



# Incorporating the choice of centralized vs. decentralized resource allocation into sustainability frameworks

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## Abstract

The grand societal challenge of implementing the Sustainable Development Goals (SDG) puts pressure on firms to improve their sustainability practices. Environmental innovation can improve firms' sustainability practices, depending, in part, on the firm's dynamic resource allocation capability. However, addressing whether to centralize or decentralize resource allocation has so far received scant attention in sustainability frameworks. This point-of-view article argues that the choice of whether to centralize or decentralize resource allocation will be increasingly more important as a structural lever for firms seeking to implement the SDGs. Linking this choice to the dynamic capability of resource allocation shows that this lever is intricately connected to the strategies of firms seeking to improve their sustainability practices. A practical framework is demonstrated that offers managerial decision support for this choice. Finally, avenues for future promising research are proposed.

**Keywords** Resource allocation · Organization design · Sustainability · Grand challenges · SDGs · Environmental innovation

## Background

*Can incorporating the choice of centralized vs. decentralized resource allocation into Sustainable Development Goals (SDGs) frameworks improve firms' sustainability practices?* This is the main question this point-of-view article is meant to address. The intricate links between resource allocation and sustainability are complex; it is a multifaceted dynamic that demands consideration of several factors beyond mere supply and demand, encompassing environmental impacts, social implications, and long-term economic viability. This paper argues that the choice of centralized vs. decentralized resource allocation is intrinsically linked to the firm's sustainability practices and highlights the limited support for this choice in existing sustainability frameworks.

As a starting point, consider the scale and multifaceted nature of the grand societal challenge of implementing the SDGs. This challenge is a complex, large-scale problem with likely specific local implications (Etzion et al. 2017; George et al. 2016). In a modern economy, the role of firms is central in mediating the allocation of both financial and

non-financial resources (Levinthal 2017; Simon 1991) such as assets, capabilities, and organizational processes controlled by a firm that enables it to improve its efficiency and effectiveness (Barney 1991). Indeed, the achievement of the greenhouse gas emission targets set in accordance with the Paris Agreement depends to a large extent on firms (Cenci et al. 2023; Krabbe et al. 2015; UNEP 2021). While a significant amount of resources have been allocated to reduce emissions, firms are still struggling to deliver on their emission targets (Dietz et al. 2021). This puts pressure on firms to improve their sustainability practices.

For some firms, the SDGs represent additional constraints; for others it could entail new opportunities. Firms can create both economic and social value by integrating sustainability considerations into their core business strategies (Porter and Kramer 2011). Furthermore, the nature of these circumstances can shift over time, potentially revealing emergent opportunities for resource redeployment (Helfat and Eisenhardt 2004; Levinthal and Wu Forthcoming; Sakhartov and Folta 2015, 2014). In other words, firms may face different opportunities in search and selection over time (Levinthal 2017). Either way, effective resource allocation can be essential to aligning business activities with sustainability targets and potentially unlocking new opportunities for growth and innovation. For instance, Cenci et al. (2023) attributed the misalignment between firms' emission

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goals and outcomes to a widespread over-investment in risk mitigation actions rather than opportunities for innovation and cooperation activities. Addressing the challenge of implementing the SDGs thus requires the effective allocation of scarce resources within and possibly between firms.

By resource allocation, this paper refers to the complex process of aligning fundamentally interrelated forces of technical, economic, financial, organizational, cultural, and interpersonal factors (Bower 2017). Knowledge of these forces can be spread across different layers within the firm, and the process of allocating resources can be decentralized among various business units and multiple levels of the hierarchical structures that govern firms (Bower 1970, 2017). Thus, as emphasized by Bower (2017), Chandler (1962) and Mintzberg (1978), resource allocation is an essential part of the strategy process. If individual firms are to contribute positively toward achieving the SDGs while remaining competitive, it implies embedding the SDGs into their strategy. This is particularly critical in sectors where environmental impacts are pronounced, as the allocation of resources not only influences organizational outcomes but also shapes the broader ecological footprint of the firm.

In addition to being an essential part of strategy, resource allocation can also be a dynamic capability. As pointed out by Helfat and Maritan (2023) firms may differ in how they structure and use various search and selection routines for resource allocation opportunities, constituting a firm's dynamic resource allocation capability. They argue that heterogeneity in how firms resolve trade-offs in the choice of resource allocation routines can be impacted by how they structure their resource allocation activities, thus impacting the firm's resource allocation capability. This implies that the choice of whether to centralize or decentralize resource allocation can enable this capability.

To illustrate, the underreporting of sustainability-related performance is used as an example. Routine flaring, the burning of excess gas released during oil production, continues to be massively underreported—for 2021 estimates were in the range of 20 Mt CO<sub>2</sub> equivalents (Esme et al. 2022). In addition to being a source of waste of energy and unnecessary emissions, flaring releases toxic pollutants spreading hundreds of kilometers, endangering millions of people. There are indications that flaring increases the risk of cancer, leukemia, respiratory disease, and other blood disorders in local communities (CDC 2018; Pinnell and Ibrahim 2023). While several major oil companies claim commitment to eliminating all but emergency flaring (World Bank 2023); when confronted with the issue of underreporting, a majority express that the responsibility for reporting flaring emissions lies with the firm they have hired to manage daily operations. In terms of dynamic resource allocation capabilities, this example illustrates a failure of firms to adapt their strategies and operations toward sustainability

by missing opportunities for environmental innovation and getting misaligned decentralized resource allocations.

*Limited support in existing sustainability frameworks* In recent years, scholarly and professional communities have developed a range of strategic frameworks and tools to assist firms in effectively implementing the SDGs. Examples include the "Ecosystem Pie Model" (Talmar et al. 2018) and the "Triple Layered Business Model Canvas" (Joyce and Paquin 2016). While existing frameworks and tools do consider resource allocation, they generally do not consider the choice of whether resource allocation should be centralized or decentralized. In an extensive review of such frameworks, Grainger-Brown and Malekpour (2019) show that the primary focus of these frameworks is on mapping existing programs or value chains against the SDGs (Baumgartner and Rauter 2017; Broman and Robèrt 2017; Compass 2015), reporting and benchmarking activities (Bebbington and Unerman 2018; De Villiers et al. 2014; Rosati and Faria 2019), or problem definition and goal setting (Littlewood and Holt 2018). Only a small subset of frameworks focuses on alignment (Morioka et al. 2018; Sullivan et al. 2018) i.e. to redefine the organizational practices to achieve the SDGs. The majority of existing frameworks focus on strategy implementation, with limited support for integrating the SDGs into strategic management processes (Grainger-Brown and Malekpour 2019). In addition, international standards like the ISO 14000 series (ISO 2015) advise on environmental impact reduction and compliance but do not offer specific support on choosing between centralized and decentralized resource allocation.

In sum, a practical framework addressing whether to centralize or decentralize resource allocation has so far received scant attention in sustainability frameworks. This is problematic, as managers responsible for implementing the SDGs will face this choice on multiple levels of the organization. This lack of framework support can pose SDG implementation risks, as existing research has documented that firms are struggling to deliver on their sustainability ambitions (Dietz et al. 2021; Goddard 2022). Firms must carefully balance the benefits of engaging in areas where they have established competence against exploring alternative, potentially more advantageous, courses of action—the next best and new best use of resources might reside internally or externally to the firm (Levinthal and Wu 2022). The allocation of firm-specific nonfinancial assets brings to the forefront the issue of opportunity cost (Levinthal 2017), especially for real-world managers, constrained by their finite capacity for time and attention (Levinthal and Wu 2022; Ocasio 1997). The distinct combination of resources and capabilities within a specific firm implies a unique set of strategic considerations when searching for and selecting opportunities. The choice of whether to centralize or decentralize resource allocation has implications for firms seeking to implement the SDGs,

as the internal hierarchy within corporations is an important structure by which resource allocation is managed (Levinthal and Wu 2022; Meyer et al. 1992).

## Linking resource allocation and sustainability practices

To establish vital links between the choice of centralized vs. decentralized resource allocation and firms' sustainability practices, this study adapts the model of resource allocation capability and the allocation of resources by Helfat and Maritan (2023). The adapted model includes four main concepts (firm sustainability practices, environmental innovation, resource allocation capability, and resource allocation routines) explained in more detail below.

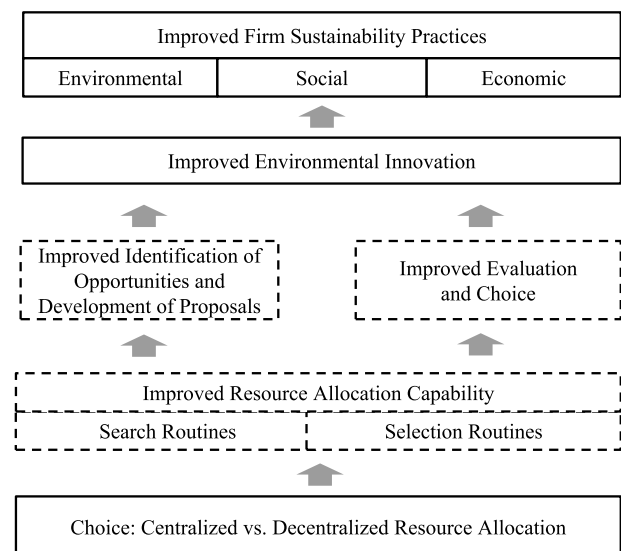
*Firm sustainability practices* assign firms the key role of integrating and pursuing economic, environmental, and social goals (Alinda et al. 2023; Annunziata et al. 2018). While the meaning of sustainability and sustainable development is changing over time (Mebratu 1998), contemporary connotations typically refer to sustainability as a way to describe the process of managing businesses in such a way that it contributes to the creation of an economy that is environmentally and socially conscious while also being efficient and viable (Kumar and Das 2018). Similarly, firm sustainability practices typically refer to corporate activities or operations that align with the triple-bottom-line principles of sustainability (Brundtland 1987)—social, economic, and environmental.

*Environmental innovation* is sometimes referred to as eco-innovation or green innovation. Kemp and Pearson (2008) offer a broad conceptual definition of environmental innovation as "the production, application or exploitation of a good, service, production process, organizational structure or management or business method that is novel to the firm or user and which results, throughout its life cycle, in a reduction of environmental risk, pollution and the negative impacts of resource use compared to relevant alternatives". This definition encompasses any changes, whether planned or unplanned, radical or incremental, in the product portfolio or production processes that aim to achieve sustainability goals like waste management, eco-efficiency, emissions reduction, recycling, and eco-design (Rennings 2000). Environmental innovation can improve a firm's sustainability practices (Silvestre and Neto 2014). Also, a firm's capacity for environmental innovation is affected by its capabilities (Salim et al. 2019).

*Resource allocation capability* A capability is the capacity to perform a set of tasks or activities on a repeated basis in a reliable manner (Amit and Schoemaker 1993; Helfat and Peteraf 2003). Research on organizational capabilities implies that companies oriented toward sustainability should

identify and develop specific capabilities rooted in the organization to implement sustainability practices that are a source of competitive advantage (Annunziata et al. 2018). Due to path dependence, the firm's unique skills and knowledge, shaped by its past investments and learning experiences, form its distinct capabilities, which shape what the firm can do and the investment choices available to it at any given moment (Levinthal 2017). Helfat and Maritan (2023) argue that some firms have a resource allocation capability that can be a source of competitive advantage, as it can enable a more effective resource allocation, particularly through resource allocation search and selection activities.

*Resource allocation routines* From an evolutionary economics perspective, organizational routines—i.e., procedures or rules that specify steps for carrying out a task or activity—are the building blocks of a firm's dynamic resource allocation capability (Helfat and Maritan 2023; Winter 2003). Helfat and Maritan (2023) highlight two types of routines comprising a firm's resource allocation capability: (1) search routines and (2) selection routines. Search routines include the set of activities performed by a firm to identify opportunities and develop proposals for resource allocation. Selection routines comprise the set of activities a firm performs to evaluate and choose among the proposals for resource allocation. Such resource allocation routines can involve multiple levels in the firm, from the top management to lower levels (Bower 2017). This, in turn, can enable a firm's environmental innovation and sustainability practices. To synthesize, Fig. 1 shows how the choice of centralized vs. decentralized resource allocation is intrinsically linked



**Fig. 1** Enabling links between the choice of centralized vs. decentralized resource allocation and firms' sustainability practices. Developed by adapting the allocation of resources by Helfat and Maritan (2023). Adaptations in solid line

to SDG implementation and firms' sustainability practices through the presented concepts of resource allocation capability, environmental innovation, and resource allocation routines. The arrows denote enabling links.

### A practical framework

While centralized resource allocation can offer advantages such as economies of scale and scope and a consistent commitment to sustainability practices throughout the organization, decentralization can enhance sustainability in cases where local context, community engagement, and rapid adaptation to change are important factors. Some firms might achieve better sustainability outcomes by allowing regions or local entities more autonomy in resource allocation. However, as illustrated by the previous example of underreporting of gas flaring, this is not straightforward, and managers can face difficult trade-offs in such decisions.

To demonstrate what a practical framework might look like, this paper draws on a related study, which identify a set of decision criteria of relevance when faced with the choice of centralized vs. decentralized resource allocation (Solberg Forthcoming; Yassine et al. 2021). The criteria listed in Table 1 may help navigate the trade-offs faced by managers.

To illustrate, this framework is applied to the problem of underreporting of routine flaring in oil production presented earlier. In some regions, this reporting is both mature and standardized (criteria 2), supported by sufficient oversight, which effectively minimizes the issue of underreporting. The nature of the reporting-related tasks might differ across various operators (criteria 4). In cases with low reporting maturity (criteria 2), centralizing the resource allocation could mitigate the risk of underreporting by increasing control and providing necessary oversight, as well as ensuring a unified reporting practice. In scenarios where multiple operators involved in oil extraction are each responsible for reporting, this may result in duplicated skills and redundant efforts in the reporting process. A centralized resource allocation could not only reduce such redundancies but also foster shared expertise and learning (criteria 1), further increasing reporting performance. Depending on the variability of demand for flare-related reporting (criteria 3), redundancies could be removed, positively impacting sustainability outcomes. In contrast, over time, technological advancements in reliable measurement of air pollution from the flares on the ground—with official measurement data readily available and improved compliance with sustainability reporting standards and requirements—could favor a decentralized approach (criteria 2). For instance, the resources could be allocated to an external independent third party.

The criteria in Table 1 can serve as a useful starting point to incorporate the choice of centralized vs.

**Table 1** Decision criteria for the choice of centralized vs. decentralized resource allocation

Criteria	Description	Factors favoring decentralization	Factors favoring centralization
1. Need for functional specialization and technical learning	Refers to development of further knowledge related to the functional specialty of emission reporting and related specific methods and technology	Little need for further functional specialization or technical learning	High need for further functional specialization and technical learning
2. Need for standardization across units	Refers to the need for consistency of methods and approaches to emission reporting across units	Little need for consistency in methods and procedures across units	Strong need for consistency in methods and procedures across units
3. Variability in demand	Refers to predictability and/or stability in the demand for emission reporting-related tasks in the different units	Stable and/or predictable demand for reporting	Unstable and/or unpredictable demand for reporting tasks
4. Uniqueness of tasks in the different units	Refers the difference between emission reporting-related tasks in one unit (A) compared to another unit (B) (e.g., in terms of inputs, methods, procedures or outputs)	The tasks are very different in each unit	The tasks are very similar across units

decentralized resource allocation into sustainability frameworks. Guidelines can be developed that outline the steps managers should follow and the criteria to consider, adapted to the firm's specific goals. Further, in policy recommendations, such a framework can mitigate risks associated with "one-solution-fits-all" regarding firms' resource allocation.

## Conclusion

The successful implementation of SDGs necessitates strategic resource allocation within firms. This paper has argued for the importance of choosing between centralized and decentralized resource allocation, a critical yet overlooked managerial choice in existing sustainability frameworks. A conceptual model is proposed, which builds upon existing literature to establish a link between this choice and a firm's sustainability practices. As firms strive for greater sustainability, incorporating this choice into SDG frameworks can offer valuable guidance and mitigate implementation risks. This study has identified an important gap in existing sustainability frameworks: a lack of decision-making support for managers faced with the choice of centralized vs. decentralized resource allocation, and proposes that decision support for this choice should be an integral part of sustainability frameworks. Incorporating it into frameworks can offer managerial guidance and mitigate challenges in SDG-related search and selection. The proposed practical framework offers a more nuanced point of view beyond the sometimes polar stand of "one-solution-fits-all" in current centralization vs. decentralization-related debates.

Future research should empirically validate the identified theoretical insights aimed at further bridging the gap between managerial decision-making and sustainability practices. Also, it could focus on empirical validation of the proposed practical framework, investigating its applicability and the actual sustainability practices across different industries over time. Longitudinal studies could track the impact of shifts between centralized and decentralized resource allocation on SDG implementation. Comparative analyses can assess the efficacy of existing sustainability frameworks that incorporate such allocation structural shifts and explore the microfoundations that drive the managerial choices.

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**Data availability** Not applicable.

## Declarations

**Competing interests** The author declared no competing interests.

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