

Absorptive Capacity: An Umbrella Review

by

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ABSTRACT

ABSORPTIVE CAPACITY: AN UMBRELLA REVIEW

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Research on absorptive capacity (AC) has proliferated in the last thirty years. With over 12,000 papers in the web of science addressing AC, it becomes increasingly difficult to offer a comprehensive overview of this field. This paper uses an umbrella review to integrate the findings of 26 literature reviews performed on AC since 1989. Included reviews have attempted to address contentious issues in conceptualization, for example conflicting conceptualizations for the identification of antecedents and outcomes for AC, and operationalization of AC. Interestingly, despite the commonly suggested integrative and synthesizing character of literature reviews, the existing reviews of AC add to the conceptual ambiguity of AC. As such, this paper interprets the reviews as a source of identifying contentious issues of AC that persists even in those areas that literature reviews have been undertaken with the purpose of finding common ground. Building on this finding, this paper argues that it is time to tackle the persisting issues in dimensionality, multilevel nature, and in understanding the process and system of absorptive capacity. However, we may need to go back to the drawing board to integrate prior findings and allow progress in tackling the persisting issues.

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1 Introduction

Innovation is no doubt one of the most important issue in nowadays' society, especially for businesses (WIPO, 2022). Among all the streams pursuing innovation, absorptive capacity (AC) is an important factor that leads to firm innovation. In their highly-cited papers, Cohen and Levinthal (1990: 128) defined AC as “the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends” and argued that AC is crucial for firms' new knowledge creation (Cohen & Levinthal, 1989, p. 570) and innovative capabilities (Cohen & Levinthal, 1990). In addition, AC can also help firms to “predict more accurately the nature of future technological advances” (Cohen & Levinthal, 1994). Since then, the original conceptualization has been the subject of intensive debate about refining conceptual issues of AC (Dyer & Singh, 1998; Joglekar, Bohl, & Hamburg, 1997; Lane & Lubatkin, 1998; Szulanski, 1996; Van den Bosch, Volberda, & Boer, 1999) and even entire reconceptualization (Lane, Koka, & Pathak, 2006; Todorova & Durisin, 2007; Zahra & George, 2002).

Despite the great efforts have been paid to refine or reconceptualize the construct, its conceptual clarity has been subjected to persistent discussion. For instance, Lane et al. (2006) found that existing refinements and reconceptualization caused AC research to be separated in multiple disparate streams. Volberda et al. (2010) demonstrated that “the AC construct is still surrounded by considerable ambiguity with respect to its meaning and nature; the domain(s) in which it exists; and its implications and antecedents” (p.943). Song, Gnyawali, Srivastava, & Asgari (2018) argued that ambiguity on AC's definition and

lack of clarity regarding its impact on firm outcomes have impeded research advancement in this area.

To capture a comprehensive picture of the AC construct or the phenomena of organizational knowledge absorption, it is important to critically juxtapose and integrate all available evidence presenting in the existing literature (Gioia & Pitre, 1990). A promising approach to achieve this goal is conducting an literature review (Snyder, 2019), such as systematic review (Rojon, Okupe, & McDowall, 2021) and bibliometric analysis (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021).

However, there are some difficulties to perform an effective synthetization of available evidence via conventional literature review methods for a mature field like AC. First, the number of AC related publications is too large for conventional reviews to fully capture – particularly given the issues in conceptualization of the core concept. The citation of papers of Cohen & Levinthal (1990) and Zahra & George (2002) exceed 21000 according to the Clarivate Web of Science. There are more than 2,500 papers in Web of Science that are containing “absorptive capacity” in their title or abstract. Yet, arguable, the field has produced very limited insights of practical relevance or even theoretical advancements. Second, empirical studies tend to focus on a small aspect of AC or a small set of antecedents or outcomes of AC. Hence, there is a lack of integration and abstraction that would enable the field to build a comprehensive set of knowledge. Third, most studies in this field didn’t try to unpack the black box of the process of AC (Lane et al., 2006; Volberda et al., 2010). They do not clearly identify which conceptualization of AC they use.

In this paper, we conduct an umbrella review, or as it is often called a review of reviews to offer an overview of the work that has tried to consolidate the field. First, an umbrella review is an effective way to integrate fragmented knowledge and identify key contributions and gaps from prior studies by various methods, such as systematic reviews, integrative reviews, meta-analyses, and bibliometric analyses (Dwertmann & Knippenberg, 2021; Post, Sarala, Gatrell, & Prescott, 2020; Rojon et al., 2021; Snyder, 2019). Second, as the field matures, accumulated literature reviews will again cause knowledge fragmentation and information overload since they cover different time periods, focus on distinct aspects, or use different methods. Therefore, we import the umbrella review, which has been widely used in healthcare research, to management with the purpose of synthesizing the evidence from the full range of prior reviews on AC (Aromataris et al., 2014). Especially for a chaotic field like AC with multiple theoretical origins and broad application, integrating findings in the existing reviews should provide a solid basis for future scholarly inquiries. The umbrella review is not entirely new to management research, however prior umbrella reviews have focussed on research methods (e.g., Aguinis et al., 2018; Rojon et al., 2021; Torraco, 2016). This paper demonstrates that umbrella review will be an effective way to advance theoretical development by synthesizing evidence from existing literature reviews.

The arrangement of this paper as follow. In the next section, we examine the original conceptualization created by Cohen & Levinthal (1989, 1990, 1994), address the primary points of contention, and highlight the main issues. Next, we discuss the applicability of umbrella review in management research and outline the process of conducting the umbrella review for theoretical development. Following that, we analyze what contentious

issues are the included literature reviews trying to resolve, by what approaches they are resolving these issues, and what new contentious issues have been created by them. In the discussion section, we discuss the persisting issues impede theoretical development of AC and suggest avenues for further research.

2 Theoretical Background

In this section, we summarize Cohen & Levinthal's three conceptual papers (Cohen & Levinthal, 1989, 1990, 1994) and present the main issues arise in these papers.

2.1 Innovation and learning: The two faces of R&D

Based on the assumption that a firm's stock of knowledge enhances its gross earnings, Cohen & Levinthal (1989) constructed a model to illustrate how various factors influence a firm's marginal return on in-house R&D. In their model, Cohen & Levinthal (1989) posit that new knowledge within a firm can originate from in-house R&D, competitors' knowledge spillovers, and knowledge external to the industry. Contrary to the prevalent assumption that absorbing public knowledge is costless, Cohen & Levinthal (1989) introduced the concept of AC and argued that AC, alongside in-house R&D and available external knowledge, is a significant determinant of a firm's knowledge stock. However, a firm must actively invest in R&D to acquire AC, which they portrayed as a byproduct of R&D investments. AC is influenced by the R&D investments and the ease of learning, which reflects characteristics of external knowledge such as complexity and importance of the external knowledge for the firm's performance improvement. Therefore, a firm's marginal return to in-house R&D is determined by the level of its in-house R&D and AC, as well as the level of available knowledge spillovers, appropriability regimes,

technological opportunities, competitiveness, and demand conditions. In their empirical analysis, Cohen & Levinthal (1989) tested how technological opportunity, appropriability regimes, ease of learning (i.e., complexity and accumulateness of the external knowledge), and demand conditions influence R&D intensity, which also represents AC.

In this paper, AC is equated to learning capacity and has been portrayed as a collective construct which encompasses several subset abilities, including abilities to imitate established innovations, exploit intermediate knowledge, and create new knowledge. This paper operationalizes AC as R&D intensity. However, equating AC with R&D intensity blurred the relationships among factors in their model and rested their model on the assumption that AC originates solely from in-house R&D. In addition, there were no discussions about how AC is developed from in-house R&D, as well as the relationship between the collective construct and the subset abilities. It is also unclear whether there is any difference between the two faces of R&D since both of them enable a firm to create new knowledge.

2.2 Absorptive capacity: A new perspective on learning and innovation

In this highly cited work, they draw findings from cognitive science and individual learning to support their argument that organizational AC is rely on prior related knowledge and generalize it from individual level to organizational level by addressing the role of some organizational mechanisms, such as communication structure and knowledge structure. In addition, they highlighted the path-dependent nature of AC based on the notion that AC relies on prior knowledge - the more a firm accumulated knowledge in a particular field, the easier for it to absorb new knowledge and predict technological advancement in

that field. Based on the previous assumption that in house R&D influence AC through firm's stock of prior knowledge, Cohen and Levinthal further argued that AC will influence R&D investment in an environment where AC is important to the firm. In turn, the increase R&D investment and AC will enhance the new knowledge creation, which leads to innovation.

In this paper, Cohen and Levinthal highlighted the important role of prior related knowledge, individual level AC, and communication system but also introduced new issues. Despite that they explicitly stated that AC is constituted by a set of abilities, Cohen & Levinthal (1990) did not articulate what these abilities are, nor provided any discussions about how these abilities interact with each other to give rise to AC. The introduction of individual level AC imply that AC is a multilevel construct. However, it is unclear whether the term "absorptive capacity" can be applied at individual level because it is an organizational capability. In addition, communication system has been addressed as the connection between individual and organizational level AC, but it based on the assumption that all knowledge can be transferred via communication. It is unclear how untransferable knowledge flows across different levels.

2.3 Fortune Favors the Prepared Firm

To address the technology advancement prediction function of AC, Cohen & Levinthal (1994) further developed a new mathematic model to test how investment experience, uncertainty, and competition influence firm's willingness to invest in AC.

In summary, Cohen and Levinthal constructed a skeleton of AC while many details are still missing. They proposed that organizational AC is a collective construct but how it

emergent from underlying abilities is still unclear. They argued that AC is determined by in-house R&D, characteristics of external knowledge (i.e., ease of learning), a firm's knowledge stock (or prior related knowledge), the communication system, individual members' AC, and knowledge structures among individual members. The outcomes of organizational AC are the increased knowledge stock, innovations, increased marginal return, and the ability to predict technical advances. However, the intricate relationships among these factors make it difficult to fully understand what AC is. In addition, the original conceptualization assumes that R&D investment is the only source of AC; therefore, AC is covary with R&D investments, meaning that "whatever conditions the firm's incentives to learn (i.e., to build absorptive capacity) should also influence R&D spending" (Cohen & Levinthal, 1990, p.138). This assumption limited the application of AC in non-technical contexts.

3 Methodology

The umbrella review is well established in health care and medical research. It is a promising methodology to integrate and generalize the common conclusions in review articles, to tackle a broad scope of issues, and to explore reasons to explain inconsistent findings (Aromataris et al., 2014; Grant & Booth, 2009). In management research, the use of umbrella reviews is relatively new. Very few umbrella reviews have been published (see Aguinis et al., 2023, 2018; Rojon et al., 2021; Sinkovics and Reuber, 2021; Torraco, 2016) often with a focus on research methodology. In this paper, we use an umbrella review as a tool to progress theoretical development of AC, synthesize findings in existing

literature reviews of AC and attempt to reduce some of the confusion that is present in AC research.

The umbrella review is an appropriate method for advancing theory development in the field of management for several reasons. First, the umbrella review is an effective approach to synthesizing evidence from existing reviews. For instance, the umbrella review has been extensively used in the field of health care research to consolidate evidence provided by systematic reviews and to identify consistency and contradictions in findings of the existing systematic reviews (Aromataris et al., 2014; Fusar-Poli & Radua, 2018). By conducting an umbrella review, researchers can highlight broader issues and delineate the big picture (Aromataris et al., 2014). In the field of management, researchers are facing similar challenges of overwhelming and fragmented evidence provided by various reviews. For instance, the systematic review has become a prevalent method to improve theory development in recent years (Rojon et al., 2021). However, it is very time consuming if a systematic review includes all relevant primary studies. For pragmatic reasons, most of the systematic reviews will control the number of included primary studies either by focusing on very specific questions or setting inclusion and exclusion criteria (Rojon et al., 2021). Such an approach leads to potential fragments and contradictory evidence, hindering theoretical development and theory applications in practice.

Second, borrowing methods from other disciplines is both common and appropriate in management research. For instance, to overcome the issues of lacking rigour and thoroughness within traditional narrative reviews, Tranfield et al. (2003) introduced

methods of systematic review into management research, which has now become widely accepted as a normative method in the field (Rojon et al., 2021). Nonetheless, we also notice that it is inappropriate to directly copy methods from other disciplines (Wright & Michailova, 2023). For instance, umbrella reviews conducted in medical science have only been utilized to synthesize quantitative evidence from a high number of meta-analyses. While in the field of management, not much meta-analyses are available to conduct a rigorous umbrella review under the quantitative-oriented criteria developed by medical or health care researchers. In contrast, evidence is more commonly synthesized by qualitative methods, such as integrative or narrative reviews. Therefore, umbrella review in the field of management should consider a more inclusive and qualitative-oriented approach to consolidate evidence from all kinds of literature reviews rather than focus on quantitative evidence.

This study conducts a qualitative-oriented umbrella review by combining criteria of an umbrella review and a systematic review. The evidence orientation, rigorous protocols, high synthesis, and high quality are four main strengths of the method of systematic review and make it a powerful tool to consolidate and understand the existing knowledge, and to identify contributions and research gaps in the original studies (Rojon et al., 2021). Research goals of this review are aligned with the strengths of systematic review; therefore, this umbrella review is conducted using the guidance of the systematic review, in other words, this is a systematic review of reviews. Following the protocols of Denyer and Tranfield (2009) and Rojon et al. (2021) and the best practices of methodological transparency of Aguinis et al. (2018), this review's research steps are described as follow.

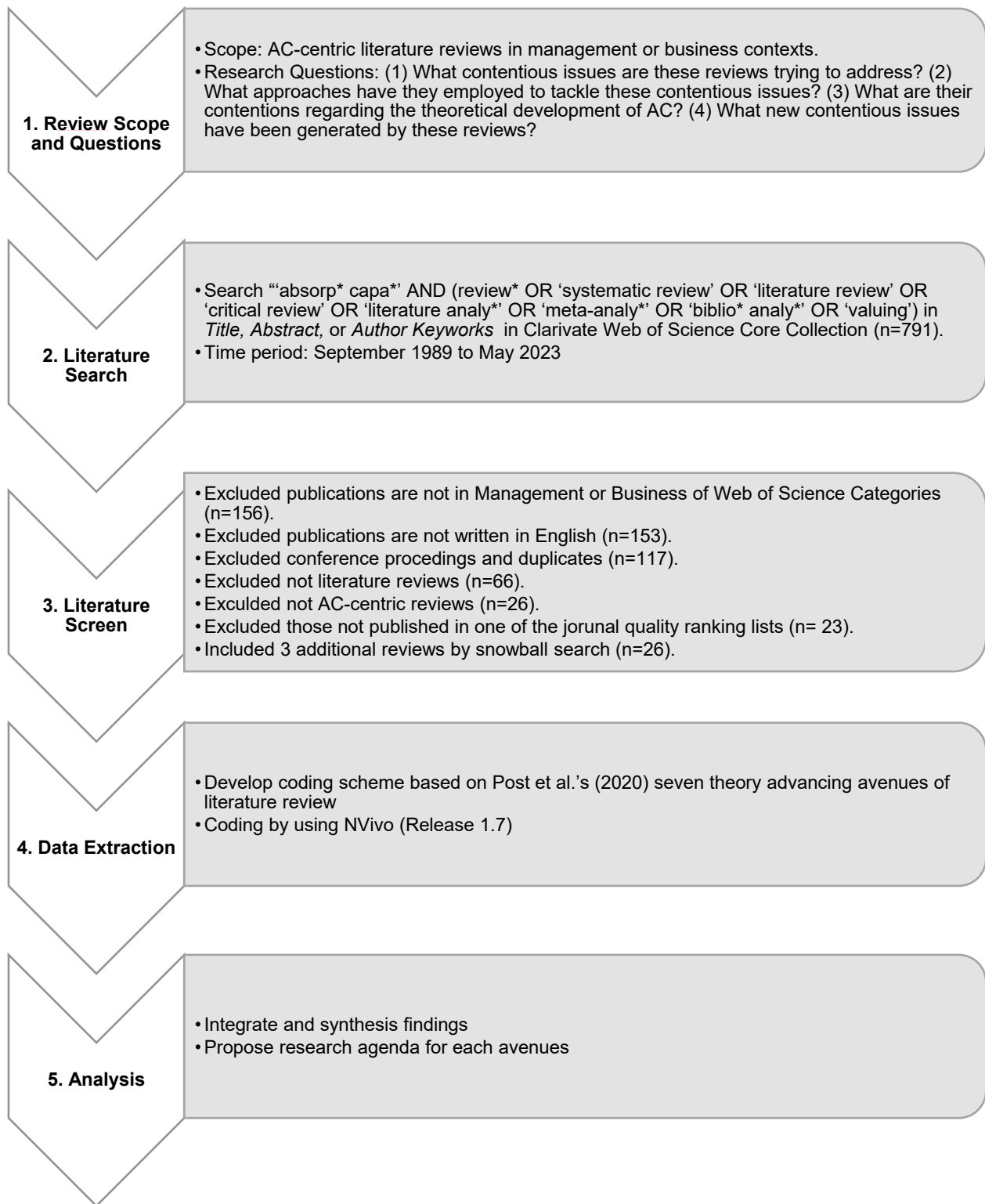


Figure 3.1: Process of the umbrella review.

3.1 Review scope and questions

This umbrella review aims to progress theoretical development by synthesizing findings in the existing literature reviews of AC. To achieve this goal, we limited our focus to academic publications in management and organization research from September 1989, which marks the publication of Cohen and Levinthal's first conceptualization paper, to May 2023. To capture as many findings as possible, we included all kinds of literature reviews, including bibliometric analysis, systematic review, semi-systematic review, and integrative review (Snyder, 2019).

We assume that all published literature reviews aim to resolve theoretical issues within a particular topic or theory. As our umbrella review aims to compare findings of existing reviews and address consistency and contradictions, we attempt to resolve the following research questions: (1) What contentious issues are these reviews trying to address? (2) What approaches have they employed to tackle these contentious issues? (3) What are their contributions in resolving the contentious issues? And (4) What remaining or new contentious issues have been left or generated by these reviews?

3.2 Literature search

We search for literature reviews in Clarivate Web of Science Core Collection. First, we searched “absorp* capa*” AND (review* OR ‘systematic review’ OR ‘literature review’ OR ‘critical review’ OR ‘literature analy*’ OR ‘meta-analy*’ OR ‘biblio* analy*’ OR ‘valuing’) in *Title, Abstract, or Author Keywords* in Clarivate Web of Science Core Collection, and 791 results were returned.

3.3 Literature screen

We applied the following exclusion criteria to screen search results. First, to address our review scope, we excluded publications that are not in Management or Business of Web of Science Categories, 156 papers remain in our list. Second, we excluded publications not written in English, reducing the sample to 153 publications. Third, we excluded conference proceedings before 2018 and duplicate papers, resulting 117 publications. Fourth, we excluded non literature reviews by reading titles and abstracts, 66 publications are left. Fifth, this umbrella review focused on theory development of AC, therefore, we excluded articles that are not AC-centric or those applied AC as an analytic framework (such as Ardito et al., 2021; Dzhengiz and Niesten, 2020). This process resulted in 26 publications. Sixth, to ensure the quality of the included reviews, we excluded those published in journals that are not included in the 9 lists within the Journal Quality List (69th edition), 23 articles remain. Seventh, to make sure no relevant literature reviews were missed, we conducted a snowball search (Aguinis et al., 2018) by going through references and citations of these 23 reviews, 3 additional publications (i.e., Duchek, 2013; Filho, Pedron, & Ruas, 2021; Gao, Yeoh, Wong, & Scheepers, 2017) were added. Finally, our sample includes 26 reviews after the search and exclusion steps (Table 3.1).

Table 3.1: Included literature reviews.

Author	Year	Title	Journal	Review Type	Reviewed Articles	Time Period
Zahra and George	2002	Absorptive capacity: A review, reconceptualization, and extension	Academy of Management Review	Integrative	NA ¹	NA
Lane et al.	2006	The reification of absorptive capacity: A critical review and rejuvenation of the construct	Academy of Management Review	Bibliometric, Integrative	289	1991-2002
Todorova and Durisin	2007	Absorptive capacity: Valuing a reconceptualization	Academy of Management Review	Integrative	NA	NA
Volberda et al.	2010	Absorbing the concept of absorptive capacity: How to realize its potential in the organization field	Organization Science	Bibliometric, Systematic	1,213	1992-2005
Sun and Anderson	2010	An examination of the relationship between absorptive capacity and organizational learning, and a proposed integration	International Journal of Management Reviews	Integrative	NA	NA
Harvey et al.	2010	Absorptive capacity in a non-market environment	Public Management Review	Semi-systematic	NA	NA
Roberts et al.	2012	Absorptive capacity and information systems research: review, synthesis, and directions for future research	MIS Quarterly	Systematic	98	1990-2008
Duchek	2013	Capturing absorptive capacity: A critical review and future prospects	Schmalenbach Business Review	Semi-systematic	NA	NA
Marabelli & Newell	2014	Knowing, power and materiality: A critical review and reconceptualization of absorptive capacity	International Journal of Management Reviews	Integrative	NA	NA
Song	2014	Subsidiary absorptive capacity and knowledge transfer within multinational corporations	Journal of International Business Studies	Semi-systematic	NA	NA
Mariano and Walter	2015	The construct of absorptive capacity in knowledge management and intellectual capital research: Content and text analyses	Journal of Knowledge Management	Systematic, Bibliometric	186	1990-2013
Martinkenaite and Breunig	2016	The emergence of absorptive capacity through micro-macro level interactions	Journal of Business Research	Integrative	NA	NA
Grandinetti	2016	Absorptive capacity and knowledge management in small and medium enterprises	Knowledge Management Research & Practice	Semi-systematic	NA	NA

¹ NA: Not provided.

Author	Year	Title	Journal	Review Type	Reviewed Articles	Time Period
Gao et al.	2017	A literature analysis of the use of absorptive capacity construct in is research	International Journal of Information Management	Systematic	65	1990-2015
Apriliyanti and Alon	2017	Bibliometric analysis of absorptive capacity	International Business Review	Bibliometric	336	1990-2015
Ali et al.	2018	The effect of organizational structure on absorptive capacity in single and dual learning modes	Journal of Innovation & Knowledge	Semi-systematic	NA	NA
Song et al.	2018	In search of precision in absorptive capacity research: A synthesis of the literature and consolidation of findings	Journal of Management	Systematic (Meta-analysis)	193	1990-2016
Zou et al.	2018	The capacity to innovate: A meta-analysis of absorptive capacity	Innovation: Management, Policy, and Practice	Systematic (Meta-analysis)	241	1989-2017
Cordero P. and Ferreira	2019	Absorptive capacity and organizational mechanisms: A systematic review and future directions	Review of International Business and Strategy	Systematic	30	2004-2017
Maldonado et al.	2019	Taking stock of the absorptive capacity construct and its dimensions in the context of technological innovation: A meta-analytic approach	IEEE Transactions on Engineering Management	Systematic (Meta-analysis)	96	1990-2017
Filho et al.	2021	What's going on in absorptive capacity studies? Research fronts on organisational knowledge absorption	International Journal of Innovation Management	Bibliometric	2,072	2016-2020
Bhadauria and Singh	2022	Blending absorptive capacity with open innovation: a bibliometric review	Benchmarking: An International Journal	Bibliometric	592	2000-2020
Cuéllar et al.	2022	Similarities and differences between absorptive capacity and appropriability: a bibliometric perspective	Benchmarking: An International Journal	Bibliometric	778	Not limited
Da Silva Florencio and De Oliveira	2022	The importance of absorptive capacity in technology transfer and organisational performance: A systematic review	International Journal of Innovation Management	Systematic	73	NA
Yao et al.	2022	Informal institutions and absorptive capacity: A cross-country meta-analytic study	Journal of International Business Studies	Systematic (Meta-analysis)	98	2001-2019
Pütz and Werner	2023	Absorptive capacity in family firms: a systematic literature review	Review of Managerial Science	Systematic	27	1990-2022

3.4 Coding and data extraction

This paper adopts a two-cycle coding strategy following Saldaña's (2013) protocol. In the first cycle coding, we apply a provisional coding approach to extract and categorize relevant data from the included reviews. The provisional coding is one of exploratory coding methods that can be used to extract data from a predetermined list. The list can be generated from literature reviews or previous research findings related to the research questions (Saldaña, 2013). The provisional coding is an appropriate method for this umbrella review because there are abundant publications, such as journal articles, books, and literature reviews, discussing theory building in the management field (Breslin & Gatrell, 2020; Post et al., 2020; Shepherd & Suddaby, 2017; Snyder, 2019; Van de Ven, 2007). From these works, we can predetermine what aspects of issue should be considered in conceptualization and theorization.

To answer the first research question, we based on Van de Ven's (2007) theory building practices to identify the contentious issues that were targeted by the included literature reviews. "A theory is an explanation of relationships among concepts or events within a set of boundary conditions" (Van de Ven, 2007, p. 112). There are five important aspects of theory, including terms, relationships, assumptions, explanations, and level of abstraction of terms and relationships (Bacharach, 1989; Van de Ven, 2007). Based on their level of abstraction, terms can be concepts, constructs, or variables and their meaning can be defined by semantic definition, which describes its similarities (positive) and differences (negation) with other terms, and constitutive definition, which describes its constitutive parts (Van de Ven, 2007). Relationships are about how terms relating to

each other in a theoretical claim, such as proposition and hypothesis (Van de Ven, 2007). Assumptions serve as the boundary conditions under which these relationships are valid, regarding time, space, and value contexts (Van de Ven, 2007).

To test a theory, empirical studies must convert the unobservable theory into observable operational models, which can be classified into two main types - variance models and process models, which representing to modes of human intelligence – paradigmatic, logico-scientific and narrative. Variance models investigate “*what* are the antecedents or consequences of the issue?” (p.145). For variance models, unit of analysis, causal model, boundary conditions, and measurement instruments are core issues needed to address. Process models answer the question of “*how* does the issue emerge, develop, grow, or terminate over time?” (p.145). In a process theory, sequence in time, focal actor(s), identifiable narrative voice, evaluative frame of reference, and other indicators of content or context are five essential features.

To answer the second research question, we follow Post et al.’s (2020) seven avenues by which literature reviews can advance theory development, namely, exposing new perspectives, analyzing assumptions, clarifying constructs, establishing and shifting boundary conditions, testing new theory, theorizing with systems theory, and theorizing with mechanisms.

The main ideas of Post et al.’s (2020) seven approaches are as follow: (1) Exposing emerging perspectives refers to the practices of extending established theoretical perspectives to address the unsolved empirical anomalies. (2) Analyzing assumptions enable reviewers to surface the hidden assumptions of different theoretical views, explain

inconsistency, and expose underdeveloped areas. (3) Clarifying constructs can be used to refine established theory, especially a matured theory, by contrasting, specifying, or (re)structuring existing constructs. In addition, reviews can also analyze the measurements and the consistency between conceptualization and measurements to clarify the construct. (4) Establishing or shifting boundary conditions is the approach to extending or contracting boundary conditions of a given theory, which represents “the accuracy of theoretical predictions for any context” by investigating “who, where, when” questions of the theory (Busse, Kach, & Wagner, 2017). Boundary conditions of a theory can be established or shifted by refining constructs, amending moderators, and amending mediators (Busse et al., 2017). (5) Testing new theory involves utilizing accumulated research to develop novel frameworks and empirically examine fresh insights pertaining to a phenomenon, a relationship, or a set of relationships. (6) Theorizing with systems theory takes the system as the unit of analysis and incorporates all related components from the primary studies to capture the complexity of the phenomena. (7) Theorizing with mechanisms can help to reveal the multilevel, multifaceted, and dynamic nature of a phenomenon. By doing so, reviews can unfold the black box of macro-level causal relationships (Hedström & Wennberg, 2017).

We test and revise the predetermined codes by randomly coding few literature reviews and consolidate the final coding scheme as show in Table 3.2. Based the final code, we code all the included reviews.

Table 3.2: Coding Scheme

Categories	Subcategories
<i>Contentious Issues</i>	
Semantic definition of AC	<ul style="list-style-type: none"> • Semantic definition • Similarities and differences between AC and other concepts
Constructive definition of AC	<ul style="list-style-type: none"> • Essential components of AC • Relationships among components
Measurements	<ul style="list-style-type: none"> • Misalignments between conceptualization and measurement. • Impacts of measurements on effects.
AC and antecedents and outcomes	<ul style="list-style-type: none"> • Relationships between AC and antecedents • Relationships between AC and outcomes • Relationships among relevant variables
Level of analysis	<ul style="list-style-type: none"> • Level of Antecedents • Level of AC and its dimensions • Interactions among levels
Assumptions and contexts	<ul style="list-style-type: none"> • Organizational contexts • Institutional or industrial contexts • Methodological contexts
Process	<ul style="list-style-type: none"> • Sequence of AC components • Dynamism of AC • Path-dependent nature and coevolution of AC
<i>Approaches to resolve the issues</i>	
Exposing emerging perspectives	<ul style="list-style-type: none"> • Tracing the historical development of the new perspective • Identifying and elaborating on key concepts of the new perspective • Interplaying the new perspective with established views
Analyzing assumptions	<ul style="list-style-type: none"> • Identifying central assumptions • Relaxing or changing central assumptions
Clarifying constructs	<ul style="list-style-type: none"> • Contrasting existing theoretical constructs • Specifying existing theoretical constructs • (Re)structuring existing theoretical constructs
Establishing or shifting boundary conditions	<ul style="list-style-type: none"> • Refining constructs • Amending moderators • Amending mediators
Testing new theory	<ul style="list-style-type: none"> • Simplifying theory by testing competing models • Testing novel boundary conditions or moderators
Theorizing with systems theory	<ul style="list-style-type: none"> • Identifying elements of the system • Identifying interrelationships among the elements • Identifying the boundary of the system
Theorizing with mechanisms	<ul style="list-style-type: none"> • Developing research agenda for a mechanism • Cataloguing mechanisms • Demonstrating the generality of a mechanism • Identifying absent mechanisms

4 Findings

4.1 Descriptive summaries

Among these reviews, sixteen disclosed the number of primary studies they reviewed, while 13 provided information on the time periods they covered. In terms of review types, six are integrative (or critical) reviews, which aim to offer criticisms on existing literature, rethink existing theoretical relationships, and propose new ones (Wright & Michailova, 2023). Fifteen reviews are systematic reviews focusing on “locating, selecting, appraising, synthesizing, and reporting evidence” (Denyer & Tranfield, 2009, p. 673). These reviews disclosed their process of literature searching, selecting, and evaluating. Among the fifteen systematic reviews, seven used bibliometric analysis, four used meta-analytic methods, and four used narrative approaches to analyse the primary literature and present their findings. Out of the Twenty-six included reviews, five are semi-systematic reviews, meaning that they did not provide details about their searching, selection, screening, and evaluation process, and used a narrative method to analyze and present their findings. It is important to note that these semi-systematic reviews may not have included all primary articles that are related to the research questions (Snyder, 2019).

Table 4.1: Contentious issues targeted by the included reviews.

Issues Reviews	Semantic definition	Constructive definition	Measurement	Antecedent /Outcome	Level of analysis	Assumption and context	Process	# of Issue
Ali et al. (2018)						x		1
Apriliyanti & Alon (2017)	x							1
Bhadauria & Singh (2022)	x							1
Cordero P. & Ferreira (2019)					x			1
Cuéllar et al. (2022)	x							1
Duchek (2013)			x				x	2
Filho et al. (2021)	x							1
Da Silva Florencio & De Oliveira (2022)				x				1
Gao et al. (2017)	x	x	x		x			4
Grandinetti (2016)	x	x		x		x		4
Harvey et al. (2010)						x		1
Lane et al. (2006)	x	x	x	x	x	x	x	7
Maldonado et al. (2019)		x	x			x		3
Marabelli & Newell (2014)					x	x	x	3
Mariano & Walter (2015)	x		x		x			3
Martinkenaite & Breunig (2016)					x		x	2
Pütz & Werner (2023)				x		x		2
Roberts et al. (2012)	x		x		x			3
Song et al. (2018)		x	x	x		x		4
Song (2014)		x				x		2
Sun & Anderson (2010)	x				x			2
Todorova & Durisin(2007)		x				x	x	3
Volberda et al. (2010)	x	x	x	x	x	x	x	7
Yao et al. (2022)						x		1
Zahra & George (2002)	x	x	x	x		x	x	6
Zou et al. (2018)			x	x		x		3
# of Reviews	12	9	10	8	9	14	7	

In terms of the issues targeted by the included reviews, issues regarding assumptions and contexts of AC have attracted most attention. Fourteen reviews examined in what contexts AC or the relationships between AC and other concepts (constructs/variables) are generalizable, or how effect sizes of these relationships vary in different contexts. The second most discussed issues are about the semantic definition of AC, having twelve reviews dedicated to their discussion. Reviews examine issues of semantic definition of AC concern about what AC is and how AC connect or differ from other relevant concepts or constructs. Ten of the reviews investigated measurement issues, which entails the accuracy of the measurements and the inconsistency between conceptualization and measurement. There are nine reviews scrutinized the constructive definition issues of AC, inquiring what are the essential dimensions of AC and what roles these dimensions play in the AC construct. Nine reviews inspected issues in the level of analysis, including whether the concept of AC can be applied at non-organizational levels and how factors at different level interact with each other and influences on AC. Reviews focus on issues in antecedents and outcomes question what the antecedents and outcomes of AC should be, how these antecedents and outcomes interact with each other, and what are the inconsistent understandings of AC's antecedents and outcomes. Seven reviews delve into the process nature of AC, exploring the sequences of AC's components or how AC change over time.

Table 4.2: Approaches applied by the included reviews.

Reviews	Approaches	Exposing emerging perspectives	Analyzing assumptions	Clarifying constructs	Establishing or shifting boundary conditions	Testing new theory	Theorizing with systems theory	Theorizing with mechanisms	# of approaches
Ali et al. (2018)					x				1
Apriliyanti & Alon (2017)		x		x					2
Bhadauria & Singh (2022)		x		x					2
Cordero P. & Ferreira (2019)								x	1
Cuéllar et al. (2022)				x					1
Duchek (2013)		x	x	x					3
Filho et al. (2021)		x		x					2
Da Silva Florencio & De Oliveira (2022)		x							1
Gao et al. (2017)				x					1
Grandinetti (2016)		x		x	x				3
Harvey et al. (2010)					x				1
Lane et al. (2006)		x	x	x	x		x		5
Maldonado et al. (2019)				x	x	x			3
Marabelli & Newell (2014)		x	x	x	x		x		5
Mariano & Walter (2015)		x							1
Martinkenaite & Breunig (2016)								x	1
Pütz & Werner (2023)		x			x				2
Roberts et al. (2012)			x	x					2
Song et al. (2018)		x		x	x	x			4
Song (2014)				x	x				2
Sun & Anderson (2010)				x					1
Todorova & Durisin(2007)		x		x	x		x		4
Volberda et al. (2010)		x		x	x		x		4
Yao et al. (2022)					x	x			2
Zahra & George (2002)		x		x	x				3
Zou et al. (2018)					x	x			2
# of reviews		14	4	17	14	4	4	2	

Regarding the approaches employed to address the contentious issues, a clear convergence on certain methods is evident, while only a few others have been utilized. Among the most frequently employed approaches are clarifying constructs, establishing or shifting boundary conditions, and exposing emerging perspectives, with seventeen, fourteen, and fourteen reviews respectively employing these methods. On the other hand, the less frequently used methods include analyzing assumptions, theorizing with systems theory, and testing new theories, with each having four reviews that employ these approaches. The least applied approach is theorizing with mechanisms; only two review articles have adopted this approach to resolve contentious issues in AC.

4.2 Contributions and limitations of the included literature reviews

In this section, we present the findings on how the included reviews utilized the aforementioned approaches to address the contentious issues they have identified. Additionally, we examine the contentious issues that remain unsolved and highlight any new contentious issues that have arisen as a result of these reviews.

4.2.1 Semantic definitions of AC

In Cohen and Levinthal's original conceptualization, AC is a capability comprised of a set of abilities (Cohen & Levinthal, 1990, 1994). However, the loose constraint of their definition has resulted in somewhat blurred boundaries of the construct (Volberda et al., 2010). Twelve of the reviews included in our study aim to resolve this definitional ambiguity by analysing assumptions and clarifying constructs.

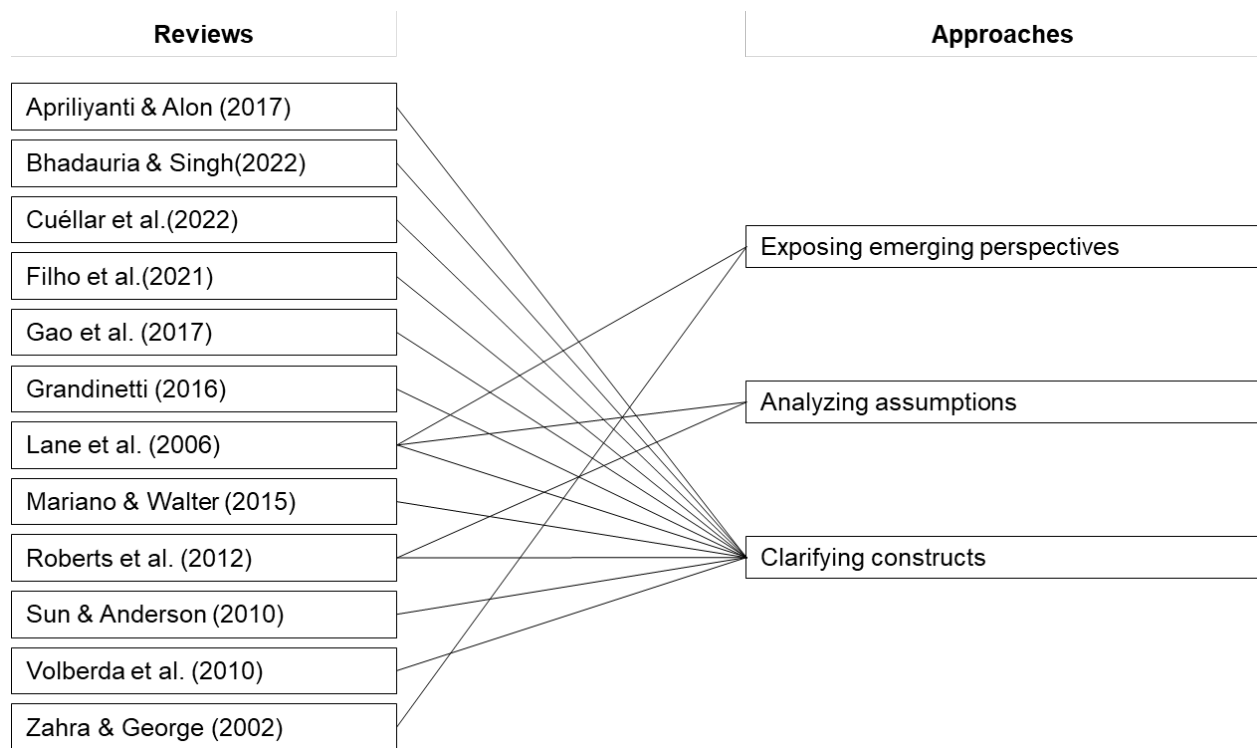


Figure 4.1: Reviews addressing issues in the semantic definition of AC.

To pinpoint inconsistencies in the definition of AC, both Lane et al. (2006) and Roberts, Galluch, Dinger, & Grover (2012) delved into the underlying assumptions of the construct. Lane et al. (2006) identified several assumptions in the reviewed studies that led to misinterpretations of AC. These assumptions include the notion that AC is only applicable in R&D contexts, that AC development hinges solely on the existence of valuable knowledge, that AC equates prior related knowledge, that competitive advantage is derived exclusively from resources possession, and that AC only resides at the firm level. On the other hand, Roberts et al. (2012) unraveled the underlying assumptions of AC present in Cohen & Levinthal's conceptualization, which they viewed as prerequisites for a comprehensive understanding of AC. These assumptions include that AC is reliant on

prior related knowledge, that organizational AC derived from individual AC, and that AC is path dependent (Roberts et al., 2012).

Zahra & George (2002) questioning the consistency of existing definitions in capturing the same essence of AC. Relying on previous definitions, Zahra & George (2002) redefine AC as a dynamic capability composed of a set of organizational routines and processes. Their definition exposed a new perspective of AC by distinguishing capabilities and dynamic capabilities. While capabilities are essential for survival and prosperity, dynamic capabilities address organizational change. Similarly, Roberts et al. (2012), Mariano & Walter (2015), and Gao et al. (2017), adhered to Cohen & Levinthal's original definition of AC, argue for viewing AC as a capability or a dynamic capability, rather than an asset (such as a knowledge base). Lane et al. (2006), based on several prior conceptualizations of AC, emphasized the process perspective of AC, redefining it as a collection of three sequential learning processes.

Several reviews are addressing the semantic definition issues by clarifying the construct. Grandinetti (2016), by clarifying the scope of AC, redefines AC as "a combination of external knowledge monitoring, evaluation, and acquisition" (p.162) to adapt the AC concept to the context of small and medium enterprises. He argued that exploitation should be excluded from the definition of AC to prevent the concept from entirely overlapping with the field of knowledge management.

Many reviews have investigated the similarity and differences between AC and organizational learning. The relationship between AC and organizational learning is frequently discussed in literature reviews, with some considering them as distinct

concepts, while others see them as identical. Among those arguing for differentiation, Lane et al. (2006) discovered that very few empirical studies have explored the relationship between AC and organizational learning. Some studies implied a connection but were inconsistent in their conclusions; some suggested that organizational learning enhances AC, while others inferred that AC facilitates organizational learning (Lane et al., 2006). Based on Cohen and Levinthal's original conceptualization, Roberts et al. (2012) proposed that AC differs from organizational learning in three ways: (1) AC is a relatively well-defined construct with clear assumptions and boundary conditions, whereas organizational learning is a broader concept encompassing several different constructs and processes; (2) Knowledge absorption is an active process, whereas organizational learning can be either active or passive; (3) AC is concerned with the relationship between organizations and external knowledge, whereas organizational learning involves both internal and external knowledge.

On the other side of the argument, Sun & Anderson (2010) analyzed the relationship between AC and organizational learning by comparing the primary components, antecedents, and outcomes of Zahra & George's (2002) four-dimensional AC construct with Crossan et al.'s (1999) "4I" model (i.e., intuition, interpretation, integration, and institution) of organizational learning. They highlighted that in Cohen and Levinthal's original conceptualization, "absorptive capacity" and "learning" were used interchangeably. Based on the comparison of the nomological networks of these two models, they concluded that AC shares a conceptual affinity with organizational learning and is "a specific type of Organizational Learning which focuses on an organization's relationship with external knowledge" (Sun & Anderson, 2010, p. 141).

Several bibliometric analyses have categorized AC-related studies by keywords or co-citations, labeling each category with certain concepts such as intraorganizational learning, interorganizational learning, dynamic capabilities or organizational capabilities, open innovation, ambidexterity, and appropriability (Apriliyanti & Alon, 2017; Bhadauria & Singh, 2022; Cuéllar, Fernandez-Bajón, & Moya-Anegón, 2022; Filho et al., 2021). However, the absence of comprehensive synthesis in these analyses makes it challenging to determine the relationships between these concepts and AC. Volberda et al. (2010) have addressed the issue of ambiguous definitions of AC, suggesting that future research should aim to provide a more precise definition of the concept. However, they did not provide suggestions on how to define AC.

In summary, great efforts have been paid to answer what AC is and how it similar and differ from other concepts. Some researchers have sought to redefine it by incorporating insights from other disciplines, while others have preferred to adhere to the original conceptualization of Cohen and Levinthal. For those who have proposed redefinitions of AC, their new definition often emphasize specific aspects, such as the strategic flexibility of organizations, the processes of knowledge absorption, or the necessity to align AC with particular contexts like small and medium enterprises. While extensive discussions about the relationships between AC and other concepts, especially the relationship between AC and organizational learning, continue to persist, no clear consensus has been reached. This lack of definitive understanding underscores the complexity of AC as an interdisciplinary construct, as well as the challenges inherent in distinguishing it from related concepts. Some bibliometric analysis attempted to categorize AC studies by relevant concepts. However, without a clear discussion on how these concepts are

defined, these categorizations rather blurred the boundaries between AC and these concepts than provided a clearer picture of AC. Despite these attempts, there seems to be a consensus on the need for a clearer, more precise definition of AC that transcends specific contexts and levels.

4.2.2 Constructive definition of AC

The development of a multidimensional model serves as an effective strategy for capturing the complexity of a construct (Van de Ven, 2007). Nine review articles in our sample have analyzed the constituents of AC. These articles address essential questions such as: What constitute the fundamental components of AC? How are these dimensions interrelated?

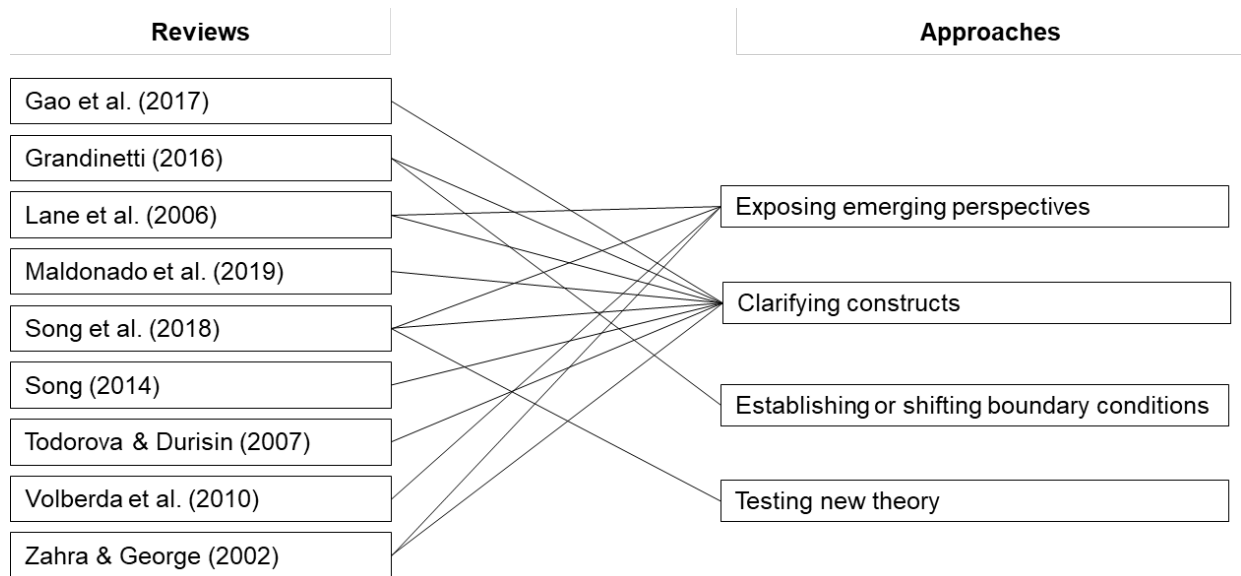


Figure 4.2: Reviews addressing issues in the constructive definition of AC.

The most common used approach to resolve issues in constructive definition is clarifying constructs. The predominant method to categorize AC dimensions is based on its underlying abilities, capabilities, or knowledge absorption stages. While Cohen and

Levinthal implied that AC is constituted by three subset abilities (1990), Lane & Lubatkin (1998) were the first to denote these abilities as dimensions of AC. Zahra & George (2002) expanded the construct into four dimensions by amalgamating assimilation and exploitation dimensions from Cohen & Levinthal (1990), the acquisition dimension from Kim (1998) and Mowery & Oxley (1995), and the transformation dimension from Kim (1998). They further bifurcated the four dimensions into two components, potential AC and realized AC. The former encompasses the acquisition and assimilation of external knowledge, while the latter focuses on the transformation and exploitation of the assimilated knowledge (Zahra & George, 2002). However, Todorova & Durisin (2007) argued that Zahra & George (2002) have overlooked the importance of the ability to recognize the value of external knowledge. Therefore, they reintroduced value recognition as the initial dimension of AC.

Building on Minbaeva et al. 's (2003) influential study which investigates subsidiary AC in multinational enterprises context, Song (2014) contended that motivation should not be viewed as a component of AC, but rather as a different construct that moderates the relationship between AC and its outcomes. Grandinetti (2016) reconstructed AC to make it applicable in small and medium enterprises (SMEs) contexts by replacing value recognition with monitoring and excluding exploitation dimension. Gao et al. (2017) also note the inconsistency in the dimensions of the AC construct. After comparing five influential AC models, they observed that assimilation and exploitation are the only two dimensions acknowledged universally across these models.

In addition to categorizations based on subset abilities, some reviews proposed non-ability dimensions of AC. For instance, Lane et al. (2006) highlighted the process perspective of AC and categorized its dimensions as three sequential learning processes. In a similar vein, Volberda et al. (2010) suggested that future empirical studies should explore the process dimensions of AC, including the formation and retrieval processes of organizational memory and elements within learning processes.

Song et al. (2018) from a function-based perspective reconstructed AC as a new three-dimensional construct. In their novel construct, *absorptive knowledge base* is “the accumulated stock of knowledge held by the firm that facilitates understanding, recombining, and transforming external knowledge” (p. 2351). *Absorptive effort* is defined as “the knowledge-building investments made by a firm that facilitate searching, identifying, and acquiring external knowledge” (p. 2347), and *absorptive process* is viewed as the “internal procedures and practices that facilitate the sharing and diffusion of external knowledge inside the organization” (p. 2352). Song et al. (2018) asserted that while these dimensions primarily serve the roles stated in their definitions, they also play secondary roles in other dimensions. For instance, even though the absorptive knowledge base primarily assists the firm in understanding external knowledge, it also contributes to the detection of external knowledge, which is primarily the role of absorptive effort.

It is important to note that the differences in dimensions of the construct not only influence how we interpret AC, but also has impacts on the effect sizes of AC on its outcomes. For instance, Song et al. (2018) found that the effect sizes of different dimensions of AC vary in predicting outcomes, such as innovation generation, knowledge acquisition, and firm

performance. Maldonado et al. (2019) have also found that effect sizes of AC on its outcomes differ when AC has been measured as unidimensional, bidimensional, and multidimensional constructs.

While there is consensus that AC is a multidimensional construct, ongoing debate remains about how to best categorize these dimensions, which ones should be considered essential, and how collective AC emerge from the interactions among these dimensions. A widely accepted method for categorizing AC dimensions focuses on the underlying abilities or capabilities. However, even within this method, variations exist. Additionally, these constitutive definitions of AC labeled subset abilities or capabilities by the stages of knowledge absorption, which lead to the assumption that each stage of knowledge absorption relies on a unique organizational ability or capability. It is possible that some capabilities are needed in many stages of knowledge absorption. For instance, to accurately evaluating the value of the external knowledge, organizations must understand at least some pieces of the targeted knowledge and envisage the potentials of transformation and exploitation. As the knowledge absorption progress, the evaluation of the external knowledge may change as well.

Recent review articles have proposed alternate methods to categorize dimensions of AC. These approaches emphasize process dimensions (for example, the organizational memory formation and retrieval processes) or function-based dimensions (such as knowledge base, effort, and processes) over abilities or capabilities. Unfortunately, the relationships both between the dimensions and the main construct, and among the dimensions themselves, remain unclear.

4.2.3 Level of analysis

In Cohen and Levinthal’s conceptualization, AC is an organizational-level construct that is built upon, but is more than the sum of, the individuals’ AC. However, disagreements exist regarding the levels of AC. Nine of the reviews in our sample have investigated these level-of-analysis issues.

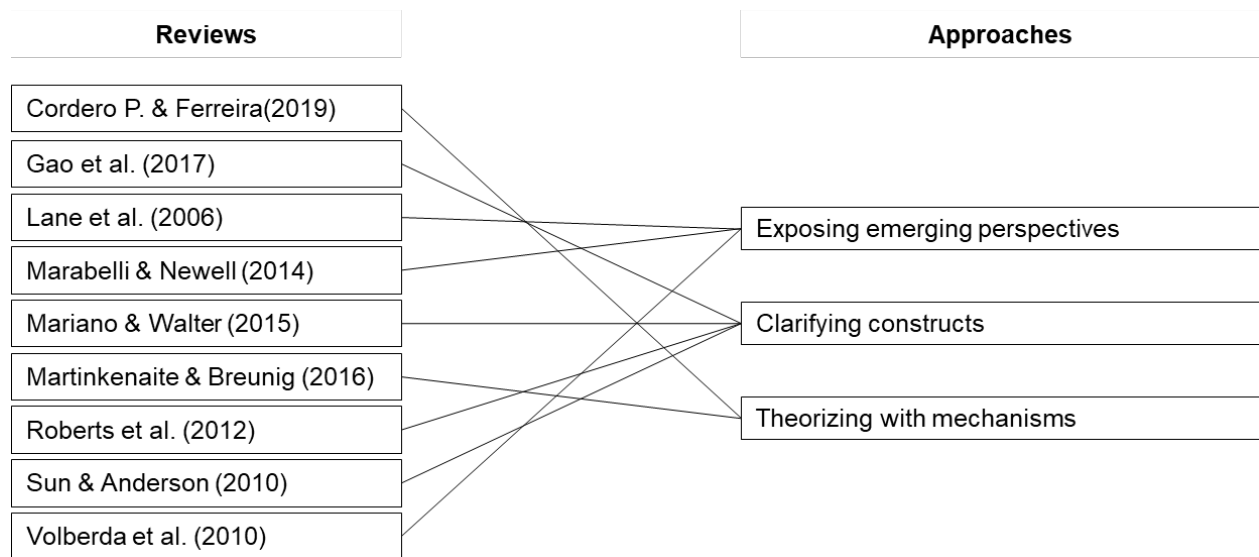


Figure 4.3: Reviews addressing issues in the level of analysis of AC.

A debate exists regarding whether AC should be considered a multilevel construct. Lane et al. (2006) first observed that empirical studies have often overlooked the important roles of individuals, leading to a lack of awareness that AC is a multilevel construct. Volberda et al. (2010) also noted that most empirical studies operationalize AC only at the business unit or subsidiary level, thus neglecting the multilevel nature of AC. However, Roberts et al. (2012), Mariano & Walter (2015), and Gao et al. (2017) insist that AC should be treated solely as a collective construct. They argue that studies interested in individual AC should utilize and further develop relevant individual learning literature, given that collective and individual AC have different antecedents and outcomes.

For proponents of the view of multilevel construct, the question of how individual-level AC integrates or transfers to become organizational-level AC remains a topic of discussion. Some reviews attempt to address this issue by introducing emerging perspectives and theorizing with mechanisms. For instance, Lane et al. (2016) introduced the characteristics of firm members' mental models as an antecedent of AC, which directly influences the creativity aspect of AC. Similarly, Volberda et al. (2010) integrate antecedents of AC by levels, such as managerial, intraorganizational, and interorganizational, and encourage further efforts to study individual AC, or the micro foundations of AC, as well as the interactions between antecedents at different levels.

Another approach to address the multilevel issue of AC is clarifying the construct. Considering Zahra & George's (2002) construct as a specific type of "4I" model of organizational learning (Crossan, Lane, & White, 1999), Sun & Anderson (2010) suggested that each dimension of AC resides on different levels. Specifically, they proposed that acquisition is the intuition stage of learning and resides at the individual level, assimilation is the interpretation stage of learning and happens at both the individual and group level, transformation is the integration stage of learning and achieves at both the group and organizational level, and exploitation is the institutionalization stage of learning and presents at the organizational level.

Contrary to the aforementioned viewpoints, Marabelli & Newell (2014) argued that organizational knowledge absorption is not a sequential process where knowledge "moves" from the individual to the group, and then from the group to the organization. By exposing a new perspective, the epistemology of practice or "knowledge as knowing",

they maintain that individual and organizational factors are involved in all dimensions of AC simultaneously. We can focus on a particular level by either “zooming in” or “zooming out” (Marabelli & Newell, 2014). A similar solution is Martinkenaite & Breunig’s (2016) theorizing with mechanisms, in which they utilize Coleman’s bathtub model to investigate the underlying mechanisms, or micro foundations, of AC. They proposed that the macro (i.e., organizational) level phenomena, such as impacts of firm strategy on firms’ value recognition ability, are emerged from interactions between macro and micro (i.e., individual) level factors.

In summary, the multilevel nature of AC is widely acknowledged in the field. Reviews contribute to this direction by exposing emerging perspectives, theorizing with mechanisms, and clarifying constructs. Some review articles attempt to address the multi-level nature of AC by introducing different levels of antecedents while others maintain that AC only exists at the organizational level. Yet others argue that the multi-level issue is somewhat insignificant, as knowledge absorption processes are simultaneously happening at both micro and macro levels. However, these perspectives do not conclusively address how AC at lower levels, if the construct is generalizable to various levels, interacts to foster the emergence of higher-level AC. Marabelli & Newell’s (2014) “zooming in” and “zooming out” metaphor suggested that activities at different levels are happening simultaneously. However, they avoid the question of how higher-level AC emergent from lower levels. Martinkenaite & Breunig (2016) explained how each dimension of AC is emergent from the interactions between individuals and organization, but how these dimensions are interacting, along with their underlying mechanisms, to constitute AC is still unclear. Codero & Ferreira (2019) summarized four categories of

organizational mechanisms that are related to AC and ladled them as external search strategy, knowledge management, reverse knowledge, and mechanisms not oriented to knowledge management. However, there are not much discussion on how AC emerge from these mechanisms.

4.2.4 Measurements

Measurement issues significantly overlap with the definition, level of analysis, and dimensionality issues of AC. Ten of the included reviews delve into these operationalization issues, exploring the accuracy of construct representation and the consistency between conceptualization and operationalization.

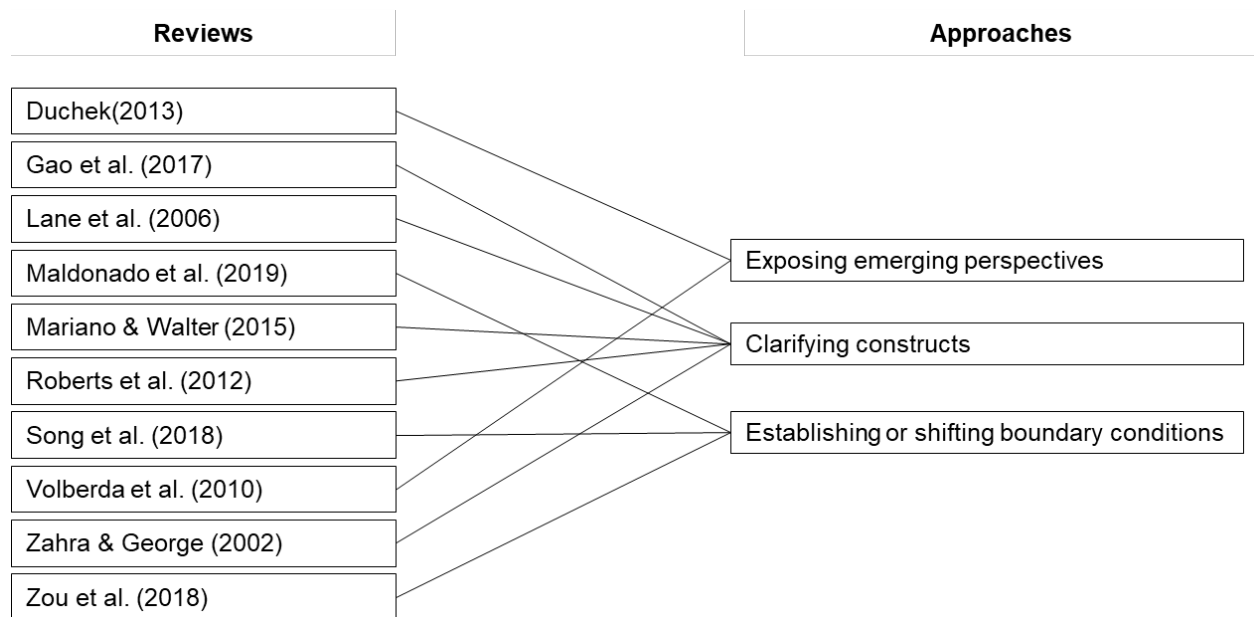


Figure 4.4: Reviews addressing issues in the measurements of AC.

The ability of measurements to capture the essential attributes of AC is one of the limitations that the review articles have identified in the empirical studies (Duchek, 2013; Lane et al., 2006; Volberda et al., 2010; Zahra & George, 2002).One important reason

that motivates Zahra & George (2002) to reconceptualize AC partly because existing measures were “rudimentary and do not fully reflect the richness of the construct” (p. 199). Lane et al. (2006) also criticized the inability of proxy measures to capture the complexity of AC and noted that studies often apply these measures as both antecedents and outcomes of AC. In addition to the limitations of indirect measurements proposed by Zahra & George (2002) and Lane et al. (2006), Volberda et al. (2010) argued that empirical studies of AC have neglected several critical characteristics of the construct, including dynamism, multilevel structure, multidimensionality, and process dimensions. Duchek (2013) systematically reviewed all existing measurements, both quantitative and qualitative, and discussed their strengths and weaknesses. Duchek (2013) argued that current measurements cannot fully capture the knowledge absorption routines due to their entanglement with practices, drawing from the dynamic capability view of AC and the practice-based view of knowledge, which posits that knowledge is practiced (i.e., knowing) rather than possessed.

There is a prevalent issue in AC studies across different disciplines concerning the construct validity (Gao et al., 2017; Mariano & Walter, 2015; Roberts et al., 2012). Roberts et al. (2012), along with Gao et al. (2017), investigated the application of AC in information system studies and found that many studies conceptualized AC as a capability (or dynamic capability) but measured it as an asset (i.e., knowledge base). Similarly, Mariano & Walter (2015) examined the application of AC in the field of knowledge management and intellectual capital and found comparable misalignment issues. Song et al. (2018) noted that issues of misalignment between conceptualization and operationalization impede theory development due to the inconsistent empirical results they produce. Such

a misalignment can reduce the level of construct validity and lead to an oversight of the essential attributes of the construct (Roberts et al., 2012).

Another issue regarding AC measurement relates to the varying effect sizes of the same theoretical relationship, which are influenced by the choice of measurements (Maldonado, Salaiz, Vera, & Keller, 2019; Song et al., 2018; Zou, Ertug, & George, 2018). Song et al. (2018) found that effect sizes are much greater when independent and dependent variables are measured with the same methods (i.e., surveys or proxies). Zou et al. (2018) focused on how measurement methods influence the effect sizes between AC and its antecedents and outcomes. They found that survey-based measurements capture stronger effects than proxy-based measurements. Similarly, Maldonado et al. (2019) observed similar results regarding the relationship between AC and its outcomes. They argued that the varying effect sizes may be caused by those proxy-based studies which mix measures of antecedents, AC, and outcomes.

By clarifying the construct into distinct dimensions and components, Zahra & George (2002) promised that their new construct, as well as the suggested measurements, enable further studies to fully capture the richness of the construct. Similarly, one goal of Lane et al. (2006) is to resolve the construct validity issue by clarifying the construct as learning processes, even though they did not provide suggestions on measurements for the dimensions and the construct as a whole.

Duchek (2013) introduced a new perspective of knowledge to resolve the measurement issues and suggested that future research should utilize practice-oriented measurements, such as ethnography, action research, and storytelling, to capture the processes of

knowledge absorption. Other recommendations include conceptualizing AC as a capability (Gao et al., 2017; Mariano & Walter, 2015; Roberts et al., 2012), ensuring alignment between conceptualization and measurements (Gao et al., 2017; Maldonado et al., 2019; Mariano & Walter, 2015; Roberts et al., 2012), avoiding unidimensional measurements, and using composite measurements that mix survey and proxy-based methods (Maldonado et al., 2019).

In conclusion, to tackle the measurement issues, some reviews articles attempt to refine the semantic or constitutive definition of AC and others suggest redefining the methodology. However, the field is still rely on few established measurements (Gao et al., 2017). Therefore, how to accurately capture AC remains a challenge due to the significant diversity in conceptualizations of AC, as highlighted in previous sections. Despite the recommendations proposed by various review articles, there is still a need for measurements that can effectively capture both the multidimensional and multilevel nature of AC.

4.2.5 Antecedent and outcomes

Issues concerning antecedents and outcomes of AC are widely discussed in the included reviews. These discussions address questions such as what the antecedents of AC are, what the outcomes of AC are, how these variables interact with each other, as well as the inconsistencies presented by the primary studies. A total of eight reviews have contributed to these discussions, by exposing emerging perspective, analysing assumptions, and testing new theory.

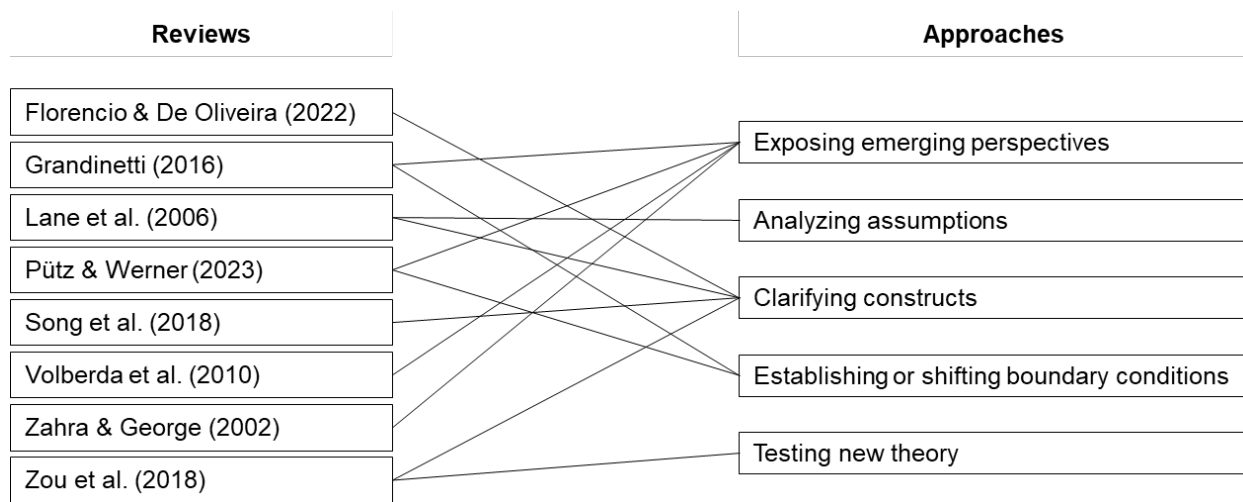


Figure 4.5: Reviews addressing issues in the antecedents and outcomes of AC.

Antecedents of AC. Under the exposing emerging perspective approach, Zahra & George (2002) identified knowledge source, knowledge complementarity, and experience as antecedents of AC. Lane et al. (2006) questioned the assumption that AC only resides at firm level and introduced characteristics of firm members' mental models as internal antecedent of AC. In addition, they argued that characteristics of internal and external knowledge and learning relationships' characteristics are two direct antecedents, mediating the relationship between environmental conditions and AC. Volberda et al. (2010) integrated antecedents of AC across different levels. Specifically, managerial antecedents include combinative capabilities, management cognition or dominant logic, and individual knowledge development or sharing. Intraorganizational antecedents comprise organizational form, incentive structures, informal networks, and internal communication. Interorganizational antecedents contain knowledge creation and sharing, alliance management systems, dyad and network knowledge, development and transfer, and relatedness of organizations. Prior related knowledge involves depth, breadth, and retrieval of knowledge, and knowledge in the short-term or long-term (Volberda et al.,

2010). They found that few attention has been paid on managerial antecedents and interactions between antecedents at different levels and encouraged further investigations (Volberda et al., 2010). In the SEMs context, Grandinetti (2016) argued that knowledge codification capability and relational capability are antecedents of AC, regarding codification-driven and interaction-driven knowledge absorption, respectively. In the family firm context, Pütz & Werner (2023) identified familiness (i.e., the family-specific resources) and socioemotional wealth, which refers to those non-financial aspects of the firm that cater to the family's emotional needs, as factors casting different effects on AC, as well as on potential and realized components.

Under the testing new theory approach, Zou et al. (2018) found firm size and firm age have an influence on AC. Their meta-analysis showed that firm size has a positive effect on AC in small firms but a negative effect in non-small firms. Firm age shows a negative effect on AC in mature firms, conflicting with the accumulative nature of AC. They explain that the negative relationship between firm age and AC as the outcome of interactions of prior related knowledge and organizational inertia (Zou et al., 2018).

Outcomes of AC. Zahra & George (2002) highlighted that AC not only led to innovations and enhanced performance but also conferred the firm with strategic flexibility, key for a firm to achieve a competitive advantage. Lane et al. (2006) suggested that most of the studies assume firm performance is the direct outcome of AC, neglecting the mediating factors – knowledge outputs and commercial outputs – between the AC – firm performance relationship. Based on Zahra & George's (2002) model, Volberda et al. (2010) proposed that R&D and the exploitation or exploration orientation are the

outcomes of AC. Both Song et al. (2018) and Zou et al. (2018) confirmed that innovations and knowledge transfers are direct outcomes of AC, mediating the relationship between AC and firm (financial) performance. Da Silva Florencio & De Oliveira (2022) confirmed that technology transfer is an outcome of AC.

By exposing new perspectives and analysing assumptions, some review articles contributed to this direction of inquiry by highlighting non-salient antecedents and outcomes of AC. Some reviews were testing the effects between AC and its antecedents and outcomes by meta-analysis. However, conflicts and ambiguities still exist. For instance, some factors, such as knowledge characteristic, have been interpreted as an antecedent in some reviews, while others treated it as a moderator of AC-outcome relationship. Some reviews have tested the effect sizes of AC or its dimensions on outcomes and confirmed that each dimension have different impacts on outcomes. While there are no discussions on how impacts of different antecedents on dimensions of AC vary.

4.2.6 Assumptions and contexts

Reviews focusing on this particular subset of contentious issues challenge the generalizability of the AC construct and the relationships between AC and its antecedents or outcomes across different contexts. Exploring boundary conditions can advance theory development by increasing its accuracy of theoretical predictions and generalizability (Busse et al., 2017). Hence, the most common approach to addressing these issues involves establishing or shifting boundary conditions. Fourteen reviews in total have

embarked on the task of tackling issues related to the theoretical prediction and generalizability of AC.

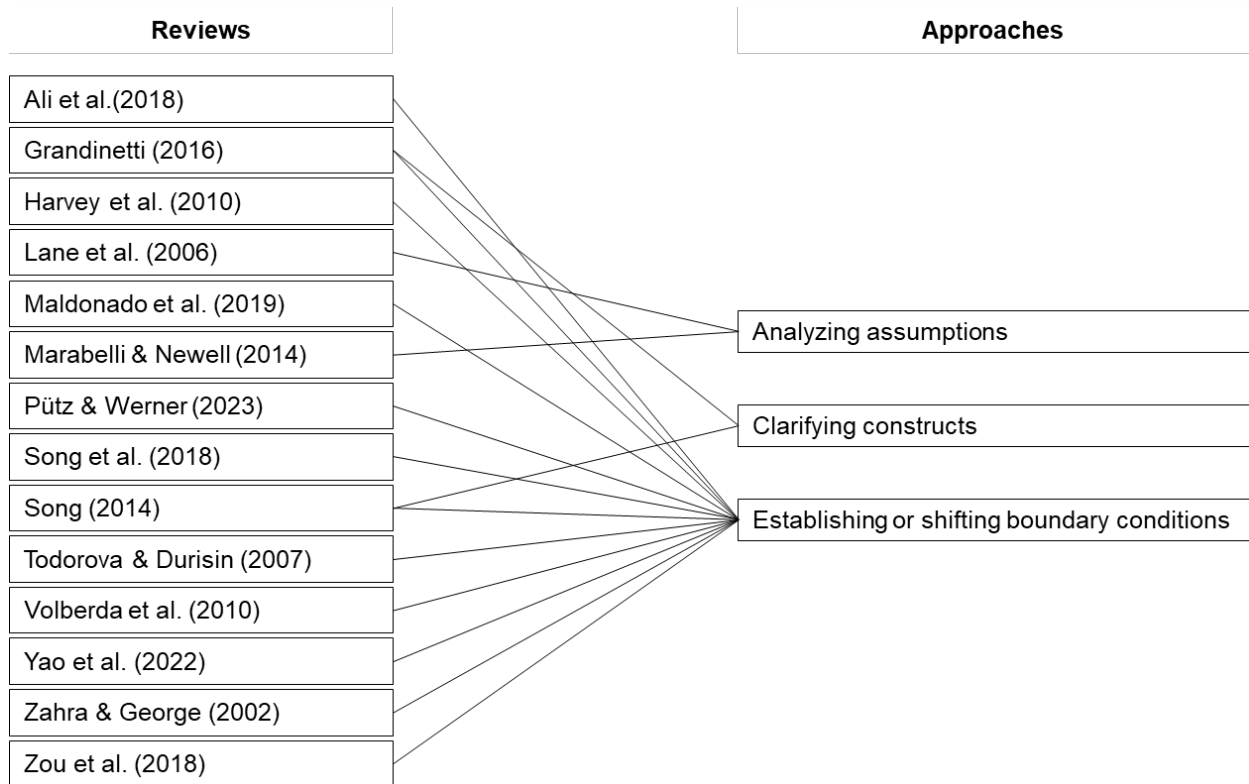


Figure 4.6: Reviews addressing issues in the assumptions and contexts.

Reviews in one stream aim to expand the boundary conditions of the AC construct, thereby broadening its range of applications. Lane et al. (2006) observed that most empirical studies were assume that AC can be only used in R&D-related contexts. This limits the generalizability of their findings and leads to the reification of the construct. Harvey et al. (2010), on the other hand, explored the possibilities and limitations of applying AC to analyze the performance of non-market organizations. They argued that introducing a process view of AC (i.e., the version proposed by Lane et al.) proves

valuable since it allows for evaluating the performance of public organizations from a knowledge process perspective.

In contrast, Grandinetti (2016) argued that it is inappropriate to apply the predominant AC constructs, such as those by Cohen & Levinthal (1990) and Zahra & George (2002), in some contexts like small and medium enterprises (SMEs) and family firms. Grandinetti (2016) contends that SMEs and large firms are different in knowledge absorption processes. SMEs rely more on interaction-driven processes, which involve the utilization of relational resources and the transfer of tacit knowledge. On the other hand, large firms depend on codification-driven processes, characterized by knowledge codification activities such as searching for external knowledge codified in patents and research articles and codifying acquired knowledge into organizational memory. However, as Grandinetti (2016) argued, predominant constructs of AC are limited in their ability to explain the differences between knowledge management processes in SMEs and large firms, due to the inclusion of the exploitation dimension, which is not an essential component of AC, especially in SMEs contexts. Therefore, Grandinetti (2016) reconstructed AC by excluding the exploitation dimension, making it applicable to explain knowledge absorption in new ventures and SEMs.

In addition to the issue of construct transferability, the generalizability of specific relationships between AC and other variables has also been a topic of intense discussion in the included reviews. When considering contingent factors that influence the relationship between antecedents and AC, activation triggers (incidents or events that stimulate or obligate a firm to react to certain internal or external cues), regimes of

appropriability, and external power relationships (i.e., relationships between the firm and its customers) are three commonly identified factors (Todorova & Durisin, 2007; Zahra & George, 2002).

Ali, Ali, Al-Maimani, & Park (2018) suggested that the relationship between organizational structure (such as complexity, formalization, centralization, and integration) and AC is affected by an organization's learning modes. Single learning mode refers to the learning process in which organizations maintain the same structure and have no clear division of work throughout the stages of learning; dual learning mode is the learning process in which different units of the organization participate in different learning stages (Ali et al., 2018). By mirroring Zahra & George's (2002) two component construct (i.e., potential AC and realized AC) to the two-stage conceptualization of organizational learning, they argue that single mode organizations have no clear differentiation in learning stages, therefore, organizational structural factors will influence AC as a whole; while dual mode organizations have clear division of work, thus, organizational structural factors will have different influences on potential AC and realized AC (Ali et al., 2018).

Regarding factors that influence the relationships between AC and its outcomes, many have been identified. Zahra & George (2002) argued that regime of appropriability influences the AC-outcome relationship, while Todorova & Durisin (2007) suggested extending it to the antecedent-AC relation. Volberda et al. (2010) integrated these factors as environmental conditions, which include competitiveness, dynamism, appropriability regime, and knowledge characteristics. However, this contradicts with Lane et al. (2006),

who treat both environmental conditions and characteristics of knowledge as antecedents of AC.

Song (2014) proposed that motivation of employees should be a moderator of the AC – outcome relationship, rather than a component of AC as suggested by Minbaeva et al. (2003). Zou et al. (2018) examined the moderating effects of factors such as country, whether a firm is publicly listed or not, industry, breadth of external search, social integration mechanisms, knowledge infrastructure, management support, environmental dynamism, competitive intensity, and relational capability on the AC-outcome relationships. Their meta-analysis confirmed that social integration mechanisms, knowledge infrastructure, management support, and relational capability have positive and significant effects on the AC-outcome relationships (Zou et al., 2018). Song et al. (2018) found that effects of AC on its outcomes significantly differ depending on the governance modes by which firms acquire the external knowledge, the learning sources from which the knowledge is acquired, and the types of knowledge. Maldonado et al. (2019) also showed that the effect sizes of AC-outcome relationships vary by countries and industries. This finding conflicts with Zou et al. (2018), who showed that there are no differences in the effect sizes of AC on its outcomes, whether in low-technology, high-technology, or mixed industry contexts. Yao, Jiang, Combs, & Chang (2022) demonstrated that informal institutions, which refers to unwritten rules within the institutions, positively influence the relationship between AC and its outcomes by reducing behavioral and environmental uncertainties. However, misalignment between informal and formal institutions negatively influences the AC-outcome relationship (Yao et al., 2022).

It's important to note that, in addition to the factors mentioned above, the researchers' choices on constructs and measurements also influence the effect sizes between AC and its outcomes. Concerning the dimensionality of the AC construct (unidimensional, bidimensional, and multidimensional models), the effect sizes of bidimensional and multidimensional models are significantly stronger than that of the unidimensional model when it comes to innovations (Maldonado et al., 2019). In terms of methodological moderators, using archival proxies or surveys to measure AC can lead to different effect sizes on outcomes. The effect size of survey-based measures is significantly stronger than that of archival proxies (Maldonado et al., 2019; Zou et al., 2018).

In conclusion, how to increase the generalizability of the construct is most discussed issue in the included reviews. The most common approach has been used is establishing and shifting the boundary conditions, with some reviews relaxing the assumption that AC can only applied in R&D contexts or commercial organizations and some others modifying the constitutive definition to make it applicable in boarder contexts, such as nontechnical organizations or SMEs. Many reviews also investigated in what conditions relationships between AC and its antecedents and outcomes are affected. However, there are inconsistencies regarding the roles and effect sizes of some factors. For instance, some factors, such as knowledge characteristics and environmental conditions, have been treated as moderators while others interpreted as antecedents of AC. Some factors, such as industry, have been confirmed significantly affect on the relevant relationship in some reviews while have been denied by others.

4.2.7 Process

Seven of the included reviews investigating this set of issues concern about the process nature of AC, which entails the sequence of the underlying dimensions of AC, the dynamism of AC, and how AC evolve over time. In theory building, there are two definitions of process are applied to explain change of an entity. The first definition relates to a set of concepts or variables associated with actions and activities, while the second definition represents a narrative that describes the development and changes over time (Van de Ven, 2007).

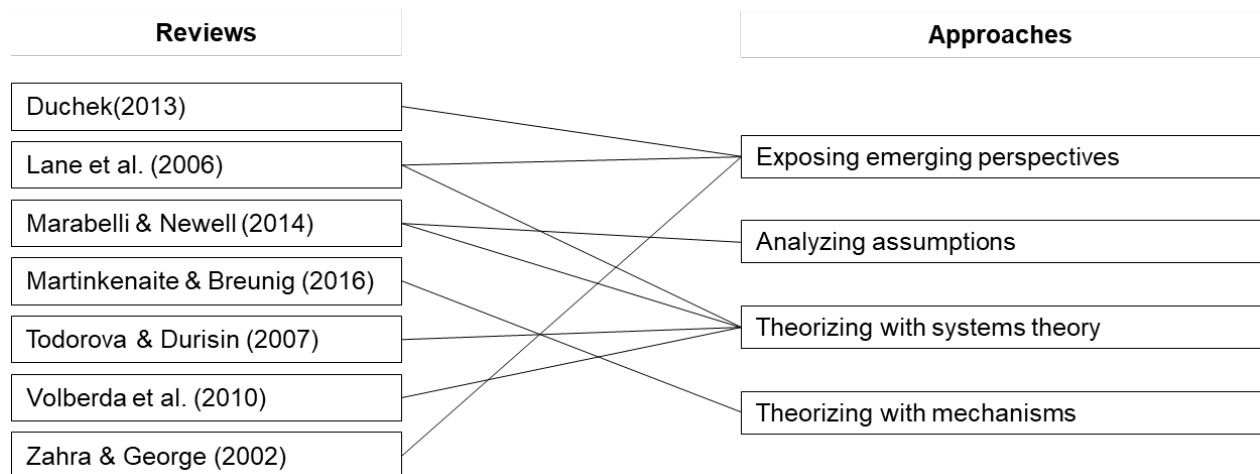


Figure 4.7: Reviews addressing issues in the process attributes of AC.

Most of the included reviews adopted the first definition of process and treated the processes of AC as distinct concepts that can be operationalized as variables. By exposing new perspective and clarifying the construct, Zahra & George (2002) separated the AC construct into four distinct process dimensions. Volberda et al. (2010) suggested that many process dimensions of AC, such as the organizational memory storage and retrieval processes, have been neglected by prior empirical studies, which provides opportunities for further research. However, treated processes of AC as process concepts

is difficult to answer the question of how AC change over time since it examines changes in variable and is more suitable for variance research design (Van de Ven, 2007).

The second definition of process is more developmental oriented and describes how events are unfolding. Based on findings in cognitive science, Todorova & Durisin (2007) clarified Zahra & George's (2002) construct by arguing that assimilation and transformation should be alternative but not sequential processes. Lane et al. (2006) converted the three dimensions of Cohen and Levinthal's construct to three sequential learning processes. Cohen & Levinthal (1990) were the first to elucidate the dynamic nature of AC, representing by the path-dependent and emergent properties of AC. Despite this, the dynamic aspect of AC has been overlooked in the majority of the studies (Lane et al., 2006; Todorova & Durisin, 2007). Several reviews have attempted to address this dynamism within AC, albeit implicitly, through theorizing with systems theory. Lane et al. (2006) highlighted the interactions between outcomes and antecedents, arguing that direct outcomes, including commercial outputs and knowledge outputs, can influence some antecedents of AC, such as firms' strategies and members' mental models, influencing future AC. To emphasize the dynamic nature of AC, Todorova & Durisin (2007) introduced a feedback loop in their revised model. Volberda et al. (2010) revealed that organizational AC co-evolves with managerial actions and institutional and environmental contexts. To test the dynamism of AC, both Lane et al. (2006) and Volberda et al. (2010) have called for more longitudinal studies.

By analyzing assumptions of the nature of knowledge and exposing the practice-based view of knowledge, both Duchek (2013) and Marabelli & Newell (2014) highlighted the

limitations of prior studies in conceptualizing and measuring AC as process dimensions. They attributed these limitations to the prevalent possession perspective of knowledge, which assumes that knowledge is a possession of individuals and is transferable. In contrary, practice-based view (or “knowledge as knowing”) proposes that knowledge is constituted in practice and is not transferable, thus, can complement the possession perspective. With the practice-based view of knowledge, Marabelli & Newell (2014) modify Volberda et al.’s (2010) integrative model by connecting AC with its antecedents and outcomes by knowing practices, such as informal networks and communication. In addition, they also included power as an important factor that influence the process of knowledge absorption (Easterby-Smith, Graça, Antonacopoulou, & Ferdinand, 2008). Duchek (2013) suggests using storytelling methods to capture the complex knowledge absorption processes.

In conclusion, these reviews have addressed the need of a process model of AC to fully unfold the processes of knowledge absorption and to answer the question of how AC change over time. In addition, they contributed to this direction by theorizing with system theory, analysing assumptions, exposing new perspectives, and theorizing with mechanisms. However, there are still many issues remaining. For instance, as we discussed in the construct dimensionality section, most of the reviews categorize the subset abilities or capabilities by stages of knowledge absorption processes, which lead to the assumption that each stage of knowledge absorption relies on a unique capability. It is possible that some stages are require more than one ability or capability. For instance, in the value recognition stage, how can it possible for organizations to accurately evaluate

the value of the target external knowledge if they did not assimilate some pieces of the knowledge?

5 Discussion

Literature review is supposed to be an effective way to progress theoretical development by synthesizing key findings of empirical studies and identifying gaps for future research (Breslin & Gatrell, 2020; Post et al., 2020; Rojon et al., 2021; Snyder, 2019). Our analysis reveals that existing reviews of AC have made concerted efforts to address and resolve contentious issues within semantic definition, constructive definition, level of analysis, measurements, antecedents and outcomes, assumptions and contexts, and process by employing various approaches independently or in combination.

Although these reviews have made concrete contributions to each direction, this umbrella review reveals that there are still remaining questions and new generated issues by the included reviews in each category. In this section, we highlight these issues and provide suggestions for further advancing theoretical development of AC through Post et al.'s (2020) seven avenues.

5.1 A precise and general definition of AC

The reason why defining a term is to distinguish the subject matter from others, and it is the core of theory building (Van de Ven, 2007). Even though semantic openness and operational vagueness will always exist no matter how much effort we have paid to clarify a definition (Van de Ven, 2007), our analysis shows that how to make the construct of AC applicable to different contexts and how to increase the effect significance between AC and its antecedents and outcomes are the main concerns in the included reviews.

Fourteen out of twenty-six review articles investigated the assumption and contexts issues and tried to make the construct applicable in different contexts. This means that a clearer while more general definition of AC is needed. An imprecise concept may cause concept misinformation, hindering the development and testing of specific hypotheses using these concepts (Osigweh, 1989).

In recent years, discussions about AC conceptualization tend to focus on the constitutive definition of AC. Our analysis shows that most of the constitutive definitions of AC categorize AC dimensions by stages of knowledge absorption process. This resides on the assumption that AC equals to the knowledge absorption process and each stage of knowledge absorption requires a unique organizational ability or capability. We argue that this assumption neglected the possibility that some subset abilities or capabilities of AC may be required for several knowledge absorption stages. For instance, Zahra & George (2002) defined acquisition as “a firm’s capability to identify and acquire externally generated knowledge that is critical to its operations” (p. 189) and assimilation as “the firm’s routines and processes that allow it to analyze, process, interpret, and understand the information obtained from external sources” (p. 189). However, without analysis and understanding of the external information, how it would be possible for the firm to know whether the information is critical to its operations? In Lane et al.’s (2006) definition, AC constituted by three sequential learning processes, including explorative learning, transformative learning, and exploitative learning. However, they did not provide much discussion on the similarities and differences among these learning processes. It is possible that these processes rely on the same sets of capabilities or abilities but vary in strengths.

There are classifications of dimensions using non-ability approaches, such as Song et al.'s (2018) construct, which includes absorptive effort, absorptive knowledge base, and absorptive process. However, these dimensions overlap significantly, and there are no explanations to clarify their relations with the overall construct. Consequently, it remains unclear how the overall construct emerges from these dimensions.

There is room for future research to create a more precise and general semantic and constructive definitions of AC. These definitions should capture the essence of the underlying phenomenon while being as widely applicable as possible. Future research can contribute to this by relaxing above mentioned assumption and applying non-stage-based categorization approaches.

5.2 Multilevel nature of AC

There continues disagreement about whether AC is a multilevel or unilevel construct and how different levels of analysis can be integrated into the AC construct. We argue that this disagreement arises for three reasons. Firstly, the narrow definition of AC makes it unsuitable for application across different levels. For instance, the most frequently cited definitions by Cohen & Levinthal (1990) and Zahra & George (2002) define AC as an organizational ability or capability. Furthermore, Cohen & Levinthal's (1990) definition stipulates that external knowledge must be applied to commercial ends. Hence, it would be inappropriate to label the knowledge absorption phenomena at an individual level as "individual AC". It is challenging to envision how individuals can possess organizational abilities or capabilities, or what commercial ends would look like when an individual applies external knowledge.

Secondly, no consensus has been reached on whether ACs at different levels are causally related or occur simultaneously. For instance, the integrative frameworks of Lane et al. (2006) and Volberda et al. (2010) suggest that “AC” at the individual level precedes organizational AC. However, Duchek (2013), Marabelli & Newell (2014), and Martinkenaite & Breuig (2016) propose that phenomena at different levels occur in parallel.

Thirdly, to our knowledge, no studies have considered outcomes at different levels when developing integrative frameworks. For instance, while Lane et al. (2006) and Volberda et al. (2010) included individual-level antecedents in their integrative framework, outcomes at non-organizational levels have largely been neglected. If AC is a multilevel construct, we expect that outcomes will vary across these levels. For example, if a firm generates an innovation by absorbing a piece of new knowledge, there must be some changes at the individual or group level. Moreover, these non-organizational level outcomes might influence the firm’s future knowledge absorption, which in turn reflects the process and dynamism of AC.

We suggest that future research should exercise caution when applying existing definitions of AC at non-organizational levels directly. To better address AC’s multilevel nature, future studies should also incorporate non-organizational factors into the main AC construct, rather than solely representing them as antecedents. Additionally, researchers should consider outcomes at non-organizational levels. By integrating these non-organizational level factors into both the main construct and the outcomes, we expect to achieve a more comprehensive understanding of AC. This approach will provide clearer

insights into how AC emerges from interactions between factors at different levels, and how AC, as a system, dynamically evolves from one stage to the next.

Future research can advance this direction of inquiry by theorizing with mechanisms. As showed in our analysis, there are only two literature reviews trying to unfold the underlying mechanisms of AC. Unfortunately, (Codero & Ferreira, 2019) only summarized some AC-related organizational mechanisms and did not provide sufficient discussion on how these mechanisms enable the emergence of AC. Martinkenaite & Breunig (2016) explained how each dimension of AC emerge from interactions between organizational factors and individual level factors. Future research can contribute to the field by investigating how AC emerge from interactions among dimensions of AC.

5.3 Measurements of AC

Our analysis show that how to precisely capture AC is still a challenge in the field, and most of the studies rely on few established measurements, such as R&D investments, survey questions based on Cohen and Levinthal's definition, and survey questions based on Zahra and George's definition. It is time saving to apply these established measurements, but it will also cause misalignment between conceptualization and measurement. As showed in Maldonado et al. (2019), conceptualization have significant influence on the effect sizes of AC on its outcomes, implying that we should take measurement issues into account when defining a concept or construct. In addition, unidimensional measurements should be avoided since it failed to explain which dimensions are the drivers of the outcomes.

There is opportunities for future research to develop measurements by separating AC from knowledge absorption processes, as discussed in previous section, and climbing the ladder of abstraction (Osigweh, 1989). We argue that categorize AC dimensions by knowledge stages is one of the barriers for accurately measuring AC. First, as mentioned before, it is possible that some abilities or capabilities are required in multiple stages. Therefore, survey questions capturing one dimension AC may correlate to other dimensions. For instance, in a widely cited measurements of AC, acquisition is capturing by six items asking how frequent employees are engaging with external knowledge holders, and assimilation is capturing by three items that reflect how fast employees can understand external information (Jansen, Van Den Bosch, & Volberda, 2005). However, for employees to successfully acquire new knowledge from the external knowledge holders, merely expose to the knowledge environment may be insufficient, and the ability to quickly understand the information they exposed to may be essential for them to successfully acquire that knowledge.

5.4 Antecedents and outcomes of AC

For some factors, such as knowledge characteristics and environment factors, there is still no consensus on whether it should be an antecedent of AC or is a moderator. To resolve this issue, there is opportunity for future research strive for greater clarity and consensus in defining and categorizing these factors. A systematic approach to classifying antecedents and moderators based on well-established theoretical frameworks would help to eliminate ambiguity. Additionally, researchers could consider conducting meta-analyses or systematic reviews to synthesize findings across different

studies and identify patterns or trends in the effects of these factors on AC and its outcomes.

In Cohen & Levinthal (1990), the individuals' AC has been highlighted as the important building block of organizational AC. Based on that argument, many following studies assume that the direction of influence between individual factors and organizational AC is unidirectional, neglecting the potential influence of organizational AC on individual factors. For instance, dynamic capability view of AC is closely related to organizational change (Zahra & George, 2002). A recent study has also showed that strategy implementation and organizational change affect employees' network ties (Lynch & Mors, 2019). Therefore, the direction of influence from organizational AC to individual factors is possible. In the included reviews, we found that intensive attentions have been paid on integrating antecedents into different levels, but few literature reviews focus on how AC impacts on outcomes at lower or higher levels. Lane et al. (2006) denoted an indirect affect of AC on member's mental models through knowledge outputs. Unfortunately, there is no sufficient discussion on this issue. To build a multilevel construct of AC, more attention is needed to investigate outcomes of AC at different levels, especially how organizational absorptive capacity influences individuals within the organization. Researchers can adopt a multilevel perspective and employ mixed-methods approaches to explore the relationships between AC at the organizational level and individual-level outcomes. This could involve examining the impact of AC on employee knowledge development, learning, and performance, as well as how changes in individual factors contribute to future organizational AC.

5.5 AC as a system

System thinking was embraced during the inception of AC research by Cohen & Levinthal (1990). Several included review articles were attempted to integrate relevant components into a system of AC. For instance, Volberda et al. (2010) integrated antecedents of AC into different levels; Lane et al. (2006) identified several external and internal drivers of AC process and included feedback loops from knowledge outputs to member's mental model, firm's strategy, and firm's structure and processes; Todorova & Durisin (2007) also included feedback loops from outcomes to antecedents. However, integrating components and adding feedback loops are not sufficient to explain components at different levels interact with each other, how the system change throughout the knowledge absorption stages, and how the system evolves in a long run. Unfortunately, little attention has been paid to answer these questions in the included reviews. We argue that the failure to distinguish AC from the knowledge absorption process is one of the reasons why the review articles have been unable to explain how the AC system changes throughout the process.

An most obvious strength of system theory is that it can simultaneously take multilevel factors into account while maintain a holistic view of the subject matter (Teece, 2018). Future research can combine the system theory and above-mentioned suggestions to investigate what are the essential components of the AC system, how the AC system initiates, how AC as a system interact with the environment, how multilevel factors interplay to make this system work, how the AC system change over the stages of knowledge absorption, and how the system transforms into other systems or dissolves.

In addition, future studies can utilize fuzzy set theory, simulations, and qualitative comparative analysis to empirically test the AC system (Post et al., 2020).

6 Contributions and Limitations

6.1 Contribution

There are two primary contributions of this umbrella review. Firstly, this article advances research method development in the field of management. To our knowledge, this is the first umbrella review in the field to promote theory development by systematically reviewing reviews on a specific topic. Compared to conventional literature reviews, an umbrella review can synthesize comprehensive evidence from existing literature. This approach enables scholars, especially those new to the field, to grasp key contentious issues in a research topic with a plethora of primary studies, such as AC, in a short time. In addition, conducting an umbrella review enables researchers to understand the focal field from a higher-level of view, dig deeper to the theoretical roots of the field, and make fundamental contributions to the field.

Secondly, this review contributes to AC research by investigating several key questions such as: What contentious issues are literature reviews of AC attempting to resolve? What approaches have these literature reviews employed to address these issues? How do these reviews contribute to AC theoretical development? And what new contentious issues have been generated by these reviews? We have identified seven categories of contentious issues challenging the advancement of AC. To address these issues, review articles have employed the seven approaches proposed by Post et al. (2020). However, we also found that these review articles often increase the ambiguities surrounding the

construct, rather than resolving the contentious issues. We have cataloged all the issues raised by the review articles and discussed the persistent issues pertaining to AC's definition, dimensionality, levels, and the dynamic process. This umbrella review, by exposing emerging perspectives, analyzing assumptions, clarifying constructs, theorizing with mechanisms, and theorizing with system theory, has revealed numerous research opportunities for future studies.

6.2 Limitations

In terms of limitations, firstly, this umbrella review only used literature reviews as a source of evidence. Consequently, there may be potentially overlooked evidence presented in primary studies that was not synthesized by the literature reviews included in our sample. To overcome this limitation, future umbrella reviews could include empirical articles that feature a systematic-like literature review.

Secondly, as illustrated in Table 1, most of the literature reviews in our sample are narrative articles. Therefore, the evidence presented in these reviews may be influenced by the authors' backgrounds, experience, and prior knowledge about AC, among other factors that could impact the authors' interpretations of the evidence.

7 Conclusion

To capture a holistic picture of AC and identify contentious issues regarding its conceptualization and theory building, this article conducted an umbrella review, which has been widely used in medical and health care research but is still in an inception stage in the field of management. By combining methods of systematic reviews, this article systematically reviewed twenty-six reviews articles that are AC-centric. Based on Van de

Ven's (2007) theory building practices, this umbrella review identified seven categories of contentious issues of AC which are targeted by the included reviews. According to and Post et al.'s (2020) avenues that literature reviews advance theory development, this article analyzed the contributions of these review articles in resolving the contentious issues and identified remaining and new generated issues. By applying Post et al.'s (2020) approaches, this umbrella review revealed five aspects of opportunities for future research.

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