A Critical Review of Absorptive Capacity Measurement and Misspecification in Business Research

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Abstract. The aim of this research is to critically review absorptive capacity conceptualization and operationalization. Although Cohen and Levinthal [1] emphasized multidimensionality of absorptive capacity, researchers have conceptualized it as a unidimensional construct, encompassing knowledge acquisition, assimilation, transformation and exploitation. From epistemological and ontological perspectives, knowledge acquisition and assimilation differ from other capacities, namely, knowledge transformation and exploitation. Knowledge acquisition and assimilation represent knowledge conversion from explicit-to- tacit and tacit-to-tacit processes that should be done at the individual level of analyses. Accumulated and assimilated knowledge with organization learning facilitate the transformative process to exploit knowledge for business purposes. Thus, absorptive capacity (ACAP) should be conceptualized and operationalized as a multilevel, multidimensional and latent construct involving distinctly dynamic capabilities. It involves a new way of thinking from epistemological and ontological perspectives. In addition, there is a paucity of research regarding ACAP measurement and specification. The current research provides a theoretical framework on how the measurement of ACAP should be taken in terms of its relation to indicators and order level.

Keywords: Absorptive capacity · Potential absorptive · Realized absorptive capacity · Epistemology · Ontology

1 Introduction

There is ample evidence that knowledge absorptive capacity has great impact on the firm's learning, innovation, performance and competitive advantage [1, 2, 12, 20]. Following the research line of Cohen and Levinthal [1] absorptive capacity refers to the firm's recognition of the value of new external knowledge, assimilating it, and applying it to commercial ends [1]. However, in recent years, absorptive capacity has undergone several reconceptualization [2, 3]. Zahra and George [2] argue that ACAP should comprise two significant subcontracts: potential ACAP and realized ACAP. They substitute the component "recognizing the value" with acquisition and transformation. In this

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respect, ACAP refers to dynamic capability formed by a set of organizational routines of knowledge acquisition and assimilation as well as knowledge transformation and application. Activation triggers moderate knowledge acquisition and assimilation (potential ACAP), while social integration mechanism moderates the relationship between potential absorptive capacity (PACAP) and realized absorptive capacity (RACAP) encompassing transformation and exploitation. Todorova and Durisin [3] suggest a reintroduction of recognizing the value of external knowledge an alternative understanding of transformation. Furthermore, the ACAP construct is based on organization level of analysis and thus, the application of this construct as an individual level of analysis may lead to misconceptualization and operationalization [20]. The process of ACAP scale measurement operationalization and validation continues to be challenging in the knowledge management literature. Undoubtedly, part of the problem is that researchers fail to adequately define construct knowledge domains, components and dimensions. The first issue is whether ACAP construct has a multiple sub- dimensions. The second is the nature of the relationship between the sub-dimensions and the higher order construct. Therefore, the aim of this research is to shed light on the ACAP conceptualization as a latent, multidimensional construct that involves a new way of thinking from epistemological and ontological perspectives. Our aim in reviewing the existing conceptualization of ACAP construct is to reduce such confusion embedded in the theorizing process of the construct component, processes and measurements.

2 Literature Review

2.1 Absorptive Capacity Conceptualization

Although the concept of ACAP initially appeared in the context of technology transfer, Cohen and Levinthal's [1] article is generally accepted as the foundation of ACAP construct. Cohen and Levinthal [1] view absorptive capacity as firm's ability to recognize the value of new external knowledge, assimilate it, and apply it to commercial ends. The premise of the ACAP concept is that a firm needs prior related knowledge to assimilate and use new knowledge [1]. Thus, a firm ACAP depends on the ACAP of its knowledged workers. It is a firm cognitive abilities and efforts of its individual members. Zahra & George [2] broaden ACAP from the original three dimensions (recognize the value of new knowledge, assimilation and exploitation) to four dimensions, acquire, assimilation, transformation and exploitation. According to Zahra and George [2], absorptive capacity exists as two sub-constructs: Potential ACAP and realized ACAP. PACAP comprises knowledge acquisition and assimilation capabilities and RACAP construct contains knowledge transformation and exploitation. Knowledge acquisition refers to a firm's capability to identity and to acquire externally generated knowledge. Assimilation capability refers to the firm's routine and process that allow it to analyze process, interpret and understand knowledge [1, 5]. External knowledge enables the firm's internal knowledge to be extended by stimulating and assimilating knowledge potential capacities and innovation capabilities [4, 9, 10]. Transformation is a firm's capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge. Exploitation capability is the ability to refine, extend and

leverage existing knowledge or to create new ones by incorporating acquired and transformed knowledge into its operations. It reflects a firm's ability to harvest and incorporate knowledge into operations [11]. However, transformation and exploitation are not steps after knowledge acquisition and assimilation but represent distinct knowledge capacity subset [12, 13]. Zahra and George [2] theorized that the relationship between PACAP and RACP is moderated by social integration. Potential ACAP represents knowledge seeking capabilities, whereas RACAP is the starting point of knowledge transfer process [13]. Todorova and Durisin [3] further argue that there are serious ambiguities and omissions in Zahra and George [2] reconceptualization of ACAP and call into question the splitting of the construct into the subsets of ACAP and RACAP. Further, Todorova and Durisin [3] suggest a reintroduction of "recognizing the value of external knowledge and clarification of potential ACAP". Contrary to Todorova and Durisin [3] position, the research findings of Flatten et al. [6] show that transformation is an integral part of ACAP. Consequently, they argue that recognizing transformation process helps to open the black box that has dominated the prior research. Volberda et al. [10] proposed an integrative framework for ACAP. They suggest that there is a vital need to consider intra organizational antecedents as significant drivers of ACAP. However, all models reviewed consider assimilation and exploitation as components of ACAP, and most other models also consider recognizing the value of external knowledge (acquisition) and transformation as important components of the construct [12, 13, 21]. Furthermore, even though Cohen & Levinthal's work [1] highlights to multidimensionality of ACAP, researchers have measured it as a unidimensional construct. They measure ACAP with simple research and development (R&D) proxies ignoring the construct dimensions and implications. These shortcomings suggest a need for a more valid measure that captures the multiple dimensions of ACAP [14]. Other shortcomings of ACAP literatures are limited attempts to conceptualize the construct and little attention is given to the actual process or dimensions underlying ACAP [18]. The reasons behind this insufficient conceptualization of ACAP as a complex and multilevel construct may be attributed to limited research attention to its dimensionality, antecedents and knowledge stickiness [15, 17]. Accordingly, fundamental epistemological, ontological and axiological differences between knowledge ACAP dimensions or processes are neglected.

3 Critical Review of ACAP Conceptualization

The majority of the research in the ACAP literature has viewed knowledge as static knowledge resources and not as a process or dynamic capability [7, 12]. ACAP researchers tend to perceive knowledge as explicit knowledge that can be transformed and exploited. Therefore, in addition to recognizing transformation and exploitation, explicit knowledge process researchers also conceptualized acquisition and assimilation as an explicit knowledge process at organizational level of analysis. The emergence of ACAP from the actions and interactions of individuals and organization levels remains unclear [11]. In contrast, Cohen and Levinthal [1] highlight the importance of individual's cognitions and organizational learning to recognize and assimilate new external knowledge. Thus, from epistemological and ontological perspectives, knowledge acquisition capacity and assimilation capacity differ from other capacities, namely, knowledge transformation and exploitation. Table 1 illustrates the difference between ACAP dimensions

or processes from epistemological, ontological and cognition perspectives. Furthermore, a firm's ACAP starts from individual's recognition of the value of new external knowledge. It depends on the individual ACAP and its relations to prior existing knowledge within a firm. A firm cannot actually assess the value of external knowledge if their knowledge workers fail to recognize, perceive and assimilate this knowledge.

Table 1. Difference between ACAP processes

	Acquisition	Assimilation	Transformation	Exploitation
Epistemology	Internalization	Internalization	Externalization practices	Externalization
Ontology	Individual	Individual	Organizational	Organizational
Knowledge conversion	Explicit tacit	Tacit-Tacit	Tacit-Explicit	Tacit- Explicit Explicit- Explicit
Cognition	Knowledge static	Knowledge dynamic	Dynamic process	Knowing dynamic process
Knowledge capacity	Potential	Potential	Realized	Realized

Thus, knowledge acquisition and assimilation represent knowledge conversion from explicit-to-tacit and tacit-to-tacit processes that should be done at individual level of analysis. Accumulated assimilated knowledge (external and internal knowledge) with organizational learning facilitate process to capsulate and exploit knowledge for business purposes. Thus, ACAP should be conceptualized and operationalized as a multilevel construct (individual and organizational) and multidimensional and learning models, involving distinctly dynamic capabilities. Knowledge ACAP does not reside in an individual's mind, nor is it an aggregate of organizational knowledge [8]. Rather it depends on the dynamic process and interaction between individual and organizational level of analysis. We believe that the failure to understand ACAP as multidimensional, latent and multilevel construct and its components will exert detrimental effect on the construct measurement and its operationalization. ACAP includes a set of four different dynamic capabilities that should be associated and build upon one another to create a firm knowledge capacity. Although, ACAP is recognized as a multilevel construct, scholars tend to omit the role of knowledge workers or they attempted to adapt measures of a firm to the individual level [11, 12, 16]. Thus, ACAP construct should be conceptualized as two different subset, acquisition and assimilation dynamic capacities which represent an individual cognition process and the organizational level of knowledge conversion incorporated with transformation and exploitation capacities. The individual cognition process implies explicit-to-tacit conversion whereas practical encapsulated process implies tacit-to-explicit and explicit-to- explicit knowledge conversion at a firm level. Therefore, the process of ACAP conceptualization and operationalization continues to be challenging in the literature. Undoubtedly, part of the problem is that researchers fail to adequately theories construct knowledge domain, its components, and dimensions. The first issue

whether ACAP construct has multiple dimensions that involves individual and organizational level of analysis. The second important issue is the nature of the relationship between construct dimensions, processes of knowledge conversion and the higher order construct.

4 Absorptive Capacity Measurement and Misspecification

Some researchers addressed ACAP as a composite construct which posited that the construct is a total sum of its measures.

Further, researchers have not confirmed the direction of causality that should be posited either from construct to measures (reflective measurement model) or from measures to construct (formative measurement model). Thus, researchers need to conceptualize carefully this construct and identify the direction of causality between potential absorptive capacity, realized absorptive capacity and their measures [19, 22]. Using absorptive capacity as composite latent construct without distinguishing between absorptive capacity processes will result in inconsistent estimates and misspecification. More specifically, absorptive capacity should be modeled as two different sub constructs: potential and realized and as having formative measures or reflective measures when researchers follow specific conditions that are associated with reflective and formative measurements models. In such cases, further theoretical, methodological and conceptualization of the construct may be needed. This may require researchers to clarify absorptive capacity at more order level which sometimes include multidimensional second order level. If we view absorptive capacity as being multidimensional and consisting of acquisition, assimilation, transformation and exploitation components, the question that should be considered is the abstract order level of the relationship between these four capacities and the higher order level.

5 Conclusion and Implications

Despite the huge growth in the ACAP literature, certain essential gaps still remain, specifically, the construct conceptualization and operationalization. This research attempts to draw attention to the epistemological and ontological distinction between knowledge absorptive capacity components. Also, it provides a set of conceptual differences for deciding on the appropriate construct operationalization. Our critical review of ACAP conceptualization suggests that there are important theoretical and empirical distinctions between knowledge acquisition and assimilation which represent an individual level of analysis and knowledge transformation and exploitation at a firm level. In closing, this research assumes that failure to recognize the distinction among ACAP capacities from epistemological and ontological perspectives will have a number of detrimental effects on the construct power and validity. Therefore, it's imperative for the knowledge management field to think more carefully about ACAP reconceptualization and operationalization and do better understanding of the dynamic and multidimensionality of the construct. Nevertheless, the current research has useful implications. First, there is little guidance rice in the knowledge management literature on how to conceptualize ACAP construct. Second, this research provides a theoretical framework on how the

measurement development process of ACAP should be taken in terms of its relation to indicators and order level of analysis.

Furthermore, this research attempts to draw attention to the epistemological and ontological distinction between knowledge absorptive capacity components. It provides a set of conceptual differences for deciding on the appropriate construct operation. Our critical reviews of ACAP conceptualization suggest that there are important theoretical and empirical distinctions between knowledge acquisition and assimilation which represent an individual level of analysis and knowledge transformation and exploitation at firm level [21–23].

In closing, we believe that failure to recognize the distinction among ACAP capacities from epistemological and ontological perspectives will have a number of detrimental effects on the construct, power and validity. Therefore, it's imperative in the knowledge management field to think more carefully about ACAP reconceptualization and operationalized and do better understanding of the dynamic and multidimensionality of the construct.

Additionally, the current research has useful implications. First, there is little guidance in the knowledge management's literature on how to conceptualize ACAP construct. Second, this research provides a theoretical framework on how the measurement development process of ACAP should be taken in terms of its relation to indicators and order level of analysis. However, this research is regarded as a first step, and an important next step would be to examine the correctness of our understanding and critical review.

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