

# Dynamic capabilities for sustainability: Developing an integrative typology

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**Abstract.** We perform a systematic literature review to synthesize the current state of knowledge about dynamic capabilities for sustainability (DCsS). Moreover, we substantiate and extend the DCsS construct by developing a typology which integrates the distinct conceptualization of DCsS applied in the literature. Based on the results of the content analysis of extant literature, we identify two dimensions that lie at the basis of the various definitions of DCsS: the type of sustainability-oriented innovation, and the level of stakeholder integration activities pursued by firms to implement their sustainability innovation strategies. The subsequent categorization of the literature according to these two dimensions resulted in the identification of five main types of DCsS: (1) *DCsS for Interactive Optimization*; (2) *DCsS for Interactive Transformation*; (3) *DCsS for Reciprocal Optimization*; (4) *DCsS for Reciprocal Transformation*; and (5) *DCsS for Systems Building*. We then align each type of DCsS with its predominant configuring elements as described in the literature. By this, and building up on other similar organizing frameworks, we contribute to a more holistic understanding of the construct.

**Keywords:** dynamic capabilities view, sustainability oriented-innovations, stakeholder integration, typology, systematic literature review

## 1 INTRODUCTION

The increasing societal, political, and economic pressure to stop the climate change crisis through a concerted effort of the public and private sectors, has made the transformation towards environmental and social sustainability a central topic for both management research and practice (1, 2). Firms are looking to build inter-organizational collaborations, in order to “attain strategic objectives such as renewal and innovation” [3] or to integrate sustainability into firms’ business models (1, 2, 4, 5) in order to “tackle grand challenges” [6, p. 1]. This calls for a more fine-grained analysis of the mechanisms that enable the deployment of a firm’s resources and capabilities over time, specifically within inter-organizational structures. The dynamic capabilities (hereafter DCs) view has increasingly been used by researchers as a theoretical framework for dissecting this issue (see 2, 7, 8). This theoretical perspective focuses on the specific organizational capabilities that allow companies – and also business networks – “to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (9). DCs are considered pertinent and relevant for understanding how companies pursue strategic change to meet increasing sustainability-oriented demands, as they focus on processes and routines deployed to recognize potential opportunities and identify the new configurations of resources best suited to exploit them [10, 11].

The scholarly interest in dynamic capabilities in the context of sustainability has continuously increased in the last 20 years, which has led to the generation of a substantial but fragmented body of literature. Amui *et al.* [7] are the first to coin the term “Dynamic Capabilities for Sustainability” (hereafter DCsS) as an umbrella term for DCs that lead to different sustainability-related outcomes in terms of innovation (such as “green product development” in [12], “business models for sustainability” in [5] or improvement of sustainable business practices (such as “sustainable supply chain management” in [13]).

A variety of conceptualizations of DCsS has emerged in the existing literature [2, 8]. Consequently, there remains significant ambiguity and disagreement regarding the theoretical nature of the DCsS construct (e.g., lack of universally accepted definition of the term), which results in dearth of consistency in theory building and testing. Therefore, integrative theory building, as well as comparison, aggregation, and generalization of findings across studies, have proven difficult.

In our paper, we specify, substantiate, and extend the DCsS construct by developing a typology that highlights two main dimensions that lie at the basis of various conceptualizations of DCsS in extant literature (hereby, we follow 14). Based on the results of a systematic literature review, we identify the form of sustainability-oriented innovation as the first relevant dimension, and the level of stakeholder integration activities pursued by firms within the adaptation and innovation processes as the second one, both of which we subsequently use to categorize the studies. Five fundamental types of DCsS emerge from our content analysis: (1) *DCsS for Interactive Optimization*; (2) *DCsS for Interactive Transformation*; (3) *DCsS for Reciprocal Optimization*; (4) *DCsS for Reciprocal Transformation*; and (5) *DCsS for Systems Building*. We then align each type of dynamic capabilities for sustainability with its predominant configuring elements (i.e., “the distinct skills, processes, procedures, organizational structures, decision rules, and disciplines” undergirding a specific type of DCsS) [11, p. 1319]. Thereby, we contribute to scholarly efforts to integrate the distinct conceptualizations of DCsS (see 8).

## 2 METHOD

We defined the following selection criteria for our literature search: (1) publication period between 1995 and 2021; (2) journals ranked with  $\geq 3^*$  according to the Academic Journal Guide 2018, published by the Chartered Association of Business Schools (CABS), and the Journal of Cleaner Production ( $2^*$ ) due to its high impact factor and increasing number of publications on the topic; (3) articles in English; (4) keywords on both dynamic capability and sustainability mentioned in the articles’ titles and/or abstracts.

Our three independent searches in three academic databases (EBSCOhost, Web of Science, SCOPUS) resulted in a total of 548 articles. Subsequently, we reviewed the titles and abstracts closely to exclude any articles that did not focus on DCsS and ended up with a sample of 131 articles published across 27 journals. During the coding stage, we dropped 45 articles as they used the dynamic capabilities framework for illustrative purposes to support their arguments and not as a main theoretical lens. This led to a final sample of 86 articles that we coded entirely.

We approached coding as an iterative process, which involved three stages of coding: the (1) initial stage, (2) main stage, and (3) reflection stage. The initial stage was aimed at creating our common coding sheet and establishing our inter-coder reliability. To define the coding sheet, we adopted the second- and third-layer coding categories used in the systematic literature review on dynamic capabilities by Schilke *et al.* [15]. In the main stage, we equally divided the remaining articles among each author and coded them based on the common coding sheet. In the process, we identified two reoccurring dimensions that emerged from the various definitions and conceptualization of the DCsS construct: the form of sustainability-related innovation, and the level of stakeholder integration into innovation processes. As a result, we created additional coding categories to account for these dimensions. In the third stage, we coded all the articles according to these two emerging dimensions. This resulted in the specification of five types of DCsS, which will be described in the next section.

## 3 AN INTEGRATIVE TYPOLOGY FOR DYNAMIC CAPABILITIES FOR SUSTAINABILITY

When analyzing the conceptualizations of DCsS as presented in the literature, we noticed a variance in the way they are defined, and which leads to distinct accounts of configuring elements of the construct (i.e., skills, processes, procedures, organizational structures, decision rules, and disciplines).

In constructing our typology of dynamic capabilities for sustainability, we aimed at capturing this variance, in order to allow for a more fine-grained analysis of its different possible configurations. For this purpose, we subsumed the conceptualizations of the DCsS found in our study sample under two key dimensions that emerged in the second stage of our content analysis, namely (1) the form of sustainability-oriented innovation, and (2) the level of stakeholder integration. We subsequently aligned the configuring elements of the different DCsS along the resulting types.

The first dimension of our typology refers to the forms of sustainability-oriented innovations that are supported by the specific dynamic capabilities. To gauge DCsS along this dimension, we adopt the three categories of sustainability-oriented innovations presented by Adams *et al.* [17]: (1) operational optimization, (2) organizational transformation, and (3) system building. The first category, operational optimization, represents a business perspective on sustainability mainly oriented internally towards the adaptation of existing focal firm’s processes and offerings, as the firm seeks to maintain these by ‘doing the same things but better’. Changes will thus focus on reducing harm through reactive, incremental improvements driven by compliance or proactively pursuing efficiencies. The second category, organizational transformation, refers to a fundamental change of mindset and purpose of the organization that moves from a harm reduction-approach towards shared value creation by delivering wider benefits for society. The third category, systems building, involves a more radical shift in managerial perspective to thinking beyond the firm’s boundaries as it moves towards developing system-wide solutions for pressing societal and environmental challenges in collaboration with a variety of stakeholders.

The second dimension in our typology refers to the different levels of stakeholder integration that is pursued by the companies in the sustainability-oriented innovation process. To capture this variance, the model proposed by [17] was useful, as it serves to distinguish between three levels of stakeholder integration: (1) interaction, (2) reciprocal influence, and (3) joint innovation. The first level, interaction, involves informal and unstructured mechanisms for capturing stakeholder concerns and knowledge, as companies recognize the potential advantages for value-creation related to learning from them. The second level, reciprocal influence, describes the integration of stakeholders’ concerns into the decision-making processes of the organization. Accordingly, the exchange mechanisms become more structured and the collaborations lead to durable alliances. The third level, joint innovation, refers to relationships with stakeholders that are formalized, structured, and usually extend over a longer period of time. These relationships will typically involve the establishment of new inter-organizational structures that lead to collective action initiatives and joint innovation outcomes.

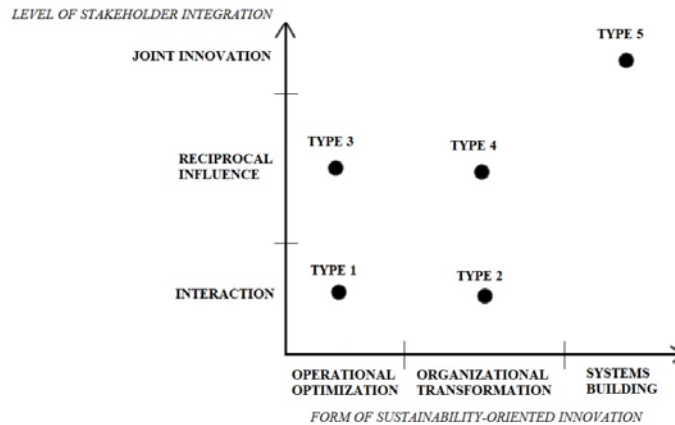
Five fundamental types of DCsS emerged from our content analysis (see Figure 1): (1) *DCsS for Interactive Optimization*; (2) *DCsS for Interactive Transformation*; (3) *DCsS for Reciprocal Optimization*; (4) *DCsS for Reciprocal Transformation*; and (5) *DCsS for Systems Building*. Even though other combinations of the two dimensions are theoretically possible, they were not observed in the literature. Table 1 gives an overview of the definitions of the different types.

Table 1. Overview of the new typology

Type	Definition
Type 1 DCsS for Interactive Optimization	DCsS for Interactive Optimization are the capabilities underlying incremental adaptations of existing business models, products, or processes of a company that aim at the optimization in terms of sustainability-related efficiency aspects, in order to comply with increasing requirements of stakeholders (mostly regulatory issues) regarding the integration of environmental and social concerns into business activities.
Type 2 DCsS for Interactive Transformation	DCsS for Interactive Transformation are capabilities undergirding a systematic integration of stakeholder concerns (e.g., via environmental management systems) into new product development, business model, and process innovations. This type of DCsS refers to a firm’s “ability to integrate, build and reconfigure competences and resources to embed environmental sustainability into new product development” [18].
Type 3 DCsS for Reciprocal Optimization	DCsS for Reciprocal Optimization transcend the boundaries of individual firms as they lie at the basis of the reduction of the environmental impact of supply chains operations by implementing mutual learning mechanisms with supply chain members.

Type 4 DCsS for Reciprocal Transformation	DCsS for Reciprocal Transformation are the capabilities underlying radical innovations for whole supply chains, as these DCsS lead to a substantial change of member firms' sustainability practices that in turn will create a competitive advantage. This type of DCsS allow a firm to "create, extend, or modify its resource base" to address changed or complex service user requirements, i.e., driving the need to form networks to foster green product innovation" [19].
Type 5 DCsS for Systems Building	DCsS for Systems Building will lead to product, process, and business model innovations that improve the sustainability performance of whole systems and markets, and that are developed in inter-organizational collaboration schemes.

Figure 1. A typology of dynamic capabilities for sustainability



#### 4 DISCUSSION - PRELIMINARY VERSION

The application of our typology to the extant literature delineates several patterns that have led research in DCsS in the last decades. First, we can observe that studies applying DCsS for Interactive Optimization (type 1) and DCsS for Interactive Transformation (type 2) are very much focused on understanding how individual firms can either maintain or improve their market positions by integrating sustainability concerns into their business strategies. In these first two DCsS types we observe a behavior that can be best qualified as reactive to the external environment, as the firm's activities do not yet aim to influence other stakeholders' strategies.

DCsS for Reciprocal Optimization (type 3) and DCsS for Reciprocal Transformation (type 4) support the turn to more proactive strategies (aiming to influence the firm's external environment). In them, sustainability-oriented innovations and the improvement of a firm's performance in terms of environmental, social, and economic terms will be influenced not only by the adaptation of a firms' internal capabilities but also by collaboration with a diverse number of stakeholders. Studies applying these DCsS types tend to shift their level of analyses from individual firms to supply chains and business networks, seeking to understand which processes and routines will lead to the adaptation and reconfiguration of the capabilities of all the members of these networks. The complexity of collaboration will in turn increasingly shift the mindsets, managerial cognition, and organizational structures of participating firms towards more formalized ones. DCsS of type 5 (DCsS for Systems Building) support the required adaptations and reconfigurations of organizational capabilities for system-wide transformations. Innovation processes backed by this type of DCsS are very comprehensive, as they not only involve the adaptation of firms' value creation and revenue generation mechanisms, but also include changes of customers' practices, market dynamics, and institutional frameworks.

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