assistance retail and professional, scientific and technical services, and one each in manufacturing, wholesaling, retail and information systems and technology. Of the 19 participants only two were female and participated in FG2. Self-selected occupation titles included seven directors of logistics, operations, business development or sustainable development, six managers of business development, transport, sustainable development or 'general' activities. In summary, we believed we met our objective to have wide and diverse sample of participants.

Phase III was a final inductive phase and involved one focus group, FG3, comprising a different participant group from Phase I. FG3 included thirteen supply chain sustainability professionals

and subject matter experts from leading UK and European retail companies, nine in retail and four in wholesaling (NAICS 2015), who were assembled for the focus group while at an industry gathering in UK. Self-selected occupation titles included nine logistics/ supply chain managers, and two each logistics and sustainability directors. The objective of FG3 was to verify the overall research findings and enabling the researchers to 'sense check' and test for consensus, as well as diversify the sample base to provide views beyond the UK focus of Phases I and II (Krueger and Casey 2009). The output and conclusion of Phase III was a definitive list of enabler, inhibitor and benefit statements ranked in importance.

Focus group research has not been extensively used within the logistics discipline compared to other methods like surveys (Sanchez-Rodrigues et al., 2010). There is an opportunity to utilise them, as an alternative or complimentary research approach, to gather a deeper and richer understanding of ESCPM (Mishra et al. 2017). We followed the focus group design process of Sanchez-Rodrigues et al. (2010), which ensured the design followed a rigorous six step process:

1.   Define the research problem

2.   Research strategy and design

3.   Focus group design

4.   Conducting the focus group

5.   Analysing the data

6.   Participant feedback

We used a professional moderator to chair and facilitate every focus group to enable the authors to observe, transcribe and record notes. A series of sub questions were asked during the focus groups (which linked back to the four research questions), to develop the list of enabler,

inhibitor and benefit statements. The moderator used a variety of skills to obtain different views, gain a consensus of opinions and probe new information using questions such as 'can you give me an example of this? Would you all agree? Is there anything else you would like to contribute to this question?'

In addition, all focus groups in Phases I and III were audio recorded to enable full transcription for the data reduction analysis. Miles and Huberman's (1994) qualitative data analysis process encompasses three distinct activities: data display, data reduction and conclusion/verification. For the focus groups, the data display process involved displaying a full transcription of the focus group dialogue on Microsoft Word, to enable the researchers to review and reflect upon. The next stage included reducing the transcription into key themes by focus group question and using MindJet Mind Manager^{TM} to reduce the data, display again, so conclusions could be drawn. A list of enabler, inhibitor and benefit statements were produced from this process for testing in Phase II.

Phase II consisted of an online survey, issued in three waves to maximise the response rate, to 11,500 UK practicing supply chain professionals through the UK's Chartered Institute of Logistics and Transport (CILT) membership database to test the ESCPM enablers, inhibitors and benefits emerging from Phase I. The CILT was chosen as a key database as it represents one of the most comprehensive and up-to-date databases of practicing logistics and supply chain professionals in the UK. While the sample is from a UK database, many international logistics and supply chain organizations have UK operations and are CILT members and likely responded to the survey; hence along with demographic data discussed next we believe the findings provide some level of generalizability.

The survey yielded 388 responses for a response rate of 3 per cent. This is a typical response rate for online surveys issued by CILT to its membership database, and any shortcomings of this were compensated by using focus groups in Phase I and particularly in Phase III to validate the overall findings (Mangan, Lalwani, and Gardner 2004). Survey respondents were mainly from supply chain middle management/ directorship positions (over 80 per cent), over sixty percent were aged between 36 and 55 years with 19 per cent aged between 26-35 years, 89 per cent worked for medium to predominantly large sized organizations, and on average were at their organization for nine years. About 42 per cent were employed in transportation and warehousing, 16 per cent in manufacturing, eight per cent in retail, seven per cent each in public administration, and professional, scientific and technical services, while less than five per cent each of responses were across 11 other sectors (NAICS 2015). Gender diversification was better than FG1 and FG2 but still only 13 per cent female compared to 87 per cent male.

The survey was divided into five key sections pertaining to each research question, with a section for respondent demographics. The survey questions were presented in a five-point Likert scale format (Likert 1932) to test respondent's level of agreement with each enabler, inhibitor and benefit statement captured from Phase I, and with anchors of 1 strongly disagree to 5 strongly agree. The survey was pilot tested with ten academics and ten practitioners before issue to test for content and execution issues.

Non-response bias was tested by splitting the survey respondents into three groups in accordance with the three waves of responses issued to the CILT database (Hair et al. 1995). A one-way analysis of variance (ANOVA) was used to test for non-response on each of the key survey questions, and p values recorded no statistically significant differences for each of the three groups; concluding that non-response bias did not exist. Survey data was analysed

using a range of statistical techniques including SPSS and SIMCA-13™ multivariate analysis
software for principal component analysis to identify underlying constructs not evident in the
descriptive statistical analysis and to answer RQ4 and how the three concepts are linked.

Thus, FG1 and FG2 I provided a high degree of internal validity and contextualisation of the
issues for survey testing, the survey provided external validity for empirical testing, while FG3
provided a final validation stage, or sanity check of the survey results, and a test for theory
saturation.

Findings and discussion

ESCPM enablers (RQ1)

Eighteen enabler statements were identified during Phase I (FG1 and FG2) and were tested in
terms of their importance to practitioners in Phase II (survey). The results are presented in
Table 1 and categorized according to SPBV theory (intra- and inter-organizational) in Figure
2, which also shows responses related to RQ2 and RQ3, that will be discussed in following
sections.

[Table 1 about here]

[Figure 2 about here]

The statement which received the highest average rating was 'desire to reduce cost' whilst the
statement receiving the lowest average rating was 'pressure from retailers'. However, all
statements rated relatively high indicating the respondent's level of agreement with the
statements.

In order to test whether there was any statistically significant association between each ESCPM enabler statement and whether respondents agreed or disagreed with these statements, a Pearson's Chi-square test was applied to the data (Hair et al. 1995). The largest statistical differences were observed on 'desire to reduce cost' and 'improving operational efficiency' with the observed counts significantly greater than expected in the strongly agree category. On the other hand, statements such as 'pressure from retailers' or 'suppliers' received observed counts significantly greater than expected in the strongly disagree and disagree categories.

Evidence from these results indicate that intra-organizational enablers, such as reducing cost and the need to be operationally efficient are very important enablers for ESCPM. However, government legislation, which is an inter-organizational factor and a coercive institutional pressure, is also a key mediator for implementing ESCPM in firms (Dimaggio and Powell 1983). Further, from an instrumental stakeholder theory perspective, the key inter-organizational enablers are predominantly linked to coercive pressure from customers, the public and suppliers. Thus, organizations are driven and influenced significantly by these key stakeholders, which supports Deegan and Shelly (2014).

One overarching theme common to nearly all enabler statements is 'financial'. Cost underpins many of the enablers statements as a key construct, either implicitly (continuous improvement) or explicitly (to reduce cost). The enabler statement which received the highest average rating in the survey was the 'desire to reduce cost'. It is clear a priority and strategy of organizations is to reduce cost or become more profitable and is very important in the context of this research as a major enabler. Cost has been discussed in the existing ESCM literature, e.g. Saha and Darnton (2005) identify ESCM as a way for organizations to save costs, but mainly from an inhibitor or benefit perspective and not as an enabler.

Therefore, the question remains, are firms being truly sustainable in their intent? According to Markman and Krause (2016) the priority must be 'environment first', however 'a genuine care for the environment' appeared rank fifth in terms of importance as an enabler, although it is potentially a normative institutional pressure (i.e. the right thing to do), it has fallen behind other altruistic enablers, such as cost and operational efficiency. Thus, firms are still very much driven by traditional supply chain performance measures, such as financial performance and there is some way to go to make the 'paradigm shift' which Markman and Krause (2016) posited.

In contrast, Testa and Iraldo (2010) found that cost efficiency appears to be a weak enabler of ESCM because the upfront investments are expensive and largely turn companies off investing in these practices. This is case with smaller firms, who often lack the financial resources to do so. Improving operational efficiency can also be linked to cost reduction. Improving efficiency has been identified in the existing literature in relation to ESCM practices and improved organizational and economic performance (Rao and Holt 2005) however, this is the first time it has been linked to the ESCPM process itself.

Government legislation and regulation was ranked as the third most significant enabler in this research and similar findings are mirrored in the existing ESCM literature (Zhu, Sarkis, and Lai 2007; Diabat and Govindan 2011). Finally, the enabler results support assertions by Walker, Di Sisto, and McBain (2008) that ESCM outputs are influenced by both external and internal factors, which we have also found in this study in relation to ESCPM.

As shown in Figure 2, there are slightly more intra-organizational (ten) than inter-organizational (eight) enablers, which suggests that firms can play a key role in influencing

their own conditions for ESCPM implementation. However, a main influence or enabling force does stem from stakeholders such as customers and suppliers, acting as a mediating force for adoption. This links back to Busse (2016), who discussed how instrumental stakeholder theory explains how stakeholders, such as customers, suppliers, government, even the environment itself, can act as a mediator or 'pressure' for change and affect performance outcomes/actions, such as ESCPM. Therefore, the complementary theories discussed in the literature review of institutional theory, stakeholder theory, and the resource-based view play a key role in enabling ESCPM as a practice in supply chains, but there are others, which extend beyond the firm to a relational view that impacts performance.

ESCPM Inhibitors (RQ2)

The seventeen inhibitor statements identified from the literature and during Phase I were tested for importance in the Phase II survey. The results are presented in Table 2 and are categorized according to SPBV in Figure 2.

[Table 2 about here]

The inhibitor statement (intra-organizational), with the highest average rating was 'cost' whilst the statement receiving the lowest average rating was 'trust in the supply chain'. However, like the enabler statements, the respondents rated all inhibitor statements relatively highly indicating the respondent's level of agreement with a majority of statements identified in Phase I. The largest statistical differences were observed on 'employees values and attitudes' and 'recession/austerity measures' with observed Chi-square counts significantly greater than expected in the strongly disagree category (Hair et al. 1995). This supports the enabler findings in that people are crucial to the ESCM process, i.e. people and the CEO /board of directors

(rank sixth for enablers) of an organization are seen more as an enabler than inhibitor of ESCPM, and reinforces the work of Genovese et al. (2014) and Gunasekaran, Subramanian, and Rahman (2017) where they identify 'change management' 'capabilities and skills' and 'culture' as an important enablers of performance measurement systems in organizations, and are within a company's span of control to influence.

Also, 'complexity of the supply chain' (inter-organizational inhibitor) received higher than expected counts in the strongly agree category indicating that this was very important to the respondents, supporting the discussion earlier that complexity theory is a challenge to ESCPM implementation (Sarkis, Zhu, and Lai 2011). A key finding of the study is that the majority of ESCPM inhibitors (and solutions to them), reside beyond company boundaries into the wider supply chain network and relate to complexity. For instance, the complexity and scope of the supply chain itself and knowing who and what should be measured in a supply chain network?

Marshall et al. (2015) identified 'what to measure' as a key issue in sustainable performance measurement, which can be further understood through complexity theory (Sarkis, Zhu, and Lai 2011) and may explain the inconsistency and non-standardization associated with ESCPM (Tuni, Rentizelas, and Duffy 2018) A key challenge for firms, is do they have the resources and capabilities to overcome this complexity to measure ESCPM. However, some steps have been undertaken to start to address this issue in the scholarly literature (Shaw, Grant, and Mangan 2010; Bhattacharya et al. 2014).

Other inter-organizational inhibitors included lack of government direction and in some cases too many disparate governing bodies & regulations create confusion, which links to back to institutional theory (Lee et al. 2013) and complexity theory. Mitra and Datta (2014) found that

regulations do not enforce the adoption of ESCM practices but that supplier collaboration, product design and logistics for environmental sustainability are key success factors impacting firm performance.

A key theme to emerge in terms of the SCPV, in relation to intra-organizational inhibitors, are how the statements are prefixed with, for instance 'a lack of…' (see Figure 2 and Table 2). A majority of the inhibitor statements within firm boundaries relate to a 'lack of' resources, such as cost or capabilities around reporting and measurement and a lack of time and training. This suggests, from a resource-based view perspective, that firms do indeed lack the capabilities and resources to implement ESCPM, as perhaps this is a key first hurdle to overcome.

ESCPM Benefits (RQ3)

The survey respondents were then presented with a list of eleven benefit statements identified during Phase I (FG1 and FG2). Table 3 summarizes the results from the survey, which again are categorized as benefits according to SPBV in Figure 2.

[Table 3 about here]

The top three benefits identified from implementing ESCPM, which reside with firm boundaries and are therefore a benefit to the organization itself (i.e. intra-organizational), are reducing waste, being more operationally efficient, and innovating and continuously improving. The statements with the most statistical differences in the strongly agree category are 'measuring helps us to be more operationally efficient' and 'measuring helps us to reduce waste'.

However, most respondents disagreed with the statement that 'measuring gives us improved customer loyalty'. It received significantly more counts than expected in the 'disagree' and 'strongly disagree' categories. There are fewer inter-organizational benefits (see Figure 2), and they relate mainly to the benefits of ESCPM in terms of collaborating with stakeholders, which links to the enablers of suppliers and customers acting as key mediators for ESCPM. Collaboration is a key theme within both the enablers and benefits for ESCPM. Yu, Chavez, and Feng (2017) found that building green collaboration with suppliers, linked to the resource-based view (i.e. green purchasing and selection capabilities) is significantly and positively related to both environmental and operational performance outcomes.

The top three highly ranked benefits can be linked to a cost construct in that the implementation of ESCM and ESCPM has win-win relationships in terms of environmental and economic performance (Zhu and Sarkis 2004). This is because these benefits ultimately lead to cost savings. Further, an organization's business model, which may be 'closed-loop' in design, could support and act as a catalyst to realize these benefits, such as waste reduction by recycling; promoting a circular economy (Errington and Childe 2008; De Angelis, Howard, and Miemczyk 2018; Masi et al. 2018).

Principal component analysis (PCA) (RQ4)

Principal component analysis (PCA), a form of factor analysis, was utilized to understand how the three concepts of enablers, inhibitors and benefits were linked to address RQ4. It is not always possible to observe underlying trends or data patterns in descriptive analysis when dealing with multiple variables, however PCA provides a platform to analyze multiple variables and datasets simultaneously; embracing the holistic approach and theoretical SCBV stance of this paper. Therefore, the enabler, inhibitor and benefit datasets were analyzed

simultaneously through a PCA model using the software SIMCA-13™ to reduce and present the data in a more meaningful manner not evident in the descriptive statistical analysis (Erikkson et al. 2006).

This software is used extensively in the biochemical and pharmaceutical industries, but to our knowledge this was the first time it has been applied to supply chain research. SIMCA-13™ software is unique in that it specialises in multi and megavariate analysis, which is required in the natural sciences when identifying multiple latent variables. SIMCA-13™ software presents the data in a way that uses rich information/ illustrative parameters which aid insight and interpretation, thus fundamentally taking a different philosophical approach to other traditional multivariate analysis techniques. The key purpose of comparing the enablers, inhibitors and benefits in the PCA model was to understand how these three elements are linked.

The most important step in the SIMCA-13™ PCA process is to decide on the number of components (or factors) to extract. The most commonly used method for deciding on the number of factors to extract is the latent root criterion. Only factors that have a latent root or eigenvalue greater than one are considered significant to retain for factor analysis, the rest can be discarded (Hair et al. 1995). Within SIMCA-13™ the rule is much harsher; it regards eigenvalues greater than two as significant and worthy of analysis, the rest are discarded. Four significant components were extracted using this process, as shown in Table 4.

[Table 4 about here]

To assess which ESCPM variables load onto each of these four components we assessed the scores of each component. We re-coded the scores with '–/ 0/ +' symbols to indicate the type

of score to aid interpretation (Erikkson et al. 2006). Scores with an absolute value lower than 0.2 were set to (0), those with a negative value were set to (–) and those greater than 0.2 were set to (+) (Erikkson et al. 2006, 37). A positive score (+) indicated that respondents strongly agreed with the statement. A neutal score (0) indicated that respondents neither agreed or disagreed with the statement and finally a negative score (–) indicated that respondents disagreed with the statement.

Four underlying constructs emerged from four components, indicating that a group of survey respondents 'strongly agreed' with a set of statements as shown in Table 4:

C1) Operational efficiency is an enabler and benefit of ESCPM (intra- organizational)

C2) The complexity of the supply chain is an inhibitor of ESCPM (inter-organizational)

C3) Cost/operational efficiency is an enabler, and (intra-organizational)

C4) External stakeholder pressure is an enabler of ESCPM (inter-organizational)

The four components extracted, underpinned by the organizational theories discussed, highlight the key trends affecting the ESCPM process. Those organizations that implement ESCPM, do so, intra-organizationally, to improve operational efficiency and reduce cost. Furthermore, those organizations that are operationally efficient may have a 'head-start' in implementing ESCPM, supporting the linkage and benefits between lean and being green (Dües, Tan and Lim 2011, Sarkis, Zhu, and Lai 2011, Garza-Reyes 2015). The complexity of the supply chain itself and the process of measuring acts as a major inhibitor to ESCPM, similar trends have been identified in traditional supply chain performance measurement (Gunasekaran, Patel and McGaughey 2004; Olugu, Wong, and Shaharoun 2011; Maestrini et al. 2017). Thus, the wider inter-organizational factors of a boundary spanning supply chain,

impact directly a firm's intra-organizational capability to measure. Organizations struggle to know 'what' and 'how' to measure. Finally, external stakeholder pressure from customers, suppliers, government and other regulations plays a significant role in enabling organizations to embark upon this transformational journey; these pressures reside outside the company into the wider supply chain.

Managerial Implications & Developing an ESCPM Antecedents Framework

The eighteen enablers, seventeen inhibitors and eleven benefits identified in this study are not mutually exclusive, with some overlapping, such as cost and operationally efficiency are both an enabler and benefit to ESCPM. Thus, to make sense of the data yield from this study and to address the foregone issues, we propose an antecedents and benefits framework, developed and summarized from the key findings of this study (RQ1, RQ2, RQ3 and RQ4), to assist supply chain practitioners in preparing their business for effective ESCPM implementation (e.g. what do organizations need to have in place and prioritize for effective ESCPM implementation), and to understand the benefits of doing so. This framework is shown in Table 5.

[Table 5 about here]

Nineteen antecedents (or prerequisites) are identified in total, which we categorize as either internal or external to the organization, and which builds upon the work of Walker, Di Sisto, and McBain (2008) and embraces the overarching theoretical lens of SPBV developed by Carter, Kosmol, and Kaufmann (2017). To assist ESCPM implementation, we also build upon the work of Gunasekaran, Patel and McGaughey (2004) by classifying the ESCPM antecedents into strategic, operational and tactical dimensions to tailor for different managerial levels within a business and to promote effective decision making and governance for ESCPM

implementation. We also add a new fourth dimension 'political' within the external antecedents (Lee et al. 2013).

We propose practitioners prioritize and focus on the fifteen 'internal' (inter-organizational) antecedents as a priority, which are within their 'span of control' but be aware of the external factors, such as 'political' which still need to be addressed (but are outside their control). This will help to address the complexity which has been identified in the background literature and provide supply chain practitioners with a useful set of discrete actions to implement ESCPM within their business, hence addressing and overcoming the resource and capability issues identified in the study, which supports the natural resource-based view (Barney 1991; Hart 1995; Hart and Dowell 2011). This demonstrates that a practice-based view, i.e. SPBV, helps address a resource-based view issue, i.e. ESCPM.

Conclusions

While a plethora of research exists on the drivers and inhibitors of ESCM practices and the relationship to organizational performance, no empirical work has been conducted to date on what motivates, prevents and benefits organizations from measuring the ESCPM process itself (Mishra et al. 2017). This paper addresses this gap by applying a rigorous three-phased methodological framework to identify eighteen enablers, seventeen inhibitors and eleven benefits of ESCPM. By adopting a SPBV lens, developed by Carter, Kosmol, and Kaufmann (2017), the study has enabled us to determine under which conditions, organizations, dyads and broader supply chain networks 'adopt' or 'refrain' from ESCPM as a practice. It has also allowed us to classify these statements holistically by either intra or inter-organizational factors or where they have the most influence.

Importantly, we conclude that ESCPM as a practice, is boundary spanning and requires, not only resources within a firm (the resource-based view), but externally within the wider supply chain network to take place (a relational view). Thus, SCPV is fundamental to research this issue to develop a holistic view. As noted by Tuni, Rentizelas, and Duffy (2018), ESCPM cannot be viewed solely at a company level. Further, from a managerial perspective the study proposes a useful hierarchical framework of 'internal' strategic, operational and tactical steps required to prepare the business for ESCPM implementation located in Table 5.

However, there are some steps which are beyond the 'span of control' of the business, for instance 'external' political actions required by government (Lee et al. 2013). This framework supports the future research agenda documented by Gunasekaran, Subramanian, and Rahman (2017) which identified several relevant themes around capabilities, such as assisting firms with complexity management, skills and talent management, and information systems within the supply chain for improving supply chain performance measurement,

This paper makes several unique contributions to the body of ESCPM knowledge. First, to our knowledge no study has attempted to address all three elements individually or together (enablers, inhibitors and benefits) in relation to the ESCPM process. This has enabled the authors to generate a clear and in-depth view of this research area. Second, cost is identified as both a major enabler and inhibitor to measuring ESCPM, which is a key empirical finding, with the 'finance' construct underpinning most of the key enablers, inhibitors and benefits, either directly or indirectly. Third, operational efficiency is identified as a key enabler and benefit of ESCPM, and this has not been identified anywhere else in the extant literature. This reinforces economic theory, in that many organizations have an implicit or explicit, financially driven

culture and an organization's primary focus and frame of reference is about profit and to a lesser extent about a genuine care for the environment.

These contributions suggest there is much more work to do to support the 'paradigm shift' needed to achieve truly sustainable supply chains documented by Markman and Krause (2016). Similarly, government legislation and regulation are both an enabler and inhibitor to ESCPM, with organizations confused over 'what' and 'how' they should measure and organizations (within the context of this study) are demanding a 'call to action' from government for clarity on this issue.

The study has also found that the ESCPM process itself is enabled primarily by internal factors, such as cost and operational efficiency and external stakeholder pressure, but at the same time hindered by internal inhibitors such as obtaining data, and knowing what to measure and report, which can be further understood by complexity theory, which may be overcome by capabilities and resources i.e. the resource-based view. This sheds new understanding on ESCPM adoption in a UK context and the capability and resource issues facing organizations.

Finally, this study has discussed and utilized four additional and complementary organizational theories: institutional theory, stakeholder theory, complexity theory and the natural resource-based view, to highlight the issues surrounding this research issue and to put in place actions to address them in the form of a hierarchical framework. Few studies, if any, have applied such prominent organizational theories, using SPBV as an overarching lens, in the field of ESCPM.

This study also provides three major managerial insights. First, diagnosing the dominant enablers (RQ1) and inhibitors (RQ2) of ESCPM adoption allows organizations to be aware and

make decisions to either promote or eliminate these factors during the implementation process. It also helps to reduce the fear and uncertainty of the unknown pitfalls associated with this supply chain initiative. Second, diagnosing the benefits (RQ3) enables organizations to see clearly their return on investment and make financial decisions in this area. Finally, the proposed antecedents and benefits framework, developed from the key findings of this study (RQ1, RQ2, RQ3 and RQ4), will assist supply chain practitioners in preparing their business for effective ESCPM implementation.

While this paper makes several unique and significant contributions to the body of ESCPM knowledge, there are a few limitations and therefore productive avenues for future research. The study has focused predominantly, but not exclusively, on medium to large sized organizations, thus there is an opportunity to explore using the same research design, the enablers, inhibitors and benefits of ESCPM for SMEs and with companies across different industry sectors. Secondly, this study was conducted in a UK context, and while we believe the findings may have generalizability to other contexts given the international nature of survey respondents and the composition of European managers in FG3, future research should explore different country contexts using the same research design, to understand how the political landscape can affect ESCPM adoption in organizations. Opportunities also exist for explorative case study and survey research that report on our ESCPM hierarchical framework to further build and enhance theory. Finally, more research is required on empirically identifying enablers, inhibitors and benefits of ESCPM within different countries and contexts and using alternative theoretical lenses and additionally determining how traditional organizational theories fit within SPBV.

Acknowledgements

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