RESEARCH ARTICLE

Green resource orchestration: A critical appraisal of the use of resource orchestration in environmental management research, and a research agenda for future study

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Abstract
Resource orchestration (RO) is a strategic management framework that details various processes by which how firms structure, bundle, and leverage resources. This study reviews how RO has been considered in environmental management research. The review highlights some limitations on how RO has been used in studies on environmental management, and it also illustrates a lack of knowledge accumulation in the field. To realize the full potential of RO, the concept of green RO is developed. Green RO (GRO) is defined as a firm’s capability to coordinate and manage the structuring of resources and the bundling and leveraging of capabilities to create economic value for the company while simultaneously creating environmental benefits. Three main research areas for GRO are described: GRO as an organizational or managerial meta-capability, management of specific GRO processes, and the synchronization of several GRO processes.

KEYWORDS
environmental management, green resource orchestration, natural resource-based view, resource orchestration, resource-based theory, sustainable development

1 | INTRODUCTION

The question of how organizations can implement and change business processes and practices to better consider the natural environment is receiving much scholarly interest in contemporary management and environmental research. While much research in this area has focused on outcomes such as green innovations (Awan et al., 2021; Dangelico, 2016) and clean production (Severo et al., 2017), another stream of research has addressed internal capabilities and attitudes, for example, environmental capabilities (Mishra & Yadav, 2021; Yook et al., 2018), green entrepreneurship (Demirel et al., 2019; Ljungkvist & Andersén, 2021), and managers’ sustainability orientation (Cheng, 2020; Kuckertz & Wagner, 2010). According to the resource-based view (RBV) of the firm (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984), organizations’ realms of action, and consequently their ability to “go green”, are restricted by their resources and capabilities. Given that resources and capabilities constitute the foundation of a firm, it is crucial to consider how resources and capabilities are acquired, developed, and managed to understand why, and to what extent, firms implement sustainability-oriented business practices. An important extension of the RBV is the resource orchestration (RO) framework (Sirmon et al., 2007, 2011), which provides a detailed account of how resources and capabilities are managed in various organizational processes. RO has received considerable interest not only in strategic management research (Stoyanov et al., 2018) but also in research on, for example, entrepreneurship (Wales et al., 2013; Wright et al., 2012), human resource management (Andersén, 2021b; Chadwick et al., 2015), and
information technology (IT)/systems (Cui & Pan, 2015; Du et al., 2018). Thus, RO has the potential to offer detailed explanations and a deeper understanding of companies’ environmental management as well.

Although RO has received increased interest in environmental management research, its use has varied. For example, some studies have adopted a more generic approach to RO by examining how it is related to environmental performance (Andersén et al., 2020; Chavez et al., 2021; Malik et al., 2021), whereas other studies have examined specific green RO (GRO) processes such as resource acquisition (Wang, Xue, Sun, & Yang, 2020) or resource bundling (Rodríguez & Wiengarten, 2017). Moreover, many studies on environmental management merely use RO to argue for the necessity of managing resources (Andersén, 2021a; El-Kassar & Singh, 2019; Tatoglu et al., 2020). Consequently, they do not address the key element of RO, namely, that it is a structured framework that details several organizational resource management processes. These range from the external acquisition in factor markets and internal accumulation of resources, via various processes of bundling resources into capabilities, to the leveraging of these capabilities by mobilization, coordination, and deployment of products in the product market (Sirmon et al., 2007). Thus, so far, no systematic literature reviews have been conducted, and there is a lack of coherent frameworks and accumulation of knowledge on how RO can contribute to environmental management research. A literature review that integrates research on how RO has been used in environmental management studies should have the potential to advance knowledge and to stimulate debate on this emerging topic.

The purpose of this article is to review how RO has been considered in environmental management research and to propose a research agenda that will contribute to the development and the study of GRO. The remainder of this article is structured as follows: in the next section, the foundations and the details of RO are described and GRO is defined. Then, a review of studies examining various dimensions of environmental management using RO is presented. Finally, a research agenda for GRO is presented. This research agenda addresses three key areas for studying GRO, namely, GRO as a capability, specific GRO processes, and GRO synchronization of several processes.

2 | GREEN RESOURCE ORCHESTRATION

2.1 | The RO framework and its origins

The RO framework was specifically developed to “address current criticisms of the RBV” (Sirmon et al., 2007, p. 273), and RO is irrefutably a framework grounded in the theoretical domains of strategic management research and the RBV. Thus, the theoretical foundation of RO is the core notion of the RBV, namely, that organizations’ resources and capabilities guide and restrict strategic and operational firm behavior (Barney, 1991). A recurrent criticism of the RBV is that the theory is primarily descriptive and overlooks how resources and capabilities are acquired and managed (Arend & Lévesque, 2010; Armstrong & Shimizu, 2007; Lockett et al., 2009; Priem & Butler, 2001). This limitation was addressed in early RO literature by, for example, highlighting the notion that resources have to be well-organized (Barney, 1995, 1997) and that resources generally have to be combined into capabilities (Grant, 1991; Hitt et al., 2019) to generate value.

In contrast to merely highlighting the idea that resources have to be well-organized or emphasizing the importance of combining capabilities, the RO framework provides a detailed overview of a series of main processes in terms of structuring, bundling, and leveraging. In the seminal RO publication by Sirmon et al. (2011), RO also encompassed additional concepts from the dynamic capability literature, and it addressed questions of breadth and depth of RO. However, Sirmon et al. (2011, p. 1390) defined RO as how managers “structure, bundle, and leverage firm resources”, based on the Sirmon et al. (2007) classification, and this more precise approach is widely used in studies on RO (see, for example, Andersén & Ljungkvist, 2021; Cames et al., 2017; Chirico et al., 2011; Wales et al., 2013). Therefore, the more precise definition is used in the present article.

The RO framework encompasses all processes for influencing firm performance, from the acquisition of resources in factor markets to the deployment of products in product markets, and it is described in detail by Sirmon et al. (2007). In the structuring process, resources are externally acquired in factors markets and accumulated within the firm, and redundant resources are divested. The results of these processes comprise a firm’s resource portfolio, thus its control over a set of financial resources, physical resources, human resources, technological resources, reputation, and organizational resources (Grant, 1991, p. 119). The bundling process refers to the combination of resources into capabilities. A capability can be defined as “the capacity for a team of resources to perform some task or activity” (Grant, 1991, p. 119). Sirmon et al. (2007) make a distinction between three bundling processes depending on the magnitude of change in a firm’s capabilities, ranging from making minor adjustments in current capabilities by stabilizing, to making more significant changes to current capabilities by enriching, and to pioneering by developing entirely new capabilities. The third main process is the leveraging process. In this process, capabilities are mobilized and coordinated with other resources and capabilities to create capability configurations that are then physically used to finally be deployed in product markets.

2.2 | Defining GRO

The original RO framework is solely focused on value creation and economic performance from a company point of view and does not address the natural environment. Moreover, efforts to include a green dimension by addressing, for example, “natural RO” (Asai, Bontis, et al., 2022) and “environmental RO” (Xin et al., 2022) have conceptual and operational shortcomings. These will be discussed in more detail in the review sections. In contrast to the internal orchestration of resources and how this is related to sustainability, the incorporation
of a “green” element has a much longer research tradition in the field of entrepreneurship, in which constructs such as ecopreneurship (Ljungkvist & Andersén, 2021), sustainable entrepreneurship (Muñoz & Cohen, 2018), and green entrepreneurial orientation (Jiang et al., 2018) have emerged. In this stream of research it has been argued that sustainable entrepreneurship should concern how firms “recognize, exploit, and create economic growth while simultaneously creating environmental benefits” (Thompson et al., 2011, p. 222). Given the strong emphasis on firm performance in the RO framework and the RBV, a definition of GRO ought to include a focus on processes that are beneficial for both firm and natural environmental performance. To consider environmental as well as economic performance is also a key element of the most significant effort to incorporate the limitations of the natural environment into the RBV, namely the natural RBV (Andersén, 2021; Hart, 1995; Hart & Dowell, 2010). Given that RO as well as the natural RBV are grounded in the RBV, it makes sense to define GRO as a combination of these two frameworks. Thus, GRO is defined as a firm’s capability to coordinate and manage the structuring, bundling, and leveraging of resources to create economic value for the company while simultaneously creating environmental benefits. This definition highlights that 1) GRO can be regarded as a specific meta-capability, 2) GRO concerns the coordination and synchronization between the three RO processes (and their sub-processes) as well as the efficient management of the specific processes, and 3) GRO is about generating firm-level economic performance as well as environmental performance.

### 3 | REVIEW OF HOW RO HAS BEEN USED IN ENVIRONMENTAL MANAGEMENT STUDIES

Searching the major databases Web of Science, Scopus, and Google Scholar yielded zero results on the term “green resource orchestration”. Nevertheless, RO has been used in environmental studies, and this makes it important to conduct a review of the literature to identify and systematize relevant areas for future research. In the following sections, the method of identifying relevant publications and the results of the review are presented.

#### 3.1 | Method

The process of identifying relevant publications for the review is summarized in Table 1.

Relevant publications were identified using the databases Web of Science, including the emerging sources index, and Scopus. These databases are widely used in reviews studies (e.g., Andersén et al., 2016; Newbert, 2007) and were selected to ensure the quality of the publications and to ensure that relevant articles could be identified. The searches were conducted on November 15, 2022. In the first step of identifying relevant publications, the first selection criterion (A) was that the publications referred to Sirmon et al. (2011). This is a core reference of RO and the publication in which the term was coined. Limiting the search to studies citing this article ensured that the publications defined RO as the structuring, bundling, and leveraging of resources. In the next step (B), publications not published in academic journals, for example, conference proceedings, were excluded. To ensure that the articles were related to RO, only articles using the RO-related concepts listed in Table 1 were then included (step C). In the next step (D), search terms related to environmental sustainability were included. The remaining articles were read to ensure that they addressed RO and some dimension of environmental management. Most of the articles removed addressed the overall business environment by, for example, examining dynamic business environments instead of the natural environment. Other studies examined “human resource management” and not “resource management”. Moreover, several articles were removed because they were only loosely related to RO by, for example, having a single reference to Sirmon et al. (2011) without addressing RO per se. Because the core concepts of structuring, bundling, and leveraging were introduced by Sirmon et al. (2007), the search procedure was replicated in an additional search in Web of Science but on studies citing Sirmon et al. (2007). After this, the same procedure was applied in the Scopus
As illustrated in Table 3.2, the 55 articles were published in 26 different journals. Because of the selection criteria of citing Sirmon et al. (2007) and/or Sirmon et al. (2011), the identified publications were published (or available as e-publications ahead of print) between 2010 and November 15, 2022. All articles included in the review are listed in the Appendix.

As illustrated in Table 2, the 55 articles were published in 26 different journals. Because of the selection criteria of citing Sirmon et al. (2007) and/or Sirmon et al. (2011), the identified publications were published (or available as e-publications ahead of print) between 2010 and November 15, 2022. All articles included in the review are listed in the Appendix.

Considering that RO is firmly rooted in strategic management research and that the search of publications concerned articles applying RO in environmental management research, it makes sense that the journal Business Strategy and the Environment stands out by providing more than a quarter of the publications. It is also worth noting that articles in the field of GRO have predominantly been published in high-quality journals. Specifically, when analyzing the journals according to the Academic Journal Guide published by the Chartered Association of Business Schools, one can conclude that 62% of the articles are published in well- or highly regarded journals (AJG3 or AJG4) and that 85% are published in journals included in the AJG list.

A summary of the content of the publications is presented in Table 3.

Although the seminal publications on RO (Sirmon et al., 2007, 2011) did not exclude external resources, the focus was on the internal development of resources and capabilities, and questions or problems concerning the orchestration of external resources or resources shared with other organizations were not addressed. Nevertheless, 62% of the studies addressed external resources. Concerning the research design, quantitative approaches were adopted in 44 publications, whereas seven studies were based on qualitative data and three articles were not based on any primary data. A detailed analysis of the content of the identified studies revealed two limitations in how studies on environmental management addressed RO, and these limitations will be discussed in the following sections. These discussions should not be regarded as criticism of specific studies. All of the studies used RO in ways that were useful and relevant for their own purposes. However, as will be argued, the potential of applying RO has not been fully realized.

3.2.1 | Addressing generic RO instead of GRO

As summarized in Table 3, the vast majority (80%) of the studies examined what can be referred to as generic RO. These studies examined how RO was related to environmental sustainability, but they did not address how to incorporate a green element in RO processes per se. Some of these studies used RO as an independent variable and various independent variables related to environmental stability to examine how these, separately or combined, influenced firm performance. For example, Kristoffersen et al. (2021) examined how RO of IT resources and circular economy implementation affected firm performance, and Chavez et al. (2022) examined how RO mediated the relationship between exchanging environmental information with suppliers and cost performance. Other studies examined how generic RO affected different dimensions of environmental performance. For example, Afum et al. (2022) showed that overall RO, operationalized as lean management, had a positive effect on the use of circular production systems.

Studies examining generic RO in the context of environmental management have provided some interesting insights into how RO can be used to improve environmental performance. They show that using resources effectively and efficiently can positively moderate or mediate the usefulness of green resources and capabilities and thereby result in improved financial (Andersén et al., 2020) and environmental performance (Afum et al., 2022). However, these studies have not incorporated consideration of environmental sustainability in the RO framework, and consequently, they define RO in terms of the efficient and effective use of resources. Similar to definitions and developments of concepts such as green supply chain management (Green et al., 2012; Srivastava, 2007) and green human resource management (Renwick et al., 2013; Tang et al., 2018), GRO needs to address environmental sustainability as an inherent part of the construct and not merely as an outcome. Thus, the 44 studies addressing...
3.2.2 Using RO to argue for the overall importance of resource management instead of considering the details of RO

Regardless of whether RO is conceptualized and/or operationalized as generic RO or GRO, another problem associated with many studies was the level of aggregation. Specifically, and as illustrated in Table 3, 82% of the studies focused on overall RO without addressing the main processes of structuring, bundling, and leveraging, nor did they address the sub-processes of these processes. Instead of using the details of the RO framework, most of these studies used RO to make one of two arguments. The first argument was that resources have to be exploited to generate value. One study asserted, for example, that RO suggests “that merely possessing valuable, rare, non-imitable, and non-substitutable resources cannot guarantee the development of a competitive advantage and create value, such as environmental innovation” (Ren et al., 2022, p. 559). The other argument was that RO was developed because the RBV “fails to explain the specific mechanisms through which resources create competitive advantage” (Rodríguez & Wiengarten, 2017, p. 2426). Several studies also used RO to argue for the importance of managers by, for example, stating that RO has “highlighted the role of top managers in capability building, and structuring the resource portfolio” (El-Kassar & Singh, 2019, p. 486) or that the “role of management has received much interest in contemporary RBV literature” (Andersén et al., 2020, p. 326). Failure to address the core contribution of the RO framework, namely, the structured framework of processes and sub-processes, was also identified in studies aiming to develop the RO concept to encompass the natural environment. Specifically, Asiaei, Bontis, et al. (2022) coined the term “natural RO” and used the concept in subsequent studies (Asiaei, Jusoh, et al., 2022; Asiaei, O’Connor, et al., 2022). However, instead of operationalizing and conceptualizing natural RO, “environmental management accounting” (Asiaei, Bontis, et al., 2022) was used as a proxy for this concept. Because they do not consider the fundamental ideas of RO of structuring, bundling, and leveraging resources, such approaches do not contribute to the development of a concept such as GRO (or natural RO).

There is, of course, nothing wrong with using RO to argue for the importance of managers or resource management, nor with using various constructs, such as environmental management accounting (Asiaei, Bontis, et al., 2022), lean management (Afum et al., 2022), or ambidextrous green innovation (Asiaei, O’Connor, et al., 2022), that are not specifically grounded in RO to address how resources and capabilities are managed. However, the notion of the importance of utilizing resources was considered in the early RBV literature (Barney, 1997) and, for example, Barney (1995, p. 56) specifically emphasized the importance of a firm being “organized to exploit the full competitive potential of its resources and capabilities” and argued for including an organization dimension in the RBV. Moreover, the distinction between resources and capabilities has always been discussed in the RBV literature (e.g., Grant, 1991; Hitt et al., 2016; Ray et al., 2004), and the role of managers in the RBV has been addressed in detail (Barney, 1994; Mahoney, 1995). As illustrated in Table 3, most publications using RO in environmental management merely acknowledge the limitations of the RBV highlighted in numerous studies and in the introduction section of Simons et al. (2007) without using the solution offered by the RO framework to overcome these problems. By not considering the actual processes and sub-processes of the RO, these studies do not realize the full potential of RO, and therefore, they offer limited contributions to GRO.

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<td>Conceptual/review</td>
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<td>Nature of examined/addressed resource(s)</td>
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<td>Green resource orchestration, aggregated</td>
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<td>Green resource orchestration, specific process(es)</td>
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TABLE 4  A research agenda for green resource orchestration.

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<th>Research area</th>
<th>Research questions</th>
<th>Prospective complementary theories</th>
<th>Examples of studies</th>
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<td>GRO capability</td>
<td>How can we understand and examine organizational GRO capability? How are managerial cognition and skillsets related to managerial GRO capability?</td>
<td>Dynamic capabilities, managerial cognition</td>
<td>Xin et al. (2022)</td>
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<td>Management of specific GRO processes</td>
<td>What is the nature of specific GRO processes? How can specific orchestration processes be managed to achieve economic as well as environmental benefits?</td>
<td>Natural-resource-based view, Green HRM, Green entrepreneurship</td>
<td>He and Shen (2019); Rodriguez and Wiengarten (2017); Wang, Xue, Sun, and Yang (2020)</td>
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<tr>
<td>Synchronization of several or all GRO processes</td>
<td>How can RO processes be synchronized to achieve economic as well as environmental benefits? How can the GRO framework be adapted to specific empirical and theoretical contexts?</td>
<td>Attention-based view, relational view</td>
<td>Asante et al. (2022); Zhang, Pan, et al. (2022); Zhang, Pee, et al. (2022)</td>
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Abbreviations: GRO, green resource orchestration; HRM, human resource management; RO, resource orchestration.

(Andersén, 2021b; Chadwick et al., 2015), and entrepreneurship (Miao et al., 2017; Symeonidou & Nicolaou, 2018), RO should have great potential in environmental research as well. The construct of GRO should be useful for better incorporating the fundamentals of RO in environmental management research. Table 4 provides a summary of a proposed research agenda for GRO.

The previously given definition of GRO highlights three overall research areas for GRO, namely, GRO as an overall capability, management of specific GRO processes, and synchronization of several GRO processes. In the following sections, these three areas will be elaborated by addressing key questions for each area and by suggesting theories that can be used to research the areas. Moreover, although most studies using RO in environmental management offer limited contributions, some highly interesting studies, relevant for the three research areas, were identified in the review, and these will also be described in the forthcoming sections.

4.1  GRO as a capability

GRO can be studied as an overall capability to successfully orchestrate resources. This can be regarded as an overall organizational capability, specifically as the type of meta-capability mainly addressed in the dynamic capability (Eisenhardt & Martin, 2000; Teece, 2007; Teece et al., 1997) literature. In addition, Simon et al. (2007, p. 287) asserted that RO is a task for “top-level managers”, and the central role of top management for RO has been addressed in several studies on RO (e.g., Chadwick et al., 2015; Chirico et al., 2011; Kor & Mesko, 2013; Symeonidou & Nicolaou, 2018). Thus, GRO as an overall capability can be studied as an organizational as well as a managerial capability.

4.1.1  GRO as an organizational capability

The multifaceted nature of GRO raises several methodological challenges if we are to study GRO as an aggregated organizational capability. An example addressing the green element in RO is a study on what Xin et al. (2022) referred to as “environmental RO”. Based on the measurement of RO by Wang, Xue, and Yang (2020), Xin et al. (2022) operationalized environmental RO as a three-component construct. The structuring process is measured as a firm’s ability to “absorb all kinds of environmental resources”, bundling as the ability to “integrate all kinds of environmental resources”, and leveraging as how firms “utilize all kinds of environmental resources integrated to create new environmental technologies and solve the environmental pollution problems” (Xin et al., 2022, p. 8). The operationalization of the leveraging process highlights that the construct suggested by Xin et al. (2022) is solely focused on the environmental impact, and in contrast to the natural RBV and green entrepreneurship literatures, it does not consider financial performance. More importantly, RO and GRO are highly multifaceted and broad concepts that involve practices ranging from recruitment and resource investments (resource acquisition) to organizational learning (resource accumulation) and long-term processes of bundling resources to develop and deploy capabilities. Using a single quantitative variable that incorporates all these processes will, most likely, result in an oversimplification of reality and an overly broad and imprecise construct. Nevertheless, addressing the overall capability to orchestrate a highly specific environmental capability, for example, a waste management capability (Redmond et al., 2008; Woodard, 2021), could be a possible avenue for future research. Taking inspiration from Xin et al. (2022), such studies could address the extent to which employees’ knowledge about waste management is considered in recruitment processes.
(acquisition), whether and how waste management is addressed in competence development (accumulation), whether waste management is considered when organizing teams or work groups (bundling), etc.

Concerning the theoretical foundation for studying overall organizational GRO capability, it is recommended to build on research on dynamic capabilities. The dynamic capability literature has provided detailed elaborations on how meta-capabilities, such as GRO capability, are built, developed, and/or emerge by addressing various micro-foundations (Bendig et al., 2018; Helfat et al., 2007) of dynamic capabilities as well as by highlighting the role of organizational routines (Winter, 2003; Zollo & Winter, 2002). Thus, the organizational capability of managing resources to consider financial as well as environmental outcomes fits well in the dynamic capability framework, and instead of reinventing the wheel, there should be great potential in adopting and adapting dynamic capability models and explanations in research on GRO as an organizational capability. As illustrated by much dynamic capability research (Cepeda & Vera, 2007; Da Giau et al., 2020) as well as in research on overall organizational RO (Amit & Han, 2017; Baert et al., 2016; Stoyanov et al., 2018), the complex nature of meta-capabilities and of RO makes case studies the most appropriate research approach for studying this.

### 4.1.2 | GRO as a managerial capability

Although managers constitute a central element in RO (Chadwick et al., 2015; Sirmon et al., 2007; Symeonidou & Nicolau, 2018), there has been little interest in managerial orchestration capabilities when applying RO in environmental management research. Environmental studies addressing managers have been restricted to considering how some characteristics of managers influence the overall realization of certain capabilities. Examples include how chief executive officers’ (CEOs) environmental orientation increases the effect green purchasing capability has on firm growth (Andersén et al., 2020) and how top managers can facilitate overall “environmental practices” (Ilyas et al., 2020, p. 8213). Thus, environmental studies using RO have not related managers’ skills or cognition to RO per se.

Because GRO capability can be regarded as a dynamic capability, an important area for future GRO research would be to apply and adapt the extant dynamic capability research that has focused on the role of managers (Helfat & Peteraf, 2015; Schoemaker et al., 2018; Suddaby et al., 2020). For example, Helfat and Peteraf (2015) provided a detailed description of how managerial cognitive abilities influence dynamic managerial capabilities, which in turn, result in different types of strategic change at the organizational level. Examining these relationships but focusing on how managerial cognition, via dynamic capabilities, influences different types of GRO processes could generate significant insights for understanding the micro-foundations of GRO.

In addition to using research on managerial dynamic capabilities to research GRO as a managerial capability, there are a number of (non-green) RO studies that have addressed the role of managers. Developing the ideas presented in those studies to incorporate a green element can be one way to study GRO from a managerial approach. For example, Garbuio et al. (2011) addressed how psychological mechanisms were related to the three sub-processes of resource structuring, namely, acquisition, accumulation, and divestment. Other RO studies have addressed the roles of different types of managers or management constellations, such as top management teams (Ndofor et al., 2015), human resource managers (Kim & Ployhart, 2018), and sales managers (Badinarayan et al., 2018). These studies offer frameworks as well as propositions and hypotheses that can be elaborated and tested on GRO, thereby advancing our understanding of the role of management capabilities for GRO.

### 4.2 | Management of specific GRO processes

The most important contribution of the RO and GRO frameworks is that they provide a comprehensive overview of various organizational processes necessary to generate positive economic and, for GRO, environmental outcomes. Although studying specific isolated GRO processes can contribute to GRO research, the specific processes and sub-processes of RO have generally been examined in detail in other areas of management research. For example, research on green human resource management has dealt with several GRO sub-processes such as recruitment (acquisition), individual learning (accumulation), and capability development (bundling) (Renwick et al., 2013; Tang et al., 2018). This makes it important to integrate other theories with GRO instead of reinventing the wheel when researching specific GRO processes. An example of how to use other theories and concepts is the leveraging sub-process of resource mobilization. In generic RO research, mobilization concerns how firms mobilize resources to exploit market opportunities, and this is a key area in entrepreneurship research. Consequently, a firm’s entrepreneurial orientation has been used frequently to address resource mobilization (Andersén, 2021b; Miao et al., 2017) because it “provides a mobilizing vision” in terms of a “system of practices and managerial styles that offers direction for the use of resources” (Chirciu et al., 2011, p. 310). Thus, to consider mobilization in the context of GRO, a viable research area would be to build on green entrepreneurship theories, such as green entrepreneurial orientation (Guo et al., 2020; Jiang et al., 2018) or sustainable entrepreneurship (Belz & Binder, 2017; Dean & McMullen, 2007; Hall et al., 2010).

Researching specific GRO processes can focus on what characterizes such processes per se, on the environmental and the financial outcomes of specific processes, or a combination of these. Regardless of the focus, this approach is firmly grounded in the natural RBV (Hart, 1995), but instead of identifying and understanding resources than can generate positive financial and environmental outcomes, GRO research concerns the role of specific orchestration processes. In the review of studies on the use of RO in environmental research, three studies that made significant contributions to this research domain could be identified. Wang, Xue, Sun, and Yang (2020) examined how “green resource acquisition” was related to green...
innovation. Green resource acquisition was measured as a three-item construct concerning a firm's ability to obtain “technical knowledge”, “market knowledge”, and “respective product and service knowledge” related to “environmental protection” (Wang, Xue, Sun, & Yang, 2020, p. 9). Although they mainly focused on environmental outcomes and did not consider financial outcomes, their study provides a useful example of how specific GRO processes can be operationalized and studied. In the other study, Rodriguez and Wiengarten (2017) examined the role of bundling resources into capabilities to foster environmental innovativeness. The study illustrates how developing an environmental innovativeness capability is a two-step bundling process in which various resources are first bundled into a process innovativeness capability, and this capability is then extended by bundling with other resources to generate an environmental innovativeness capability. Thus, the study by Rodriguez and Wiengarten (2017) highlights the possibilities and potential of focusing on the nature of specific GRO processes, and such research endeavors are likely to be important in the development of GRO. In the third study, He and Shen (2019) showed that resource utilization, resource accumulation, and resource allocation mediated the relationship between ISO14001 certification and innovation. This study provides an excellent example of how specific GRO processes can be used to examine and validate the importance of GRO. It offers examples of operationalization of GRO processes and, because it involves several GRO processes, it illustrates the usefulness of applying the structured framework of GRO instead of a specific construct than can be found in other theories or frameworks.

### 4.3 | Synchronization of GRO processes

Although specific GRO processes constitute an important research area, the most important contribution of GRO to environmental research is most likely the holistic and structured approach offered by the framework. As stated by Simon et al. (2007, p. 287), “each component of the resource management process is individually important, but, to optimize value creation, they must be synchronized.” This highlights the importance of researching how different GRO processes are coordinated and related. The review of studies clearly demonstrated that synchronization has been an overlooked area, and there is a lack of studies examining how incorporating green practices in one process will influence other processes. For example, organizations can be highly committed to considering green elements in their structuring processes by focusing on recruiting employees with knowledge of and commitment to ecological sustainability, by incorporating environmental sustainability in competence development programs, and by continuously divesting resources that are not environmentally friendly. The result will be a highly green resource portfolio, and the capabilities bundled and leveraged based on such resources could, consequently, be expected to have a positive impact on the natural environment. Whether it is enough to focus on green structuring processes or if highly green bundling and leveraging processes can compensate for a lack of green resources is unclear, however, and this constitutes an important area for future research. Holistic approaches to GRO, which address the relationship between, and orchestration of, several processes, are likely to require the inclusion of additional theoretical explanations and adaptations to different empirical contexts.

#### 4.3.1 | Incorporating the attention-based view into GRO research

The synchronization of GRO requires managers and organizations not only to orchestrate the specific GRO processes but also to orchestrate environmental and financial objectives. This requires managers and organizations to pay attention to several processes and goals (Andersén, 2022), and the attention-based view of the firm (Hoffman & Ocasio, 2001; Ocasio, 1997, 2011) could provide a viable framework to address this issue. According to the attention-based view, what “decision-makers do depends on what issues and answers they focus their attention on”, and the perspective offers a structured approach for examining how attention is distributed within organizations that can explain why firms behave in different ways (Ocasio, 1997, p. 187). The importance of attention has been highlighted in several studies on generic RO. For example, Garbuto et al. (2011) argued that psychological mechanisms governed which structuring processes managers pay attention to. Moreover, Lerner et al. (2018) argued that managers with deficit/hyperactivity disorder (ADHD) would be inferior in orchestration practices requiring formalization and institutionalization, such as resource coordination, but that they would excel in creative-oriented processes such as resource mobilization. These studies illustrate the usefulness of examining synchronization of GRO processes from an attention-based view.

#### 4.3.2 | Adapting GRO to different empirical contexts

When researching synchronization of GRO, the original sequential model of RO may have to be modified or adapted to different empirical and theoretical contexts. This is evident from studies on generic RO research. For example, Amit and Han (2017, p. 239) identified various micro-processes of the RO framework for firms in a “digitally enabled world”. Wright et al. (2012) identified key resources of university spin-offs and linked these to specific orchestration practices, and Baert et al. (2016) substituted some processes with new ones that are more relevant for explaining value creation in portfolio entrepreneurship. Based on the systematic review of the present study, three studies that proposed alterations and/or adaptations of RO in environmental research could be identified. In two of these studies, new orchestration processes that were relevant for orchestrating big data to reduce air pollution (Zhang, Pan, et al., 2022) and to achieve sustainability in smart cities (Zhang, Pee, et al., 2022) were identified. These studies focused on the regional and municipal levels, and so the need to adapt the firm level-oriented RO framework makes sense. In
the third study, the relative relevance of all RO processes for transitioning into circular supply chains in the Ghanaian construction and demolition industry was examined (Asante et al., 2022). This study provides an excellent example of how GRO can be applied in different contexts, and researching the relative importance of different GRO processes in various empirical settings is an important future research area that highlights the usefulness of the aggregated and structured approach offered by the GRO framework.

As illustrated by the review, 62% of the studies considered external resources. Although the RO framework is not explicitly limited to internal resources, it does not detail any of the differences of, or problems associated with, orchestrating resources internally versus orchestrating resources shared with other organizations. Thus, researching GRO could benefit from combining the RO framework with the relational view of the firm, as described by Dyer and Singh (1998), or other external approaches, such as network approaches (Tomkins, 2001; Tsai, 2001) or the dyadic rent distribution model (Lavie, 2006). Moreover, in contrast to orchestration processes merely undertaken to enhance firm performance, GRO is also about having a positive impact on the natural environment. For organizations in free market environments, disseminating knowledge about organizational processes can risk eroding competitive advantages, and companies could consequently face a tradeoff between ensuring long-term financial performance (dependent on safeguarding knowledge) and environmental performance (sometimes dependent on disseminating knowledge). Thus, companies operating in free markets are likely to face different challenges than governmental organizations or companies in highly regulated or monopolistic markets, and the level of market regulation is likely to be an important factor for how GRO is, or can be, manifested.

5 | CONCLUSION

As illustrated by the literature review, there is increased interest in using RO in environmental research. However, most studies have not realized the full potential of RO, and the GRO construct is an effort to better incorporate a green element into the RO framework. When addressing theories that can complement and extend GRO research, I have mainly focused on theories grounded in strategic management research. The rationale for this is that it is essential to position theoretical framings and results in GRO research to contemporary strategic management research and current debates in this specific field of strategic management. This will 1) enable studies on GRO to contribute to the field of RO research because RO is first and foremost a strategic management model grounded in the RBV and 2) ensure theoretical coherence and accumulation of knowledge. If other theories, outside the realm of strategic management, are used in GRO research, it is important to show the novelty of this approach and how it contributes to strategic management and RO. So far, the use of RO in environmental research has been fragmented, but it is hoped that, as GRO research continues, a more coherent approach will develop in which new knowledge can be accumulated.

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APPENDIX: PUBLICATIONS INCLUDED IN THE LITERATURE REVIEW


He, D., Ren, S., & Zeng, H. (2022). Environmental labeling certification and firm environmental and financial performance: A resource...


