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Global Value Chains and the Environmental Sustainability of Emerging Market Firms: A Systematic Review of Literature and Research Agenda

Abstract

The globalization of production has brought significant growth and connectivity opportunities to firms and workers in emerging markets. However, research on the interplay between global value chains (GVCs) and emerging market firms' environmental sustainability remains fragmented. A coherent picture of the dispersed body of knowledge on the environmental implications of global production vis-à-vis emerging market firms is lacking. This paper integrates research on GVCs and emerging market firms' environmental sustainability through a systematic literature review. Findings reveal important descriptive and thematic characteristics of the current body of knowledge. They point to the increasingly important yet dual and multilayered role of GVCs in environmental sustainability of emerging market firms. They also highlight the importance of emerging market firms' strategies, capabilities, and collaborative GVC relationships to enable the effective implementation of environmental practices in emerging markets and support the environmental sustainability of GVCs. The review highlights a lack of theorization in analyzing this topic and develops an appropriate research agenda.

Keywords: Global value chains; emerging market firms; environmental sustainability; systematic review

1. Introduction

Global value chains (GVCs) are holistic systems and governance structures of business value creation and provision that involve multiple *actors* spanning across multiple countries and *activities* and *resources* that run both upstream and downstream (Gereffi, Humphrey, & Sturgeon, 2005). Typically led by large multinational enterprises (MNEs), GVCs profoundly impact the environment both in developed and emerging markets (Achabou, Dekhili, & Hamdoun, 2017; Ras & Vermeulen, 2009; Sun, Li, Ma, & He, 2019). Accordingly, research on the intersection between GVCs and environmental sustainability, i.e., "the situation in which vital environmental functions are safeguarded for future generations" (Hueting, 2010, p. 526), has flourished in recent years (Achabou et al., 2017; Ben Brik, Mellahi, & Rettab, 2013; Jiang & Green, 2017; Tolentino-Zondervan et al., 2016).

However, despite growing academic interest in GVCs and environmental sustainability, research on the interplay between local emerging market firms (EMFs) and GVCs they participate in vis-a-vis environmental sustainability remains disconnected and siloed. The existing knowledge on GVCs and environmental sustainability of EMFs is dispersed across three streams of research on GVCs, environmental studies, and international business. Likewise, while literature reviews on value/supply chains and environmental sustainability with different aims or objectives exist (Table 1), virtually no reviews examine the environmental sustainability of EMFs that are embedded in GVCs. As such, there is a shortage of a systematic review that synthesizes the dispersed body of knowledge on the interplay between GVCs and local EMFs regarding environmental issues such as pollution, greenhouse gas emissions, and biodiversity. In particular, most research examined either the role of GVCs in environmental outcomes in emerging markets (Allan Lerberg & Jette Steen, 2006; Ben Brik et al., 2013; Dong et al., 2017) or the impact of EMFs' environmental practices on the environmental sustainability of GVCs (Diabat, Kannan, & Mathiyazhagan, 2014; Hong, Zhang, & Ding, 2018). However, research remains fragmented and lacks a coherent picture of the multifaceted interplay

between GVCs and EMFs' environmental sustainability. Thus, there is a pressing need for an advanced and integrated understanding of how GVCs and EMFs interact in the pursuit of environmental sustainability.

- Table 1 about here -

Against this backdrop, this paper aims to review, integrate, and synthesize the current state of research on GVCs, local EMFs, and their environmental sustainability. This is important since EMFs' environmental practices within GVCs contribute to the environmental sustainability of emerging markets (Tatoglu et al., 2014; 2020). Thus, we examine the following inter-related research questions via this study. First, we investigate "*How do GVCs influence the environmental sustainability of emerging market firms that participate in these chains?*" Second, we turn the table and probe into "*What role do emerging market firms play in the environmental sustainability of their GVCs?*" In fulfilling this aim, we conduct a systematic analysis of the GVC research to develop a framework that explains how the dynamics of being part of GVCs shape the environmental sustainability of EMFs and how EMFs, in turn, manifest their role in the overall environmental sustainability of GVCs in which they are embedded. In doing so, we integrate different research streams underlying the understanding of GVCs vis-à-vis EMFs' environmental sustainability by establishing connections in the literature, identifying relevant research gaps, and offering directions for future research.

Our research makes two notable contributions at the intersection of GVC research and the international business (IB) field. First, we consolidate the fragmented empirical and conceptual research on environmental sustainability vis-à-vis GVCs to develop an inclusive framework and offer a theory-driven research agenda. Second, we advance the understanding of environmental sustainability in emerging markets by acknowledging that local and global stakeholders influence much of the contemporary firms' environmental footprint within the value chains in which they are embedded (Akhtar, Tse, Khan, & Rao-Nicholson, 2016; Gölgeci, Gligor, Tatoglu, & Arda, 2019; Zhu, Sarkis, & Lai, 2018).

Next, we provide an overview of GVCs and environmental sustainability and explain the systematic methodology employed in conducting this review before presenting and discussing our descriptive and thematic findings that lead to an integrative framework. This is followed by a section on the theory-driven research agenda and concluding remarks.

2. Background

GVCs refer "to nexus of interconnected functions and operations through which goods and services are produced, distributed, and consumed on a global basis" (Kano, Tsang, & Yeung, 2020, p. 579). GVCs are also described as globally distributed networks of interdependent value-adding enterprises, focused around a particular product or service, linking households, enterprises, and states within the global economy and potentially including firms of any size, from SMEs to MNEs (Gereffi et al., 2005; Kaplinsky & Morris, 2000). The merit of the GVC framework lies in its ability to analyze the entire industry structure from the production to consumption of a specific end-product and the global spatial scale of that process (Gereffi, Lee, & Christian, 2009). The core premise of GVCs is that business value creation and provision require more than a sole business and reside in greater networks of interdependent actors, activities, and resources (Kano et al., 2020). However, importantly, they also enable linking these actors and territories through manufacturing and innovation (De Marchi, Di Maria, & Gereffi, 2017). Such a comprehensive framework enables getting a fuller picture of tensions and contradictions that are embedded in GVCs.

Though the term GVC has attracted considerable attention within the IB community in recent years, the broader literature on GVCs represents a mosaic of contributions by scholars from diverse (inter)disciplinary backgrounds, such as economic sociology (Gereffi et al., 2005), economic geography (Thomsen, 2007), development studies (Kaplinsky & Morris, 2000), economics (Pietrobelli & Rabellotti, 2011), and international studies (Palpacuer, Gibbon, & Thomsen, 2005). Overtime, GVCs have become a prominent analytical approach amongst interdisciplinary researchers to conceptualize economic globalization, analyze the dynamics of international trade, and understand

the complex structure of global industries (Gibbon, Bair, & Ponte, 2008). Given the inherent overlaps in research interests between the GVC and IB literatures, IB scholars have highlighted the usefulness of the GVC perspective in informing existing and emerging IB research (De Marchi, Di Maria, Golini, & Perri, 2020; Kano et al., 2020). Particularly, GVC-related issues such as MNE's role in the governance of global industries, the importance of institutional contexts in co-evolution of global industries, barriers and opportunities in the internationalization of EMFs, regionalization, and the sustainability of global production systems are argued to be of primary relevance to IB (De Marchi et al., 2020; Ghauri, Strange, & Cooke, 2021). Furthermore, GVC research helps better understand cross-border linkages and power dynamics between different actors in the global production process, particularly MNEs and their GVC suppliers (Sinkovics, Sinkovics, Hoque, & Alford, 2018). It also provides a more fine-grained understanding of the types of knowledge flows and controls needed for different types of externalized transactions in international contexts (Strange & Humphrey, 2019).

It is important to emphasize that the term EMFs is used in this paper to refer to local participants of GVCs in emerging markets. The majority of supplier firms in GVCs originate from emerging markets (UNCTAD, 2013). As such, we identify EMFs in this paper as local firms (i.e., SMEs, exporters, producers, suppliers) that originate in countries commonly accepted as emerging markets, which include developing and transition countries, whose economies are becoming more integrated with the global economy (Contractor, Kumar, & Kundu, 2007). More broadly, emerging markets are low- to middle-income and quickly transforming countries with young and dynamic populations, changing institutional environments, and market uncertainties (Hoskisson, Wright, Filatotchev, & Peng, 2013). In terms of their characteristics, EMFs are typically small and medium-sized, export-oriented, resource-deficient firms with limited management capabilities (Contractor et al., 2007). They tend to operate in environments with high levels of uncertainties and weak institutions. EMFs' capabilities and decision-making styles are often not entirely institutionalized (Lyles & Baird, 1994), and their processes are not completely formalized (Patel, 2011). Furthermore,

their economies of scale and productivity levels lag notably behind developed market firms owing to poor local institutional conditions that inhibit financial, technological, and organizational competence (Thomas, Eden, Hitt, & Miller, 2007). That said, EMFs increasingly seek internationalization opportunities (Lechner, Lorenzoni, Guercini, & Gueguen, 2020). However, due to their resource, size, and environmental constraints, these firms increasingly rely on GVCs as a more feasible and sustainable path to major international markets, including global and regional ones (UNCTAD, 2013). The engagement of EMFs in GVCs is found to lead both to economic and technological opportunities and cost-related pressures (Buckley, 2009). Opportunities provided by being a part of GVCs often managed by MNEs from developed countries such as Ford, Apple, L'Oréal, and Panasonic may increase capabilities, drive, and means for environmental practices, such as eco-friendly production and packaging, pollution prevention, reduction in greenhouse gas emissions, decrease in hazardous/harmful/toxic materials, energy conservation, waste elimination, reverse logistics, remanufacturing, and recycling. However, cost pressures and the political nature of many GVCs can drive local firms to cut corners on such practices (Clarke & Boersma, 2017) and hurt EMFs' environmental sustainability (Plank, Eisenmenger, Schaffartzik, & Wiedenhofer, 2018). Indeed, EMFs face increasing pressure to adopt and comply with strengthening environmental sustainability requirements as part of their participation in GVCs. Due to the above-mentioned knowledge and resource limitations, weak local incentives, and ambivalent institutional contexts, these firms tend to perform poorly in relation to environmental sustainability. As such, improvements in standards and practices of these firms may be needed to enhance the overall environmental sustainability performance of GVCs in which they participate.

Environmental sustainability is increasingly recognized as crucial to future generations' survival and well-being (Rajeev, Pati, Padhi, & Govindan, 2017; Tolentino-Zondervan et al., 2016). Among others, essential environmental sustainability pillars include energy use, biodiversity, water use/cleanliness, carbon footprints, resource conservation, pollution reduction/prevention, and waste

management. Increased awareness of and external pressures on the environmental impact of GVC activities are forcing GVC partners to assess and address the extended environmental implications of activities linked to their products beyond those carried in-house (Gölgeci et al., 2019; Poulsen, Ponte, & Lister, 2016). These developments in GVCs led to the emergence of the concept of environmental upgrading, in addition to economic and social upgrading, where GVC partners leverage resources and opportunities provided by GVCs to upgrade their environmental practices as a way of reducing the environmental impact of business operations along the value chain (Khattak & Pinto, 2018).

The calls for environmental sustainability in GVCs can especially be seen in the light of the fact that a large share of global trade (approximately 80% according to UNCTAD) is conducted through systems of GVC governance, which link firms together in various sourcing and contracting arrangements (Andersen & Skjoett-Larsen, 2009; Gereffi et al., 2005; Hueting, 2010). The term GVC governance implies that key actors (i.e., lead firms) in the value chain – often large MNEs or brand holders – undertake responsibility for the inter-firm coordination of specific GVC participants' capabilities and activities to upgrade their processes in view of environmental requirements (Gibbon et al., 2008). Thus, lead firms are considered capable of controlling production over large distances and across national borders without exercising ownership (Andersen & Skjoett-Larsen, 2009). Indeed, GVC research has thus far placed significant emphasis on the governance structures and their role in determining supplier entry barriers and upgrading outcomes (Neidik & Gereffi, 2006; Thomsen, 2007). However, because GVCs are complex networks with multiple stakeholders and connections (Bridge, 2008), the influence of GVCs on firm activities is not limited to lead firms and should entail a holistic investigation. Therein lies an important gap in GVC research where the primary focus on understanding the behavior of lead firms in controlling chains and influencing upgrading outcomes, including environmental upgrading, has resulted in the neglect of the role of suppliers as active rather than passive participants of value chains and the influence of their domestic

institutional contexts on their value chain participation and upgrading prospects (Neidik & Gereffi, 2006).

The fact that production is increasingly fragmented geographically and organizationally poses specific challenges to value chain actors seeking to reduce their environmental footprint (Poulsen et al., 2016; Tatoglu et al., 2020). The coordination and management of environmental practices across multiple actors spanning national boundaries are daunting (Chiarvesio, De Marchi, & Di Maria, 2015; Clarke & Boersma, 2017; Gölgeci et al., 2019; E. L. Li, Zhou, & Wu, 2017). Furthermore, in the international context, regulatory bodies, NGOs, suppliers, and customers are noteworthy stakeholders in environmental sustainability beyond EMFs and MNEs typically covered by the research. The involvement of multiple stakeholders in environmental sustainability exacerbates the complexity of the problem and challenges faced in analyzing antecedents and consequences of environmental practices. As such, GVC research on environmental practices remains limited.

Despite extensive research on GVCs and how EMFs leverage GVCs to move up the value chain for economic gains (Poulsen et al., 2016), EMFs' environmental sustainability within GVCs remains largely underexplored and fragmented (Khattak & Pinto, 2018). This paper seeks to link GVC research on the environmental sustainability of EMFs to the IB field. Our systematic review takes stock of recently increasing research on the interplay between GVCs and the environmental sustainability of EMFs, consolidates findings, and guides future IB research efforts on the topic.

3. Methodology

Our review followed the five stages outlined by Denyer and Tranfield (2009) and widely utilized by the other systematic studies: 1) question formulation; 2) locating studies; 3) study selection and evaluation; 4) analysis and synthesis; 5) reporting the results. Below we provide a detailed account of each stage.

3.1. Question formulation

Developing coherent research questions is critical to establish the boundaries of a research project and provide a clearer direction (Tranfield, Denyer, & Smart, 2003; Wong, Skipworth, Godsell, & Achimugu, 2012). Following an overview of key debates in relevant research streams to develop a strong grounding in the field, a research problem was identified and a clear need for a review study was highlighted. This was followed by several rounds of discussions and iterations among the research team members and the development of a review proposal highlighting the need to address the following two interrelated research questions: "*How do GVCs influence the environmental sustainability of emerging market firms that participate in these chains?*" and "*What role do emerging market firms play in the environmental sustainability of their GVCs?*"

3.2. Locating studies

It is recommended that the initial stages of a systematic review should involve "an iterative process of definition, clarification, and refinement" (Tranfield et al., 2003, p. 214). Two members of the research team with the knowledge and expertise of GVC research streams identified relevant keywords and appropriate search terms for the search process. This process was conducted iteratively. The third member, who was not involved in the search stage, with a background in the area of International Business and Strategy, together with an external academic with experience in Economic Geography and another external academic with expertise in systematic methodology, formed an expert panel to review and suggest necessary refinements to the research protocol. This process reduced researchers' bias and ensured, among other things, that relevant variants of search terms were included in the search process.

Given that our research questions incorporate three thematic concepts of GVCs, emerging markets, and environmental sustainability, we divided our search terms into three thematic pillars and considered different variants of these key terms to expand the search scope (see Table 2). Once the search terms and their groupings were agreed upon, researchers developed selection algorithms or search strings to identify relevant studies. As a result, a comprehensive search string comprising 38

individual keywords listed in Table 2, was deployed to optimize the search scope. The search string ensured that every identified abstract contained a combination of any of the keywords from all three thematic pillars (thematic concepts), thereby maximizing the relevance of retrieved studies. Business Source Complete (provided by EBSCOhost) and ABI/INFORM (provided by ProQuest), regarded as the two of the largest and most widely used sources for citations, indexing and abstracting in the social sciences, were utilised as our main search databases. Given that this study encompasses three thematic sets of concepts (GVC, emerging market, and environmental sustainability), these databases were deemed to offer the best coverage of and the best access to peer-reviewed journal titles in this regard.

The search was limited to the following inclusion/exclusion criteria: published between 1988 and 2019, scholarly (peer-reviewed) journals, academic journal (publication type), article (document type), in the English language, and in abstracts/author provided abstracts. We excluded books, book chapters, editorials, letters to editors, conference proceedings, reports, and working papers. The main search in the two databases resulted in 693 papers. Following the removal of duplications, 546 papers remained.

3.3. Study selection and evaluation

The next stage involved reading the titles, keywords, and abstracts to evaluate papers' relevance to research questions. This was conducted by two team members who divided the papers between them, each evaluating 273 papers. Researchers adopted an approach where they identified three categories of papers – those *relevant*, those *possibly relevant,* and those *not relevant* to the study. To enhance the objectivity of the selection process, researchers cross-checked each other's evaluation results. Any ambiguities and divergences in opinion, particularly concerning studies in the *relevant* and *possibly relevant* categories, were resolved through discussion and further reading of the papers. Following the iterative reading of abstracts and consultation among the co-authors, 76 papers were considered relevant and selected for further review. The next stage, which involved an in-depth analysis of full texts of 76 studies, resulted in twelve of these papers being eliminated due to having little relevance

and adding little value to research questions (see Table 2 for details of procedures followed in locating, selecting, and analyzing the studies). Thus, this systematic literature review is based on a sample of 64 papers (see Appendix for the full list of papers with details).

- Table 2 about here -

3.4. Analysis and synthesis

We followed a commonly accepted method of analyzing the papers by first conducting a descriptive analysis followed by an in-depth thematic examination of studies in our sample (Tranfield et al., 2003). Descriptive analysis focused on the examination of studies according to their publication year, journal title, methodology, empirical context (country or region and sector focus), unit of analysis, and theory applied to understand the key patterns and trends in the focal body of literature (see Appendix and Table 3). The thematic analysis focused on identifying and highlighting emerging themes, inconsistencies, gaps, tensions, agreements, and disagreements between the different perspectives in GVC research. During this stage, the main aim was to conduct a systematic synthesis of papers and highlight the key emerging findings and implications concerning our research questions. Thus, we emphasized extracting pertinent knowledge from each paper on how GVCs affect environmental practices of EMFs and EMFs' role in the environmental sustainability of GVCs. The analysis and synthesis stage was conducted by the two members of the research team, who regularly discussed their respective progress and continually cross-checked their results to ensure they adopted a similar and consistent approach in analyzing and synthesizing the content of papers.

3.5. Reporting the results

We report our results in two sections presented below. First, we provide a descriptive analysis of our findings, highlighting each paper's relevant aspects in our sample, including theoretical perspectives, methodological approaches, empirical focus, and so forth (Tables 3 and Appendix for descriptive summaries). Second, we offer a thematic discussion to summarize and synthesize the key findings from an in-depth examination of studies vis-à-vis our research questions.

4. Findings

4.1. Descriptive findings

We conducted an in-depth descriptive analysis of papers regarding the publication year, journal, methodology, country/region and sector focus, unit of analysis, and theory applied to understand the key patterns and trends in the focal body of literature. Table 3 suggests that research on this topic is fragmented and draws on various disciplinary perspectives. Research on GVCs and their interplay with EMFs' environmental sustainability have been published in journals from a wide range of disciplinary backgrounds. Only two journal titles – *Business Strategy and the Environment* and *Journal of Cleaner Production* have published more than others on this topic. Other journal titles with multiple publications include *Journal of Business Ethics, Thunderbird International Business Review, Industrial Marketing Management,* and *International Journal of Production Economics.* Furthermore, research on this topic has increased dramatically in recent years, particularly in 2016, 2017, 2018, and 2019. The number of papers published in these three years constitutes 33 out of 64 papers in the sample. This potentially signifies the contemporary nature of this research topic as well as the fact that discussions concerning environmental sustainability are proliferating among academics, industry practitioners, policymakers, and institutional actors. With increased globalization and emphasis on environmental sustainability, scholars have started to pay more attention to the environmental implications of GVCs for emerging markets and beyond.

There is a variety of empirical and non-empirical research on the issue (see Appendix). The majority of the studies (45) are empirical. These studies typically rely on secondary or primary means of data collection and follow various data analysis techniques from the analytic hierarchy process to structural equation modeling. Most research relying on primary data employs surveys or interview methods to draw conclusions. Most research relying on secondary data makes only descriptive data use to offer some exploratory insights instead of collecting large-scale data and using advanced techniques to test the theory. Such descriptive use of limited data both in GVC research highlights the

need for improving rigor. It also confirms that data for measuring environmental sustainability across GVCs are often not available, and the development of indicators requires collaboration with GVC partners outside of the organization (Mollenkopf, Stolze, Tate, & Ueltschy, 2010).

The most common unit of analysis in papers we analyzed is the organization/firm (41) (see Table 3). Although most papers discuss GVCs in one form or another, only eight papers analyze such networks as a unit of analysis. This highlights the challenge of analyzing GVCs as they are because of the complexities of these networks and indistinct boundaries across different GVCs. Organization and network are followed by industry (8) and country/region (4) as units of analysis.

- Table 3 about here -

On the one hand, the need for MNEs to build stronger relationships with suppliers to support them in developing environmental capabilities, strategy, the role of private regulations/governance and national institutions, the gap between promises and actual behavior, export dependency, and the lack of environmental awareness among EMFs were the key themes. On the other hand, the role of governance/institutions in environmental sustainability and supplier upgrading were the key themes. Some studies focused more on the importance of supporting EMFs in developing necessary capabilities to address environmental issues, while others focused more on governance issues and the role of governance (manifested through both MNE governance structures and local institutions) in environmental sustainability.

Another pattern observed in Table 3 is the lack of theory-driven research on EMFs' environmental sustainability vis-à-vis GVCs. Only the minority of the papers follow explicit theoretical lens(es). This could reflect the nascent nature of the research issue and the insufficiency of theoretical engagement to address such a novel and phenomenon-driven research domain. However, as theory is a keystone of advancing knowledge (Connelly, Ketchen, & Hult, 2013; Wong et al., 2012), current research on the environmental sustainability of GVCs faces the difficulty of accumulating scientific knowledge on the issue without making a definitive theoretical contribution.

4.2. Thematic findings

Our systematic review identified two major themes of the interplay between GVCs, EMFs, and environmental sustainability defined and explained in this section under two dedicated subheadings. The first theme that emerged from the first research question elaborated below focuses on the role of GVCs in the environmental sustainability of local EMFs. It delves into how governance mechanisms and structures in GVCs and regulatory environments in which GVCs are embedded influence EMFs' environmental practices. It represents top-down mechanisms that influence EMFs' environmental practices and environmental sustainability. The second theme that emerged from the second research question focuses on the role of EMFs in the environmental sustainability of their GVCs. It represents bottom-up mechanisms that stem from EMFs and aggregates into the environmental sustainability of GVCs through the agency role of EMFs. As such, our review encompasses the impact of both GVCs and EMFs on each other and accounts for the agentic role of EMFs in the environmental sustainability of GVCs beyond being passive members of these chains. All in all, our review leads to the development of an integrative framework depicted in Fig. 1 that synthesizes insights provided by the reviewed papers.

- Fig. 1 about here -

4.2.1. The role of GVCs in the environmental sustainability of EMFs

GVC-related drivers and enablers of EMFs' environmental sustainability. The exploration of the role of GVCs in the environmental sustainability of EMFs revealed interesting insights into how EMFs manage their environmental practices and achieve environmental sustainability in GVCs. First, GVC membership emerged as an important qualifier for EMFs' successful adoption of environmental practices like waste and emissions reduction (Achabou et al., 2017). Recent research found that being included in value chains of incoming MNEs has facilitated and strengthened local EMFs' capacities to develop their firm-specific advantages (FSAs) in tackling environmental problems (Curran & Ng, 2018). Opportunities provided by being a part of GVCs often managed by MNEs from developed

countries are found to enhance EMFs' environmental practices, such as pollution control and adopting ISO 14001 standards (Khanna & Yuan, 2014).

Moreover, GVC research frequently discussed private regulations and transition from public to private regulations in relation to environmental sustainability (e.g., Bartley, 2010; Blowfield, 2003; Mayer & Gereffi, 2010; McCarthy, Gillespie, & Zen, 2012; Tolentino-Zondervan et al., 2016). A meaningful way to achieve environmental sustainability is found to be via private regulations such as third-party certifications and NGOs (Achabou et al., 2017; Bartley, 2010). Public governance (i.e., state regulations) in emerging markets can be weak or inconsistent (Hoskisson et al., 2013). Hence, private regulations have emerged to play a prominent positive role. However, the caveat is that the rise of private regulations has also resulted in higher barriers for entry of EMFs into GVCs (Mayer & Gereffi, 2010; Perez-Aleman & Sandilands, 2008; Tencati, Russo, & Quaglia, 2008). Thus, such private regulations do not always have a decisive influence on EMFs' environmental practices (Bartley, 2010; Khanna & Yuan, 2014; Mayer & Gereffi, 2010).

The role of institutional environment on EMFs' environmental sustainability was also frequently discussed (Clarke & Boersma, 2017; Gosens, Lu, & Coenen, 2015; Vanalle, Ganga, Filho, & Lucato, 2017; Zhu, Geng, Fujita, & Hashimoto, 2010). Formal and informal institutions are argued to play a prominent role (Mayer & Gereffi, 2010) in supporting or conditioning the role of private value chain governance for EMFs' environmental sustainability. Institutions are found to have a salient impact on EMFs' environmental sustainability. On the one hand, research suggests that institutions provide incentives and stimulate firms to adopt environmental practices like sustainable supply chain management (SSCM) (Ben Brik et al., 2013). On the other hand, feeble and inconsistent home country institutions and unchecked economic development are found to increase obstacles to implementing environmental practices and harm the environment in emerging markets (Khanna & Yuan, 2014). Our findings, thus, strongly emphasize the role of governments and the importance of

local formal and informal institutions (Blowfield, 2003) or national institutional systems (Gosens et al., 2015) such as local rules and policies and enforcement mechanisms.

Finally, beyond private regulations and local institutions, lead firms' value chain governance emerged as an essential enabler of enhancing EMFs' environmental practices. Developed economy MNEs increasingly transition from traditional supply chain management practices to SSCM and apply more stringent environmental criteria on their value chain partners. Especially larger and more visible MNEs promote environmental practices, such as waste management, reduction in emissions to air, water, and soil, as well as the elimination of hazardous substances, or deploy strategies to demand their suppliers' environmental sustainability (Allan Lerberg & Jette Steen, 2006;Tatoglu et al., 2014). For example, some lead MNEs from developed economies run environmental supplier development initiatives toward EMFs (Ehrgott, Reimann, Kaufmann, & Carter, 2013). Likewise, some lead MNEs align and manage resource flows across GVCs through the circular economy to improve EMFs' environmental sustainability (Goyal, Esposito, & Kapoor, 2018). Some other lead MNEs put pressure on their GVC partners to enhance the adoption of environmental practices (Ben Brik et al., 2013). Nonetheless, recent research found that leadership as a governance mechanism is more appropriate than merely exercising power in explaining how EMFs implement environmental practices in GVCs (Jia, Gong, & Brown, 2019).

We also found evidence on the complementarity between GVC membership, private regulations, public institutions, and lead firms' value chain governance in supporting EMFs' environmental sustainability. For example, NGOs' voluntary engagement and the potential of public disclosure provide incentives for self-regulation by MNEs and compensate for the lack of domestic regulatory capacity (Khanna & Yuan, 2014). Likewise, environmental champions in GVCs foster EMFs' alertness to environmental practices like green packaging (Dharmadhikari, 2012). Thus, the effectiveness of EMFs' environmental practices is found to depend on the interplay between private

regulations, public institutions, and value chain governance (Gosens et al., 2015; Tolentino-Zondervan et al., 2016).

GVC structure-based obstacles of EMFs' environmental sustainability. On the other hand, environmental value chain governance activities run by lead MNEs and developed economy firms appear to be less effective to GVC partners beyond these firms' first-tier connections. This finding highlights the limits of analyzing GVCs as a whole and indicates that the effect of GVC governance dissipates across upstream and downstream tiers. While firms find it easiest to apply environmental sustainability policies to their subsidiaries in emerging markets, the challenges they face grow as their ties move from first-tier GVC partners to second and further-tier partners that tend to be smaller and/or less visible (E. L. Li et al., 2017; Rock, Angel, & Pao Li, 2006; Tsoi, 2010; Zhu et al., 2010). This waning influence of developed economy firms on EMFs' environmental practices is primarily due to monitoring and management challenges experienced further in the chain (Allan Lerberg & Jette Steen, 2006). Likewise, smaller and less visible members in GVCs are less likely to follow environmental practices due to a lack of sanctioning (Bartley, 2010; Tsoi, 2010). Thus, the lack of influence on sub-suppliers can hinder SSCM adoption (Geng, Mansouri, Aktas, & Yen, 2017).

Beyond the waning influence of developed economy firms on EMFs' environmental practices along growing tiers, executing and assessing environmental aspects of sustainability in GVCs becomes more difficult (MacCarthy & Jayarathne, 2012). For example, the institutional and technological transfer of clean-tech across GVC partners is very complex (Gosens et al., 2015). This is in line with research that explores the role of different tiers in supply chains and shows that supply chain visibility and control suffer as upstream and downstream tiers grow (Wilhelm, Blome, Bhakoo, & Paulraj, 2016). The complexity of technology-intensive processes like environmental practices exacerbates challenges involved in the visibility and control of multi-tier value chains (Gosens et al., 2015). Thus, the extensiveness and complexity of GVCs are found to impede the positive role of GVC

membership, private regulations, public institutions and lead firms' value chain governance in EMFs' environmental sustainability.

Dual role of GVCs' in EMFs' environmental sustainability. Furthermore, our review identifies the contradictory influence of GVCs on the environmental sustainability of EMFs. Developed economies are often associated with superior capabilities and willingness to tackle environmental problems (Jiang & Green, 2017). Accordingly, the logic may follow that environmental practices smoothly diffuse from developed economy MNEs to EMFs through such mechanisms as GVC membership, value chain governance, and institutional pressure. However, increasing evidence suggests that environmental upgrading prospects through GVC participation are failing to realize (Achabou et al., 2017). Thus, our findings suggest that reality is more multifaceted and sophisticated than such potential assumptions.

First, stakeholders' normative influences and lead firms in GVCs do not automatically translate into superior environmental practices (Tencati et al., 2008), especially when inconsistency exists between lead firms' statements and actions. For example, MNEs like Apple, on the one hand, enforce strict environmental demands. On the other hand, it is difficult for EMFs to follow those demands when faced with even more stringent economic demands (Clarke & Boersma, 2017). The omission of specific issues from environmental criteria can be attributed to MNEs' unwillingness to handle contentious issues or prioritize issues that resonate with Western stakeholders (Blowfield, 2003). Thus, evidence found in our systematic review suggests that some developed economy MNEs do not pay closer attention to the consistency between their intentions and actions for environmental sustainability. This is in line with the point made by Appolloni, Risso, and Tao (2013) that specific strategies are needed for advancing environmental sustainability beyond the superficial and frequently ineffective codes of conduct phase. In the words of Tsoi (2010, p. 402), MNE strategies that go beyond "partnership of convenience" and focus instead on assistance for environmental upgrading via close partnerships, learning opportunities, and long-term cooperation are necessary.

Second, for EMFs, there is a trade-off between short-term and long-term environmental consequences of involvement in GVCs. Potential long-term economic benefits of participating in GVCs aside, many EMFs end up having to tackle immediate environmental problems linked to production intensity that drives the so-called industry curse (Dong et al., 2017). Plank et al. (2018) highlight that EMFs' participation in GVCs is a crucial driver of raw material consumption, leading to resource depletion, degradation of the ecosystem, and increased waste pollution. Sun et al. (2019) also attest to that point by arguing that firms lying downstream in GVCs are mainly engaged in energy and psychical resource-intensive processing and assembling parts that hinder environmental performance. A large share of emissions growth in emerging markets is accounted for by higher participation in GVCs that serve consumption overseas (Ferrarini & de Vries, 2017). The shift in GVC geography shapes global greenhouse gas (GHG) emissions due to energy efficiency and the low-carbon technology gap between developed economies and emerging markets (Jiang & Green, 2017). Eventually, this could lead to the increased cumulative emission of GHG in some cases, at least in the short run, as the same product could emit less GHG if it were to be produced in a developed economy.

Furthermore, the economic potentials of MNEs relocating polluting activities to emerging markets with lenient environmental policies (e.g., Rajeev et al., 2017; Rock et al., 2006) could weaken the incentives for local stakeholders to reinforce environmental requirements for fear of driving investment to other countries. However, it is also acknowledged that MNEs can also improve environmental protection in emerging markets (Khanna & Yuan, 2014). Therefore, EMFs face a double-edged sword of participating in GVCs manifested through environmental upgrading vs. being a pollution haven (Khanna & Yuan, 2014).

Third, environmental standards could be used to marginalize and drive some EMFs into a corner instead of helping them improve their environmental practices (Perez-Aleman & Sandilands, 2008). Tencati et al. (2008) suggest that social and environmental criteria currently required for EMFs' access to international markets might ultimately become an implicit form of protectionism.

The distribution of costs and benefits of environmental practices across GVC partners exacerbate the imbalance that leads to opportunistic behavior (Appolloni et al., 2013; Tolentino-Zondervan et al., 2016). Global actor-networks and institutions, in some cases, are found to block local innovations for the environment (Gosens et al., 2015). To avoid this, environmental requirements are suggested to be supported, rather than imposed, through building innovative collaborations, demand-driven informative programs, and the capabilities to adopt environmental practices (Ben Brik et al., 2013; Tencati et al., 2008). These findings indicate the need for more nuanced threading of environmental policies that focus less on building and enforcing regulations that have little impact in reality and more on truly supporting EMFs to enhance their environmental performance.

Fourth, the differences between cultural and ideational dimensions of environmental practices across developed economies and emerging markets confine what can actually be improved when it comes to the environment (Blowfield, 2003). Environmental concerns of stakeholders in emerging markets can be vastly different from those in developed economies (Tsoi, 2010). There is, accordingly, a disparity between environmental standards used by developed economy MNEs and the norms, values, and priorities of local EMFs (Blowfield, 2003). Such disparity results in the tensions between etic (the outsider's perspective) vs. emic (the insider's perspective) approaches to environmental sustainability in emerging markets. The benefits of environmental practices like fair-trade are inconclusive, partly because of the insufficiency of consideration to local stakeholders' concerns and realities in emerging markets (Blowfield, 2003). We argue that this problem can be remedied by correctly recognizing and attending to the welfare of those in emerging markets and better aligning priorities of lead MNEs and EMFs.

These four patterns of dual influence of GVCs on EMFs' environmental sustainability highlight the paradox EMFs face when addressing environmental concerns. On the one hand, EMFs need to develop beyond being component suppliers to creating true economic and environmental value (Mudambi, 2008). On the other hand, their initial advantage stems from their low-cost processes

and environmentally lenient local regulators (Khanna & Yuan, 2014). Likewise, during the development stage, EMFs pose greater damage to the environment until they complete their process and become more environmentally friendly (Dong et al., 2017). This fact could be exacerbated in many mid-range emerging markets that fail to make leapfrog economic and environmental improvements (Hoskisson et al., 2013). All in all, as depicted in Fig. 1 and Table 4, we identified several tensions and challenges that lead to the contradictory influence of GVCs on EMFs' environmental sustainability.

4.2.2. The role of EMFs in the environmental sustainability of GVCs

EMFs' environmental practices in GVCs. EMFs are not merely reactive operand entities. They are active agents that play a strategic role in the overall environmental sustainability of GVCs and their contexts (Lechner et al., 2020; Wilhelm et al., 2016). Therefore, in response to our second research question, the second theme focuses on EMFs' role in the environmental sustainability of GVCs and provides two additional salient insights. This theme offers an internal view of environmental sustainability of EMFs within their GVCs.

EMFs' (lack of) awareness, capabilities, resources, and internal organizational mechanisms in adopting environmental practices, such as eco-friendly production and packaging, decrease in hazardous/harmful/toxic materials, energy conservation, and reverse logistics, at a larger scale in GVCs emerged as another major theme from the analysis of papers (Ehrgott et al., 2013; Soda, Sachdeva, & Garg, 2015; Zhu, Qu, Geng, & Fujita, 2017). Added compliance costs associated with driving environmental initiatives in GVCs can be prohibitive for many EMFs. However, beyond the cost considerations, our review reveals that some EMFs have neither the awareness of environmental issues nor willingness to lead positive environmental change in GVCs (Soda et al., 2015; Zhu et al., 2017; Zhu et al., 2018).

As their home country economies are often either factor or efficiency-driven (Schwab, Sala-i-Martin, Samans, & Blanke, 2016), many EMFs lack conducive national innovation systems and

technological resources to initiate environmental practice (Chiarvesio et al., 2015; Gosens et al., 2015). A higher intensity of high greenhouse gas emitting processes and lower resource productivity in China than in developed markets are evidence of such shortage (Dong et al., 2017; Jiang & Green, 2017). Likewise, we found that EMFs often lack entrepreneurial capacity to undertake environmental initiatives at a larger scale than their organizational boundaries (Ras & Vermeulen, 2009).

On the other hand, it is also recognized in the literature that not all EMFs lack awareness and capabilities to realize their environmental goals (Akhtar et al., 2016; Hong et al., 2018). Innovative resource management and technological transformation are significant elements that enable EMFs to overcome the industry curse experienced by Japan and South Korea and positively impact their environment (Dong et al., 2017). Some EMFs have gradually been adopting environmental practices, as their critical SSCM practices highlight their growing environmental capabilities that lead to an acceleration in the integration, transformation, and upgrading of EMFs in GVCs (Diabat et al., 2014; Hong et al., 2018). Likewise, they already follow eco-innovation and eco-reputation strategic orientations as drivers of their SSCM practices (Hsu, Tan, & Mohamad Zailani, 2016). Accordingly, we observed in our review that though EMFs still have a long way to be truly sustainable, they made notable strides in this pursuit.

Many studies that reveal EMFs' shortage of awareness, capabilities, and processes to realize environmental goals highlight the need for MNEs/lead firms to adopt a collaborative approach with EMFs, building stronger and long-term relationships, providing assistance, and transferring skills and knowledge expertise (e.g., Perez-Aleman & Sandilands, 2008; Rock et al., 2006; Soda et al., 2015; Tencati et al., 2008; Tolentino-Zondervan et al., 2016). Increasing participation in collaborative partnerships in GVCs and firm-to-firm knowledge exchanges are argued to be among key enablers of EMFs' conformance to environmental standards (Blowfield, 2003; Gosens et al., 2015). For example, Fernando, Bee, Jabbour, and Thomé (2018) find that the transfer of knowledge from MNEs to EMFs is crucial in making EMFs more aware of energy efficiency and helping them generate renewable

energy. In-depth engagement between GVC partners is found to help EMFs learn, develop skills, and enable knowledge transfer to support environmental sustainability across their GVC partners (Turker & Altuntas, 2014).

Studies further report that most EMFs prefer long-term and closer collaborative approaches that increase the likelihood of enhancing EMFs' environmental performance (e.g., Al-Ghwayeen & Abdallah, 2018; Lee, 2016; Tsoi, 2010). As pointed out by Chen and Chen (2019), EMFs' justice perception is vital to their commitment to environmental sustainability as EMFs often have to invest more in sustainable practices, and lead firms simply issuing codes of conduct is not sufficient to prompt EMFs to take the lead on positive environmental change. Based on long-term partnership commitment, synergistic cooperation, and win-win relationships with EMFs, responsible supply chain management can improve EMFs' environmental performance within their GVCs (Lee, 2016; Zhu et al., 2010). Our findings, therefore, our findings suggest that it is crucial for EMFs to leverage collaborative relationships and knowledge exchange with developed country MNEs in order to enhance their capacity and capability for them to be able to seriously engage in activities related to greening GVCs (Kusi-Sarpong, Sarkis, & Wang, 2016).

EMF-driven environmental change in GVCs. Our review revealed that the environmental sustainability agenda represents a strategic opportunity for EMFs. Therefore, these firms can exploit the emerging sustainability or green initiatives to gain a competitive advantage and enhance their economic performance in GVCs (Al-Ghwayeen & Abdallah, 2018; E. L. Li et al., 2017; Luken & Stares, 2005; Soda et al., 2015). This pattern indicates that environmental sustainability provides strategic opportunities for many EMFs to enhance their competitiveness if they rise above the sustainability challenges of GVCs (Luken & Stares, 2005). Proactive EMFs approach environmental sustainability initiatives as opportunities for developing appropriate environmental strategies to respond to such pressures and exploit lead firms' involvement in chains to gain technical knowledge and develop

capabilities (Sharma & Iyer, 2012). They position themselves as ethical partners and embrace the sustainability agenda to promote it further in their local context.

Some papers identified in our review are linked to strategy through the perspective of lead firms from emerging markets. SSCM is seen as a strategic approach/managerial tool adopted by lead firms to address environmental concerns beyond what they can do within their own boundaries (Vanalle et al., 2017; Zhu et al., 2010). However, SSCM implementation remains an important challenge in many emerging markets due to complications attached to governing collaborative supply networks across countries (MacCarthy & Jayarathne, 2012).

Interestingly, the theme of strategy is not well-established or discussed within our sample base. With some exceptions, GVC research does not typically advocate environmental sustainability as a strategic opportunity for EMFs in upstream GVCs. We posit that this situation reveals a relative limitation regarding linking key issues in GVCs to strategy and management. The emergent firm strategy theme reveals that EMFs can gain a competitive advantage through continuous learning and a long-term perspective. EMFs, therefore, are in the position of strategically leveraging their relationship with developed economy firms in GVCs and access their environmental skills, knowledge, and technologies to enhance their competitive edge as long as they are proactive in developing environmental strategies (E. L. Li et al., 2017).

Our findings also reveal that EMFs should focus on radical, rather than incremental, innovation and developing green products instead of making existing products green through such approaches as "resource-constrained product development" to enhance their environmental sustainability and ensuing competitiveness in GVCs (Sharma & Iyer, 2012). Likewise, EMFs' strategy of tapping global knowledge flows by joining multinational groups spurs green innovations (Chiarvesio et al., 2015). This logic suggests that EMFs can exploit SSCM as a way of achieving environmental targets within and across their organizational boundaries and as a strategy for competing and achieving economic gains in global markets (Soda et al., 2015). Thus, adopting a

proactive strategy, instilling long-term perspective, and utilizing technological capabilities are found to be key enablers of EMFs in leading positive environmental change in their GVCs.

Table 4 summarizes key thematic findings and provides an overview of emergent themes.

- Table 4 about here -

5. Future research agenda

Our review's descriptive and thematic findings suggest that recent attention to GVCs is likely to grow further, as there are a plethora of issues waiting to be addressed and explored. This review presented an integrative framework with important insights that lead to new questions on the interplay between GVCs and EMFs concerning environmental sustainability. By drawing on identified gaps, this section focuses on the implications of our systematic review findings for future research. In line with our findings, we organize the discussion around the two major themes of our study and provide future research directions focusing on three areas: theoretical, content, and methodological developments, as shown in Table 5.

- Table 5 about here -

5.1. The role of GVCs in the environmental sustainability of EMFs

We first delve into unexplored issues around the role of GVCs and GVC-driven phenomena in the environmental sustainability of EMFs. This review identified that a major limitation of current research examining the interplay between GVCs, EMFs, and environmental sustainability is the lack of theoretical application. As stated earlier, much research on the topic tends to be descriptive, idiosyncratic, and contextualized and fails to utilize extant theory to advance knowledge on the issues addressed (Mayer & Gereffi, 2010). As a result, the theoretical underpinnings of GVCs and the environmental sustainability of EMFs remain underdeveloped. To address this, future studies can benefit from greater utilization of theories such as the internationalization perspective and the paradox lens. First, we find that the role of value chain governance, private regulations, and public institutions in EMFs' environmental sustainability may become less effective as GVCs grow and when analyzing

interorganizational connections beyond first-tier linkages. Such complication calls for further research on why the size and scope of GVCs may hamper EMFs' environmental sustainability and what managers and policymakers can do to thwart such a threat against environmental sustainability in GVCs. Concerning this key finding, some papers in our review directly or indirectly point out the need to explore environmental sustainability in GVCs through an internationalization angle. As EMFs internationalize by becoming a member of existing GVCs or expanding their value chains to the global context, the environmental issues they face are exacerbated. Firms can face difficult economic and environmental choices involved in their internationalization process and when extending their GVCs (Connelly et al., 2013). In particular, relevant research questions, such as whether a firm's geography of exports is related to its green strategies and influences its environmental innovation propensity, need to be addressed in future research. In this regard, greater utilization of internationalization theory may help to better understand the challenges and opportunities of international expansion via GVCs and the adoption of environmentally sustainable practices from an EMF's perspective.

Our findings also indicate a need for further research to resolve the contradictory role of GVC behaviors, decisions, strategies, and priorities in EMFs' environmental sustainability. Paradox is a multifaceted phenomenon (Hahn, Figge, Pinkse, & Preuss, 2018; Ricciardi, Zardini, & Rossignoli, 2016) and involves holistic theorization and in-depth research to be better understood. As such, scholars interested in analyzing and understanding environmental sustainability paradoxes and contradictions that EMFs and lead firms face in GVCs have ample opportunities to contribute GVC and IB research. Employing the paradox perspective and doing in-depth research can better inform the IB field, for instance, about time dynamics of environmental sustainability in GVCs and inconsistencies experienced by GVC actors in the global arena. As our findings highlight, both EMFs and lead firms in GVCs face a plethora of tensions and paradoxes in achieving environmental sustainability that could be addressed via paradox theory. In particular, paradox theory could be

employed to gain a deeper understanding of the inconsistencies and trade-offs involved in environmental sustainability in emerging markets as well as the contradictory influence of GVCs on the environmental sustainability of EMFs. Such understanding can help overcome and transcend GVC-related paradoxes in emerging markets and further enhance environmental sustainability worldwide.

In terms of directions for content development, our review reveals that risk and uncertainty-related issues such as long-term vs. short-term gains and losses associated with environmental practices remain under-explored themes in GVC research (Rock et al., 2006). Environmental practices still represent a relatively uncharted territory with technology intensiveness and high initial costs, coupled with unpredictable financial returns (Shevchenko, Lévesque, & Pagell, 2016). This means the firm's managers' cognitive motives to adopt environmental practices and promote them to GVC partners need to be explored further (Ehrgott et al., 2013). As such, future research needs to illuminate how managers in GVCs react to changing environmental conditions and returns concerning environmental practices. As environmental demands and what it means to be sustainable are not static but evolve, firms and their managers can exhibit flexibility in their responses to internal and external pressures for environmental sustainability (Shevchenko et al., 2016). Therefore, we need a better understanding of the evolution of environmental demands and opportunities/threats/uncertainties embedded in environmental practices and managers' responses to such conditions.

Furthermore, contractual forms and governance mechanisms in GVCs that operate across developed and emerging markets with different market rules and mechanisms have received little attention. Because transaction costs are aggregated to a system-level as firms expand into GVCs, scholars should identify the attributes of environmental transactions among GVC partners (Rock et al., 2006). In the context of environmental practices, it is still not clearly known how contractual forms and governance mechanisms are connected to new types of business exchanges that go beyond economic exchanges. Thus, the question of how the involvement of non-business actors such as social

enterprises in GVCs for environmental sustainably shapes GVC governance decisions and exchange patterns and EMFs' environmental sustainability requires further research (McCarthy et al., 2012). Likewise, understanding the role of environmental initiatives in asset and contract specificity and potential opportunism among GVC partners can explain how environmental practices can reduce or increase transaction costs.

GVCs rely on member firms to provide resources, and successfully integrating these partnerships is an integral part of GVCs (Gereffi et al., 2005). Therefore, scholars are advised to provide further insights into the GVC network structure and dynamics and the role of these factors on the environmental behavior of GVC partners like EMFs. For example, network-related factors such as strong and weak ties, structural holes, network centrality, brokerage, cohesion, and social capital can play an instrumental role in how EMFs understand and adopt environmental practices and achieve environmental performance (Borgatti & Foster, 2003). They may also shed light on the interplay between GVC size and complexity and EMFs' environmental sustainability. However, these factors have rarely been examined in the context of GVCs (Connelly et al., 2013). Our review reveals a similar pattern that GVC research can focus more on the network effects of GVCs on EMFs' environmental sustainability. For example, research themes such as the diffusion of knowledge from MNEs to SMEs based in emerging markets (Zhu et al., 2017) can be illuminated further, which will also contribute to the IB literature by examining the less-explored supply side of environmental sustainability and the role of MNEs as GVC lead firms in environmental sustainability sustainability of export-suppliers in emerging markets (Li et. al. 2017). Likewise, network-level analysis of the flow of products, services, and information in GVCs can reveal interesting insights into how individual firms perceive and act on environmental sustainability (MacCarthy & Jayarathne, 2012).

Finally, our review has also uncovered important methodological features of the literature on the interplay between GVCs and EMFs' environmental sustainability. There is a notable variation in methodological approaches used in this domain, which shows a great diversity in the disciplinary

traditions informing this research area. One of the main methodological limitations identified is the dominant focus on a selective number of larger emerging markets and comparatively fewer studies focusing on peripheral emerging markets. For instance, we found that countries like China and India have received the most empirical attention. Other countries covered include Malaysia, the Philippines, Sri Lanka, Bangladesh, Pakistan, Vietnam, Thailand, Brazil, and Kenya. While this may reflect international outsourcing patterns of recent decades, it also suggests limitations of the literature in terms of geography. Here, we highlight an opportunity for future research to extend the geographic scope of the literature into more countries in Latin America, Africa, and the post-Socialist transition economies, which remain comparatively under-represented in the empirical literature.

There is also a lack of studies adopting a longitudinal perspective. Future studies could benefit from greater utilization of a longitudinal case study approach as it allows to better capture change in actors' behavior and thereby enable a more in-depth understanding of how the impact of GVC participation reflects on environmental sustainability of EMFs. In addition, the existing literature is limited in capturing perspectives of multiple actors in the chain. Most empirical studies focus either on actors in the buyer-end of the chain (typically MNEs/global buyers) or supplier-end of the chain (typically EMFs/exporting SMEs). While including multiple chain actors present particular methodological challenges as it effectively means including developed country MNEs as well as emerging market suppliers in study samples, future researchers favoring this design may be rewarded by the opportunity to capture contrasting perspectives and perceptions of both upstream and downstream chain participants on environmental sustainability challenges and outcomes in GVCs.

5.2. The role of EMFs in the environmental sustainability of GVCs

Our review reveals that EMFs play an important yet often an overlooked role in the overall environmental sustainability of GVCs, thereby requiring further attention. Studies in our review have emphasized the need to better understand and theorize the role of institutional context, especially in emerging markets, in enforcing environmental sustainability standards that are practiced in GVCs.

For example, Mayer and Gereffi (2010) emphasize that public institutional structures in emerging markets need to be strengthened to complement private governance structures in GVCs and thereby address environmental and other sustainability concerns more effectively. The GVC literature has been subject to notable criticism for not placing sufficient attention to local institutional factors as key influences of supplier firm behavior (Thomsen, 2007). To this end, future research would benefit from greater utilization of institutional theory in examining the effectiveness of formal institutional structures in emerging markets as well as EMF behaviors as embedded in emerging markets' informal institutional context. Gaps in regulations in emerging markets, or institutional voids, can adversely influence environmental sustainability outcomes in GVCs. That said, institutions' influence is not manifested in a wholesale fashion. EMFs can serve as a conduit into society for those institutional factors that affect business behavior in GVCs, such as environmental sustainability (Aparicio, Urbano, & Audretsch, 2016). Thus, weaknesses in emerging market regulations may not always be translated negatively into GVCs' environmental sustainability. The role of EMFs in channeling institutions' influence on the environmental sustainability of GVCs requires further theoretical attention.

Another promising avenue for theoretical development lies in informing behavioral and power-related dimensions of EMFs' role in the environmental sustainability of GVCs through the resource dependence theory. Resource dependence theory is concerned with maintaining control of vital resources and uses power as a central concept in so doing (Pfeffer & Salancik, 2003). Its core premise is that actors commanding strategic resources with few alternative sources can wield a high degree of power within their network (Pfeffer & Salancik, 2003). It proposes that power dynamics can shape make-or-buy decisions that are crucial for GVCs beyond cost considerations (Connelly et al., 2013). EMFs can have advantages beyond low-cost offerings in GVCs, and such advantages for increased autonomy and self-control can shape the way they consider, adopt and lead environmental practices. Accordingly, some research possibilities informed by our review can be examined using resource dependence theory. For example, Bartley (2010) argues that EMFs' export dependence vis-

à-vis environmental sustainability needs to be unpacked. Exploring EMFs' entrepreneurial qualities needed to command power in GVCs can be another research theme pursued through this theory (Ras & Vermeulen, 2009). Furthermore, it can inform a better understanding of issues around EMFs' resource-constrained product development in relation to GVCs' environmental sustainability (Sharma & Iyer, 2012). Our review reveals that many export-oriented SMEs operating in resource-constrained environments of emerging markets rely on their Northern partners for resources needed to implement environmental practices. Issues such as GVC interlocks as a means to manage environmental interdependencies and complications surrounding information sharing and knowledge spillover concerning environmental processes could be other issues that can be explored through resource dependence theory (Q. Li, Xue, Truong, & Xiong, 2018).

Thematically, our findings reveal that despite the increasingly important and visible role in GVCs, EMFs show limitations in influencing environmental practices in and sustainability of GVCs. Future research can expand upon our findings and delve deeper into mechanisms of how EMFs can transcend their challenges in championing large-scale adoption of environmental practices and steering GVCs' environmental sustainability in the global marketplace. Such focus, in turn, will contribute to advancing knowledge about how MNEs, through their GVC partners, can more effectively advance and achieve their environmental sustainability goals in the context of emerging markets. While our findings reveal the potential sources of the EMFs' limitations, further investigation is needed to shed light on the means to overcome EMFs' challenges in leading environmental change in GVCs.

Additionally, questions relating to how knowledge exchange between EMFs and MNEs takes place for improving the environmental sustainability of GVCs, particularly on the supplier side, presents a promising theme, including in the wider IB research circles. Indeed, understanding channels and mechanisms through which environmental spillovers can occur between local EMFs

and MNEs can advance knowledge on environmentally sustainable practices in the context of both GVC and IB fields (Q. Li et al., 2018).

Methodologically, there is scope for future research to bring greater diversity to the types of sectors and industries examined. Our review findings suggested an apparent industry bias in that a selective number of sectors have received greater attention in the literature, namely the textiles and clothing, electronics, and tea and coffee. However, sectors such as seafood, fresh and dried fruits, chemical manufacturing, and primary commodities such as cotton have not received adequate attention. Focus on these sectors, which also generate significant environmental footprints, in the context of emerging markets could provide important new insights on the nature of environmental sustainability challenges faced by EMFs in different sectors and the strategies adopted in overcoming them.

Furthermore, we observed significant variation in the types of environmental sustainability issues and practices investigated. Related to this, there is also a tendency among some papers to discuss environmental issues in emerging markets in generic terms or cover environmental and social sustainability issues together in the same study, which can contribute to a lack of specificity. While this may reflect the multi-disciplinary nature of many studies contributing to this area, it also indicates that the findings of previous studies can be inconsistent and their applicability limited. Future studies are advised to be more specific in investigating the types of environmental sustainability issues and practices of EMFs to allow greater cross-country comparability, consistency, and applicability.

Lastly, we observed a lack of studies applying quasi-experiments in exploring the impact of EMF's behavior on the environmental sustainability of GVCs. Greater utilization of this method is recommended as it leads to deeper insights into the behavioral mechanisms in GVCs and the ability to infer causality between focal variables. Quasi-experimental studies as a means of rigorous scientific scrutiny can enable a much-improved measurement precision of the variables related to GVCs and

allow the causal analysis of GVC-related phenomena in both developed and emerging markets that could not be fully assured through cross-sectional studies or archival data (Deck & Smith, 2013).

6. Concluding remarks

The rise of GVCs demonstrates the increasing interconnectedness of GVCs and highlights the changing nature of the involvement of different actors from various geographies into the global economy. More fundamentally, participation in GVCs offers significant strategic and developmental opportunities for thousands of firms and millions of workers in emerging markets. There have been limited and fragmented insights into how GVCs operate and affect EMFs' environmental sustainability strategies and practices. This paper contributes to addressing this lacuna by conducting a systematic review of the relevant body of knowledge and presenting state-of-the-art research on the interplay between GVCs, EMFs, and environmental sustainability.

We conducted an in-depth review of 64 articles identified through a systematic database search. We first conducted a descriptive analysis of articles, followed by an in-depth thematic examination of studies focusing on synthesizing key themes and arguments concerning our research questions. Our thematic findings are summarized in the integrative framework, which serves as key lessons from our study. Insights gained from the framework can provide a basis for making fragmented insights more coherent and designing hypotheses or research questions for future investigation. Furthermore, we provide a research agenda to discuss research opportunities for enriching the current thinking on GVCs, EMFs, and environmental sustainability.

Our findings point to several important conclusions. It is suggested that while the GVC governance structures, also understood as strategic activities of MNEs, play a crucial role in facilitating the spread of environmental practices among EMFs, the role of national institutional contexts should not be underplayed. Positive environmental outcomes can be achieved when the two complement and support each other. The impact of GVCs on the environmental sustainability practices of EMFs is manifested through the dominant MNE lead firms and their propensity to

develop closer relationships with EMFs whereby technical knowledge is transferred, and assistance is provided to enable EMFs to develop environmental capabilities. However, MNEs' and other GVC partners' influence may wane beyond their immediate connections and as EMFs' distance to MNE lead firms increases. Furthermore, our review reveals that inconsistencies between lead firms' statements and actions, geographical shifts, time-related trade-offs, using rule enforcement as an accessory to protectionism, and etic approaches to environmental sustainability in emerging markets limit the potential of leveraging GVCs to advance and achieve environmental sustainability goals of EMFs, which is essential for MNEs' success on the global stage.

Our findings further highlight how EMFs lack the resources, capabilities, awareness, and internal organizational structures required to adopt environmental practices. They also stress the importance of effective knowledge transfer activities between MNEs and EMFs for environmental sustainability. This underlines the importance of enhancing EMFs' environmental capabilities to achieve environmental sustainability and the critical role of MNEs and their strategies in this process. Thus, these lead firms are encouraged to go beyond their top-down application of codes of conduct and imposing sustainability requirements, and actively support supplier environmental upgrading in emerging markets. Lastly, our findings suggest that environmental initiatives represent strategic opportunities for EMFs to gain a competitive advantage. EMFs are encouraged to approach such initiatives with proactive strategies and long-term views to develop a competitive edge by leading the environmental change in their respective GVCs. These findings present the current state of knowledge on the environmental implications of GVCs and their participants. They offer important avenues and insights on how these issues can be examined and addressed in the future. Consequently, they bear significant implications for an academic audience, policymakers, and different stakeholders within and across the GVCs.

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Table 1. Outline of major reviews on value/supply chains and environmental sustainability

Review	Timeline	Number of studies covered	Contextual coverage	Topical coverage	Key focus
(Patala, Hämäläinen, Jalkala, & Pesonen, 2014)	1990-2013	41	Not specified	Environmental sustainability	The paper explores various forms of eco-industrial networks in advancing environmental sustainability and highlights the role of materials reuse, collective action, value chain optimization, and co-innovation.
(Bush, Oosterveer, Bailey, & Mol, 2015)	Not specified	Not specified	Not specified	Environmental and social sustainability	This paper reviews sustainability governance in value chains and outlines five frontiers of sustainable value chain governance.
(Fahimnia, Sarkis, & Davarzani, 2015)	1992-2013	884	Worldwide	Environmental sustainability	The study presents a thorough bibliometric and network analysis that provides insights into emergent research clusters on green supply chain management and illustrates the research domain's evolution.
(Saenz, Koufteros, Touboulic, & Walker, 2015)	1995-2013	308	Not specified	Environmental and social sustainability	This paper maps the use of theories in sustainable supply chain management.
(Rajeev et al., 2017)	2000-2015	190	Worldwide	Economic, environmental, and social sustainability	Based on an in-depth study conducted on 190 articles covering economic, environmental, and social sustainability, the study proposes a conceptual framework to classify various factors along the triple bottom line pillars of sustainability issues in supply chains.
(Khattak & Pinto, 2018)	2009-2018	12	Not specified	Environmental upgrading	The study provides a systematic literature review related to environmental upgrading in GVCs and suggests possible future research agendas in advancing environmental upgrading and ultimately GVC boundaries.
(Koberg & Longoni, 2019)	2003-2018	66	Not specified	Environmental sustainability	The study reviews the literature on sustainable supply chain management in global supply chains to synthesize the critical elements of sustainable supply chain management in global supply chains.
This study	1988-2019	64	Emerging markets	Environmental sustainability	The study integrates research on GVCs and emerging market firms' environmental sustainability. It reveals the important yet dual and multilayered role of GVCs in environmental sustainability of emerging market firms, as well as the importance of EMFs' strategies, capabilities, and collaborative GVC relationships to enable the effective implementation of environmental practices in emerging markets.

Table 2. Steps in planning the research and locating, selecting, and analyzing the studies

Step	Sub-step	Description	No. of studies
Planning the research	- Question formulation and definition of themes	Development of proposal highlighting the need to address the following research questions: 1) "*How do GVCs influence the environmental sustainability of emerging market firms that participate in these chains?*" 2) "*What role do emerging market firms play in the environmental sustainability of their GVCs?*" This research questions incorporate three thematic concepts of *GVCs*, *emerging markets*, and *environmental sustainability*.	N/A
	- Refinement of keywords and development of selection algorithm (search strings)	*GVC Keywords:* global value chain*, global commodity chain*, global production network*, regional value chain*, global cluster network*, supply chain*, supply network*, global factory *Emerging Market Keywords:* regional development, developing econom*, developing region*, developing market*, developing countr*, transition* countr*, transition* econom*, emerging market*, emerging region*, emerging econom*, emerging countr*, nascent econom*, nascent countr* *Environmental Sustainability Keywords:* sustain*, planet, green, environment*, ecolog*, eco-friend*, conserv*, natural resource*, clean, pollut*, emissi*, energ*, waste*, hazard*, footprint*, climate change*, environmental upgrad*	N/A
Conducting the search and locating studies	- Database selection and citation search	EBSCOhost's Business Source Complete and ProQuest's ABI/INFORM databases were selected to conduct the search process. The following filters were used: (i) find the search strings in Title (TI) and Abstract/Author provided abstract (AB); (ii) publication period: 1988 – 2019; (iii) publication type: academic journal (peer-reviewed); (iv) document type: article; (v) language: English	693
	- Duplicate removal	All potentially relevant studies exported to EndNote and duplicate records/studies removed	546
Selecting and analyzing studies	- Review and selection	Titles and abstracts of all potentially relevant studies reviewed and scrutinized against fit-for-purpose criteria. In several cases, introductions and conclusions of studies were also evaluated to determine relevance. Following fit-for-purpose criteria applied in selecting studies for further analysis: *Inclusion criterion:* papers focusing on GVCs and the environmental sustainability of emerging market firms. *Exclusion criteria:* (i) papers focusing on GVCs and environmental sustainability issues but not covering emerging market contexts and their firms; (ii) papers not addressing all three themes of the research (GVC, emerging markets, environmental sustainability); (iii) papers focusing solely on domestically-oriented value/supply chains and thus lacking the international dimension; (iv) papers focusing on social sustainability rather than environmental sustainability.	76
	- Analysis and synthesis	Full texts of selected articles studied in-depth. Descriptive analysis of selected articles conducted and descriptive data extracted (Appendix). Thematic analysis is followed focusing on identifying and coding emerging themes (Table 4).	64

Table 3. Literature affiliation, theoretical lens, and unit of analysis of analyzed papers

Theoretical lens*	**Unit of analysis**
Not specified / no theory (43)	Organization/firm (41)
Diffusion of innovation (2)	Network/Chain (9)
Institutional theory (5)	Industry (8)
Internationalization theory (3)	Region (within country) (1)
Resource-based view (4)	Country (4)
Stakeholder/legitimacy theory (4)	Not specified (1)
Strategic choice theory (1)	
Social network theory (2)	
Social exchange theory (2)	
Transaction cost economics (1)	

*Some papers adopt multiple theoretical lenses.

Table 4. Overview of emergent themes

Theme	Sub-theme	Explanation	References
The role of GVCs in the environmental sustainability of EMFs	GVC-related drivers and enablers of EMFs' environmental sustainability	EMFs' GVC membership, private regulations, public institutions, and lead firms' value chain governance have a complementary positive influence on their environmental sustainability.	(Allan Lerberg & Jette Steen, 2006; Clarke & Boersma, 2017; Gosens et al., 2015; Mayer & Gereffi, 2010; Tencati et al., 2008; Vanalle et al., 2017)
	GVC structure-based obstacles of EMFs' environmental sustainability	The role of GVC-related drivers and enablers of EMFs' environmental sustainability is weakened or reversed with the extension and increased complexity of GVCs.	(E. L. Li et al., 2017; Rock et al., 2006; Tsoi, 2010; Wilhelm et al., 2016)
	Duality of GVCs' role in EMFs' environmental sustainability	Inconsistencies in lead firms, long and short-term trade-offs faced in GVCs, backhanded rule enforcement, and etic approaches to environmental sustainability in emerging markets lead to the contradictory influence of GVCs on the environmental sustainability of EMFs.	(Blowfield, 2003; Clarke & Boersma, 2017; Dong et al., 2017; Perez-Aleman & Sandilands, 2008; Tencati et al., 2008)
The role of EMFs in the environmental sustainability of GVCs	EMFs' environmental practices in GVCs	EMFs' close collaborative relationships and knowledge exchange with developed country MNEs facilitate transcending their challenges in driving environmental practices at a large scale in GVCs.	(Ehrgott et al., 2013; Fernando et al., 2018; Soda et al., 2015; Turker & Altuntas, 2014; Wilhelm et al., 2016; Zhu et al., 2017)
	EMF-driven environmental change in GVCs	EMFs with a long-term perspective and technological capabilities that adopt proactive strategies lead the environmental change in their GVCs.	(Chiarvesio et al., 2015; Dong et al., 2017; E. L. Li et al., 2017; Sharma & Iyer, 2012)

Table 5. Future research avenues

Theme	Theoretical development	Content development	Methodological development
The role of GVCs in the environmental sustainability of EMFs	The use of internationalization theory can help better understand the challenges and opportunities of international expansion through GVCs and explore whether a firm's geography of exports is related to its green strategies and influences its environmental innovation propensity. Greater use of the paradox lens can help better understand environmental sustainability paradoxes and contradictions that lead firms and supplier firms in emerging markets face in GVCs. Utilization of this approach can help explore the dynamics of environmental sustainability in GVCs and inconsistencies experienced by value chain actors globally.	Long-term vs. short-term gains and losses associated with the adoption of environmental practices remain under-explored. Exploring the cognitive motives of firm managers in adopting and promoting such practices to GVC partners requires further exploration. The role of non-business actors such as social enterprises in shaping GVC governance decisions and EMFs' environmental sustainability requires further research focus. There is scope to further the theme of diffusion of knowledge from MNEs to SMEs based in emerging markets. In particular, the mechanisms and conditions that allow/hinder knowledge exchange from taking place in GVCs.	There is a need for future research to extend the geographic scope of the literature into more countries in Latin America, Africa, and the post-Socialist transition economies, which remain comparatively under-represented. Greater utilization of longitudinal case studies is advocated to capture change in actors' behavior and enable a more in-depth understanding of how the impact of GVC participation reflects on environmental sustainability of EMFs. Studies capturing contrasting perspectives of upstream and downstream GVC participants on environmental sustainability challenges and outcomes would be a welcome addition.
The role of EMFs in the environmental sustainability of GVCs	The use of institutional theory can help explore the role of local institutions on environmental sustainability practices of EMFs. Particularly, whether and how local institutions in emerging markets complement or contradict private governance structures to more effectively address environmental concerns in GVCs. Greater use of resource-dependency theory can help better inform the behavioral and power-related dimensions of EMFs' role in the environmental sustainability of GVCs.	More focus on EMFs in leading environmental change in GVCs is needed. Future research can delve deeper into mechanisms of how EMFs can transcend resource and context-related challenges in championing large-scale adoption of environmental practices in GVCs. Exploring entrepreneurial qualities needed for EMFs to command power in GVCs to lead environmental change agenda is also a promising theme for future research.	There is scope for future research to bring greater diversity in terms of sectors that have not received adequate attention. There is a need for future studies to be more specific and consistent in investigating the types of environmental sustainability issues and practices of EMFs to allow greater cross-country comparability and applicability. Greater utilization of quasi-experimental research design is recommended to gain deeper insights into the behavioral mechanisms in GVCs and infer causality between focal variables.

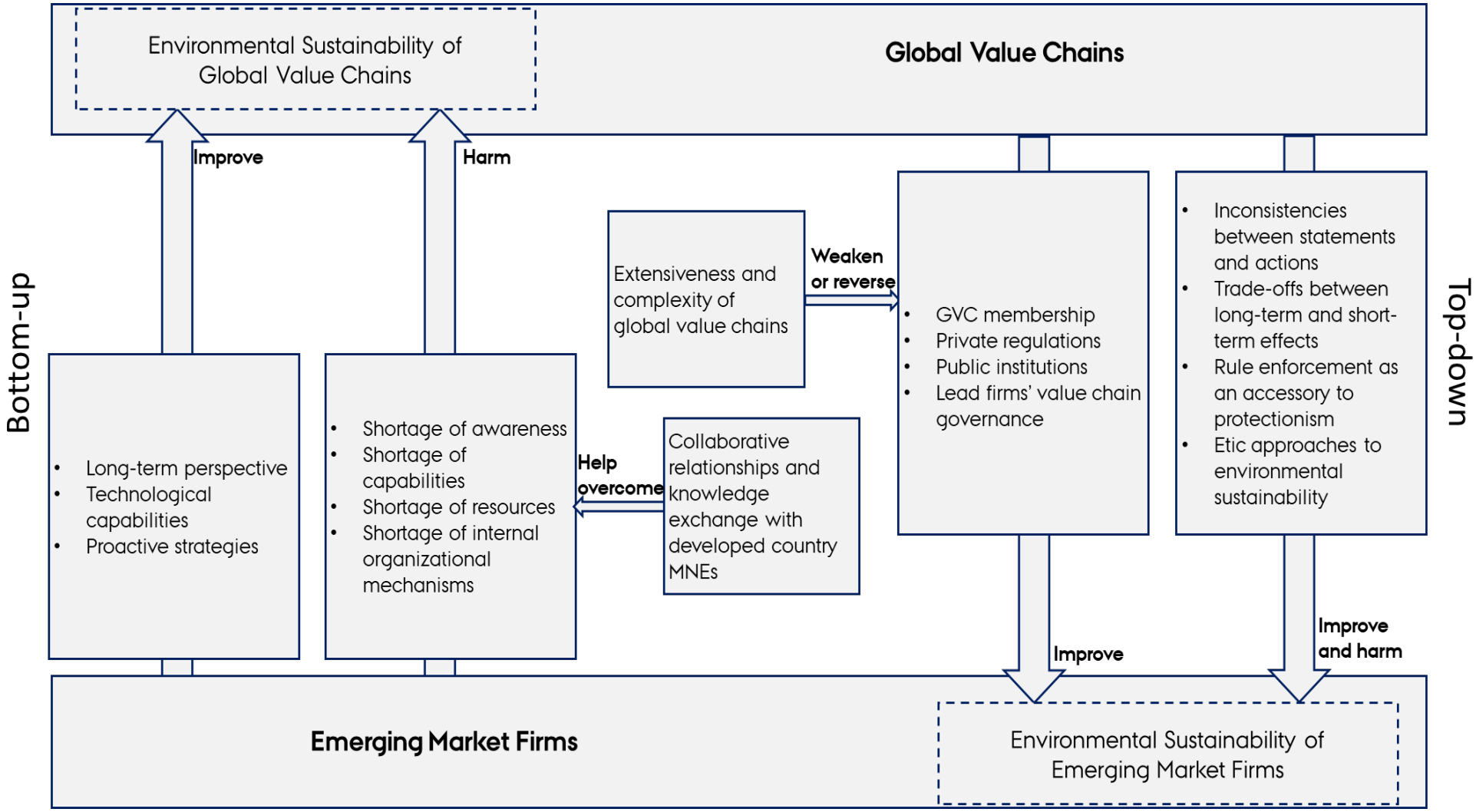

Fig. 1 An integrative framework of environmental sustainability of EMFs and GVCs