A literature analysis of the use of Absorptive Capacity construct in IS research

Shijia Gao [a], William Yeoh [b,*], Siew Fan Wong [c], Rens Scheepers [b]

[a] Faculty of Information Technology, Monash University, Caulfield East, VIC 3145, Australia
[b] Department of Information Systems and Business Analytics, Deakin University, Geelong, VIC 3220, Australia
[c] Faculty of Science and Technology, Sunway University, Selangor 47500, Malaysia

ABSTRACT

Since the seminal inception of Absorptive Capacity (ACAP) by Cohen and Levinthal (1990), it has been adopted widely in information systems (IS) research. This paper analyzes the use of ACAP in IS research through a literature analysis of ACAP-related papers published in 52 reputable IS journals from 1990 to 2015. Drawing on a review of the evolution of ACAP, the analyses conducted include: (1) descriptive analysis of ACAP in IS papers; (2) domains of ACAP usage; (3) analysis of hypotheses and propositions to show how ACAP is being used to explain various organizational phenomena in IS research; and (4) analysis of the measures to provide insights into the operationalization of ACAP in IS research. Our findings suggest that while the majority of the research correctly conceptualizes ACAP as a capability, various misalignments between ACAP conceptualization, operationalization and measurement, and the level of analysis in the literature continue to do a disservice to the accumulated research in ACAP. The findings and recommendations should help IS researchers to conceptualize and operationalize ACAP appropriately.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Since Cohen and Levinthal's (1990) seminal work on Absorptive Capacity, ACAP has become recognized as a key driver of an organization's competitive advantage, and over time ACAP has been re-examined and further developed by other authors. Generally, ACAP is defined as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990; p128). With the ubiquitous and pervasive nature of knowledge in organizations, the rapid convergence and diffusion of computing, communications, and content technologies offers organizations significant opportunities to enhance organizational ACAP (Roberts, Galluch, Dinger, & Grover, 2012). Zahra and George (2002) acknowledge that while the references to ACAP in the literature are many and varied, there is also much ambiguity in the use of ACAP among different researchers.

ACAP is an important construct in information systems (IS) research, as evidenced by the large number of citations in IS academic journals. Organizations are now allocating more expenditure to human resource enhancement, software and ICT infrastructure with the aim of developing the absorptive, retentive, and exploitative capabilities to use acquired knowledge. These developments are enabling organizations to achieve and sustain their competitive advantage (Armstrong & Sambamurthy, 1999). This applies both to an organization's understanding of its operations, in terms of process and the management of its product and service offerings, as well as to its understanding of the "state of the art" in IS. Being close to the cutting edge of IS through continual research and investment in technology assets and capabilities thus enables an organization to continually learn and absorb external knowledge in order to improve its ACAP. Understanding how researchers observe and explain the extent of organizational ACAP and its relationship with various aspects of IS is critical to the ability to determine methods and constructs that organizations can utilize to develop this capability.

Although ACAP has been applied broadly in IS research, a paper by Roberts et al. (2012) is the only work which has reviewed and synthesized the role of ACAP in IS research by exploring ACAP at the theoretical level. However, the insights provided in Roberts et al. (2012) might be limited by its review of only nine top journals that included every article that uses ACAP, even if it is only a minor citation. In response to these issues, the aim of this paper is to conduct an extended literature analysis of the use of ACAP in IS research in

order to create a solid foundation for advancing knowledge of this subject (Webster & Watson 2002).

The remainder of this paper is structured as follows. The next section presents the ACAP literature review. The third section describes the methodology used to conduct the review and the analysis of the application of ACAP in IS research. The fourth section provides the research findings. The fifth section highlights the important implications on the use of ACAP in future research, then follows the conclusions and contributions.

2. Literature review

According to the seminal work of Cohen and Levinthal (1990), ACAP is a function of the firm's prior related and complementary knowledge. They emphasize that such capacity is path-dependent and critical to innovative performance, and they allude to the importance of "recognizing the value" of new external information by noting that this is difficult without prior knowledge. In terms of "assimilation," Cohen and Levinthal argue that the impact on the firm's ACAP by individual members is significant and critical to embedding new external information throughout the organization, and they cite research in the cognitive and behavioral sciences that underlie learning and knowledge-acquisition. This suggests that ACAP is dependent on the collective prior knowledge of individuals and that the firm's ACAP can be enhanced by investing in the ACAP of individuals and by advancing the R&D, thus widening the potential interface between sources of external information and social networks within the firm. Consequently, the "assimilation" component of ACAP encompasses the firm's ability to transform, re-configure, and re-deploy resources in order to be ready to exploit new external information. Cohen and Levinthal also recognize that while the knowledge of individuals is important, ACAP "assimilation" is also dependent on the efficient proliferation and socialization of new external information in the firm, thus emphasizing that knowledge-retention into corporate memory is best facilitated by investing in, and encouraging, communication among the organization's sub-units. Cohen and Levinthal describe "applying new external information" as the exploitation of the newly acquired knowledge for commercial benefit to the organization based on technological opportunity, the volume of external knowledge available, and on the "regimes of appropriability" (innovation protection mechanisms that create a barrier between the organization and valuable external knowledge). They further argue that such exploitation of new external information is a critical component of a firm's innovative capabilities.

However, Zahra and George (2002) argue that ACAP should comprise two significant sub-components: potential ACAP (PACAP), which is the dimensions of "acquisition" (new to ACAP) and "assimilation" (as per Cohen & Levinthal, 1990), and realized ACAP (RACAP), which is the commercial "exploitation" dimension (as per Cohen & Levinthal, 1990) and the "transformation" dimension (new to ACAP). With these two sub-set components, Zahra and George focus on an "efficiency view" of ACAP; that is, its efficiency in reducing the gap between an organization's PACAP and its RACAP. Put simply, a firm can, at best, only transform and exploit as much knowledge as it has acquired and assimilated, and an innovating firm should therefore aim to maximize the ratio of RACAP to PACAP. Lane, Koka, and Pathak (2006) also acknowledge the "efficiency view" proposed by Zahra and George (2002). However, they adopt a definition that rolls back the transformational component of the ACAP model proposed by Zahra and George (2002) to that proposed originally by Cohen and Levinthal (1990; 1994). Lane et al. (2006) justify this regression by suggesting that "transformation" is incorporated and assumed in the "assimilation" and "exploitation" components of their model. Todorova and Durisin (2007) further argue that there are serious ambiguities and omissions in Zahra and George's (2002) reconceptualization of ACAP and call into question the splitting of the construct into the sub-sets of PACAP and RACAP. Volberda, Foss, and Lyles (2010) propose an integrative framework for ACAP based largely on Zahra and George's (2002) model. However, their most important contribution is the emphasis on multilevel antecedents and contingent factors that influence the outcomes of organizational ACAP. Volberda et al. (2010) suggest that there is a need to consider "intra-organizational antecedents" and "managerial antecedents" as significant drivers of organizational ACAP.

Table 1 summarizes the commonalities and differences of the reviewed ACAP models. The cells highlighted in dark-grey indicate a commonality between all five major ACAP models. All of the models reviewed consider "assimilate" and "apply" as components of ACAP. Most of the models reviewed also consider "recognizing the value," "acquisition," and "transformation" as important components (light-grey highlighted cells). There appears to be agreement among these researchers regarding ACAP antecedents "knowledge source" and "prior knowledge", and with minimal agreement on other observed antecedent factors. There is less agreement, however, in regard to contingent factors although most agree that "regimes of appropriability" are a significant mediating factor. Cohen and Levinthal (1990) view "regimes of appropriability" as a mediating factor between ACAP antecedents and ACAP, taking

Table 1
Summary of the elements of the various ACAP models. (Note: dark-grey highlights show common views among all researchers in the sample; light-grey highlights a majority view.)

Article	Year	Antecedents						ACAP Components							Contingent Factors								Outcomes							
		Knowledge Source / Complementarity / Interorganizational Antecedents	Prior Knowledge	Intraorganizational Antecedents	Managerial Antecedents	Learning Relationships / Individual Development	Environmental Conditions / Incentives	PACAP	RACAP	Recognizing the Value	Acquire	Assimilate	Transform	Apply / Exploit	Regimes of Appropriability	Activation Triggers	Social Integration Mechanisms	Environmental Conditions	Organisational Mental Models	Organisational Strategies	Organisational Structures and Processes	Power Relationships	Innovation	Innovative Performance	Knowledge Outputs	Exploitation / Exploration	Commercial Outputs	Flexibility	Performance	Competitive Advantage
Cohen and Levinthal	1990	X	X							X		X		X	X								X	X						
Zahra and George	2002	X	X					X	X		X	X	X	X	X	X	X						X					X	X	X
Lane et al.	2006	X	X			X	X			X		X		X			X	X	X				X		X		X		X	
Todorova and Durisin	2007	X	X							X	X	X	X	X	X	X	X					X	X					X	X	X
Volberda et al.	2010	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X					X			X			X	X