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The Field of Ambidexterity Research: Perspective from Information Systems Domain

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Abstract

The study of ambidexterity continues to attract attention from scholars across multiple business domains. This has contributed to several reviews of the ambidexterity field being conducted and reported in the recent past. This article builds on the existing reviews and takes stock of the ambidexterity research, with a focus on Information Systems (IS) domain. Furthermore, this systematic review takes a unified perspective of the field and addresses some of the ongoing debates about the conceptualisation of the ambidexterity construct, trade-offs being addressed as well as its relevance and applicability for IS research.

Keywords

Ambidexterity, Alignment, Adaptability, Exploration, Exploitation

1 Introduction

Ambidexterity, in the literal sense, refers to the state when an individual can use both the hands to equal effect. While ambidextrous individuals are able to carry off special tasks, they struggle with trade-off decisions. This notion has been extended to organizational studies since several decades. Firms generally attempt two different things at the same time in their bid for survival as well as continued growth: (1) exploring new markets as well as exploiting existing assets and capabilities, or (2) aligning to today's business demands as well as adapting to future environmental changes. This creates internal tensions at multiple levels, primarily due to the prominence of constraint in available resources. Every organization has a limited set of resources. Their allocation must be done appropriately to strike a balance between short-term and long-term benefits. Ambidexterity relates to the specific ways adopted by organizations in order to reconcile the tensions. This could involve creation of separate units to handle the duality (Duncan 1976; Tushman & O'Reilly 1996) or the provision of an appropriate context for business units (Gibson & Birkinshaw 2004).

1.1 Origins of the Construct

The roots of the construct lie in the organizational learning and innovation literature (cf. Duncan 1976; March 1991; Tushman & O'Reilly 1996). Duncan (1976) first used the term "ambidextrous" to study innovation process in organizations. According to his study, "dual structures" – two sub-units each handling unique trait - facilitate the initiation and later implementation of innovation process in organizations. Organizations rely on high structural complexity, low centralization, and low formalization to initiate innovation. Inverse conditions are relied upon to implement innovation. The idea of separate structures followed by organizations, each responsible for its own unique strategy and environment has long been advocated (e.g., Lawrance & Lorsch 1967). In a seminal work on innovation, Burns & Stalker (1961) advocate for organizations to follow "organic" approach while undergoing periods of change. It encourages fluid definitions of roles and responsibilities, and lateral coordination mechanisms. In parallel, "mechanistic" approach is recommended during periods of stability. It encourages well defined roles and responsibilities, and clear hierarchical relations.

Building on this insight, researchers argue for organizational need to address trade-offs. This is seen as crucial for their success in the long run. In a seminal work on organizational learning, March (1991) introduce the notion of exploration and exploitation as two ends of a continuum. Exploration is looked upon as basis to experiment with new alternatives. Exploitation is looked upon as basis to refine existing competencies. Subsequently, the pursuit of these individual strategies is seen to require different organizational structures, processes and contexts.

These earlier attempts to suggest the need for organizations to embrace trade-offs brought the focus on ambidexterity. One of the initial ways proposed is to balance the duality through following an either/or approach at a given point of time. Temporal shifting of activities concerning one instance of trade-off is seen as an effective way to address the issue (e.g., Burns & Stalker 1961; Brown & Eisenhardt 1997). Specifically, punctuated equilibrium model (Tushman & Romanelli 1985) refers to a sequential pattern where long periods of exploitation is interspersed with short bursts of exploration (e.g., Burgelman 2002). However, scholars suggest a shift from this approach of balancing the trade-off to paradoxical thinking (Raisch & Birkinshaw 2008). In this regard, Tushman and O'Reilly (1996) present a review of several organizations studied over a couple of decades. They suggest the need for organizations to explore and exploit simultaneously to sustain growth. To embrace this kind of thinking, scholars have shifted the focus to structural and contextual mechanisms which potentially lead to the attainment of ambidextrous capabilities. Several scholars from an increasing variety of research domains have undertaken studies in different contexts, such as innovation (e.g., Andriopoulos & Lewis 2009; Benner & Tushman 2003; He & Wong 2004; Jansen et al. 2006; Tushman & O'Reilly 1996; Tushman et al. 1997; Tushman et al. 2010), corporate venturing (e.g., Hill & Birkinshaw 2014; Vanhaverbeke & Peeters 2005), software development (e.g., Cao et al. 2013; Ramesh et al. 2006, 2012; Tiwana 2010). These studies make an attempt to understand specific ambidextrous mechanisms that can help embrace the trade-off simultaneously.

1.2 Objectives of the Review

Over the last decade, scholars have dwelled upon ambidexterity contingent on the duality being faced in a particular setting (Andriopolous & Lewis 2009). Consequently, the literature is ripe with instances of ambidextrous solutions across several contexts. This has raised concerns around clarity on the notion of ambidexterity (cf. Raisch & Birkinshaw 2008). Several reviews on the existing state of

literature have been undertaken in the recent past (e.g., Birkinshaw & Gupta 2013; Cantarello et al. 2012; Cao et al. 2009; Gupta et al. 2006; Junni et al. 2013; Lavie et al. 2010; Li et al. 2008; Nosella et al. 2012; O'Reilly & Tushman, 2013; Raisch & Birkinshaw 2008; Raisch et al. 2009; Simsek 2009; Simsek et al. 2009; Turner et al. 2013). At an aggregate level, these reviews present a fragmented perspective of the field. Some of them have restricted the focus on one kind of trade-off, such as exploration-exploitation (e.g., Gupta et al. 2006; Li et al. 2008; Lavie et al. 2010). A few of them have focused on a particular stream of literature, such as innovation (e.g., Cantarello et al. 2012), while few others have addressed issues raised in the field around a particular time (Raisch et al. 2009). Moreover, some of the recent ones have deliberated more upon the future of the field (e.g., Birkinshaw & Gupta 2013; O'Reilly & Tushman 2013). As a response to the call for more integrative and multilevel analyses (Raisch & Birkinshaw 2008; Simsek 2009), this review builds on these earlier works to take stock of the ambidexterity field.

The objectives of this review are two-fold. First, it aims to understand the kind of ambidexterity trade-offs that are dealt by organizations. A holistic understanding of the different kinds of dualities shall help assess the clarity around the notion of ambidexterity in the literature. Second, it attempts to bring out the different approaches followed by the organizations to become ambidextrous.

The selection of articles is based upon an extensive search through primary databases, such as 'ABI/Inform Proquest' and 'EBSCO'. Suitable keywords ("ambidexterity", "ambidextrous", "exploration", "exploitation", "alignment" and "adaptability") are used for the search string. The focus has been on the referred journal articles. Research published in other sources, including conference proceedings, has been considered when the citation count for them exceeds 100. Title-based and abstract-based short-listing is done to come up with the final list of articles. Subsequently, 77 primary articles have been selected for this review.

2   Ambidexterity Trade-offs

Several competing forces faced at multiple levels of an organization have been discussed in the literature, such as exploration-exploitation (e.g., Tushman & O'Reilly 1996), alignment-adaptability (e.g., Gibson & Birkinshaw 2004), efficiency-flexibility (e.g., Adler et al. 1999) and (global) integration-(local) responsiveness (e.g., Takeuchi et al. 2008b).

2.1   Exploration - Exploitation

The primary and most extensively studied ambidexterity trade-off is between exploration-exploitation. Typically, growth of an organization depends on its 'exploration', whereas immediate survival depends on its 'exploitation'. However, it is difficult to establish the optimal mix between them (Levinthal & March 1993). Generally, organizations tend to be biased towards exploitation, due its emphasis on short term success. However, activities concerning both of them are critical for prosperity of the organizations (Benner & Tushman 2003, Raisch et al. 2009).

In a simplistic sense, exploration is about "search, discovery, autonomy and innovation" whereas exploitation is about "efficiency, control, certainty and variance-reduction" (March 1991). Both these set of activities are not competing but complimentary in nature (Katila & Chen 2008). Consequently, they require different structures and processes to be followed (He & Wong 2004). Exploration activities, which are non-routine in nature, require organic structures with fluid roles & responsibilities and decentralized decision making (Jansen et al. 2006; Lavie et al. 2010). Exploitation activities, which are routine in nature, require mechanistic structures with formally defined roles and responsibilities and centralized decision making (Jansen et al. 2006). Although March (1991) gives a broad classification of the exploration-exploitation trade-off, researchers continue to dwell on its applicability to specific contexts. In a subsequent work on organizational learning by Levinthal & March (1993), the distinction is restricted to the knowledge domain, where exploration has been referred as "the pursuit of new knowledge, of things that might come to be known," and exploitation as "the use and development of things already known." Although this view is appreciated for its specificity, researchers continue to re-define the trade-off. More recently, they have come up with several other interpretations.

The conceptual distinction between exploration and exploitation has been covered across several domains, such as organizational learning (e.g., Holmqvist 2004; Kang & Snell 2009; Levinthal & March 1993; March 1991), innovation (e.g., Andriopoulos & Lewis 2009; Atuahene-Gima 2005; Benner & Tushman 2003; Danneels 2002, 2007; Gilsing & Nooteboom 2006; Greve 2007; He & Wong 2004; Jansen et al. 2006; Katila & Ahuja 2002; Lee et al. 2003; Lee & Ryu 2002; O'Reilly & Tushman 2004; Tushman & O'Reilly 1996, 1997; Tushman & Smith 2002, Tushman et al. 2010; Van Looy et al.

2005), alliance formation (e.g., Dittrich & Duysters 2007; Dittrich et al. 2007; Hagedorm & Duysters 2002; Lavie & Rosenkopf 2006; Lin et al. 2007; Rothearmel & Deeds 2004), research & development activities (e.g., Cantwell & Mudambi 2005; Cesaroni et al. 2005; Garcia et al. 2003; McCarthy & Gordon 2011), technology search activities (e.g., Benner & Tushman 2002; Nerkar & Roberts 2004) and corporate venturing (e.g., Hill & Birkinshaw 2014; Vanhaverbeke & Peeters 2005).

Organizational learning studies have explicitly emphasized the notion of knowledge. Creation of new knowledge is seen as exploratory in nature, whereas refinement of existing knowledge is seen as exploitative in nature (e.g., Levinthal & March 1993). Existing knowledge gets refined through various combinations of such available stock, resulting in generation of value-creating ideas (Kang & Snell 2009). The process of acquiring, sharing and integrating new knowledge is driven by components of 'intellectual capital' (Crossan et al. 1999). Knowledge captured through intellectual capital depends on (1) Human Capital: Skills of individuals, (2) Social Capital: Relational networks of organizational members, and (3) Organizational Capital: Processes, systems and structures of organization (Kang & Snell 2009). Some of the more recent conceptualizations in the domain have moved the focus to inter-organizational learnings, besides those of intra-organizational learnings (e.g., Holmqvist 2004).

Innovation studies have addressed the notion of pursuing radical as well as incremental innovation, simultaneously within an organization. Radical innovation, explorative in nature, presents new designs which are helpful to attract new customers (Danneels 2002). It requires creation of new knowledge (Jansen et al. 2006). Incremental innovation, exploitative in nature, is aimed to meet the demands of existing customers (Benner & Tushman 2003). It deepens existing knowledge (Jansen et al. 2006).

Alliance formation studies have discussed the inter-organizational level of collaborations. On the one hand, exploratory alliances are formed to gain access to new technological opportunities (Dittrich & Duysters 2007; Dittrich et al. 2007; Hagedoorn & Duysters 2002). It leads to generation of new knowledge (Lavie & Rosenkopf 2006; Lin et al. 2007). On the other hand, exploitative alliances are formed to commercialize existing technologies (Hagedoorn & Duysters 2002). It leads to consolidation of existing knowledge (Lavie & Rosenkopf 2006; Lin et al. 2007). In essence, Research & Development (R&D) alliances are exploratory in nature, whereas commercialization alliances are exploitative in nature (Rothearmel & Deeds 2004).

R&D as well as corporate venturing related studies have emphasized the notion of competencies. Creation of a new competency is seen as exploratory in nature, whereas the refinement of an existing competency is seen as exploitative in nature (Cantwell & Mudambi 2005, Cesaroni et al. 2005; Hill & Birkinshaw 2014; McCarthy & Gordon, 2011; Vanhaverbeke & Peeters 2005). In essence, exploratory projects are aimed at creating new designs and exploitative projects are aimed at leveraging on existing designs (Garcia et al. 2003). Studies concerning technology search have focussed on the depth of search activities. Distant search to create new capabilities are seen as exploratory in nature, whereas local search in close proximity are seen as exploitative in nature (Benner & Tushman 2002; Nerkar & Roberts 2004).

It is evident that studies addressing the trade-off between exploration-exploitation have paid considerable attention to the notion of knowledge. This construct has received an explicit mention in majority of the studies. Despite multiple interpretations by several researchers, Levinthal & March's (1993) conceptualization seems to still hold ground. However, the implications for varied context would vary contingent upon the specifics of the domain.

In IS domain, studies have not explicitly addressed this notion. Instead, indirect references through the studies addressing dualities such as agility - stability (e.g., Vinekar et al. 2006) in the context of software development, and solution innovation - solution reuse (Durcikova et al. 2011) in the context of technical support work, are present. These studies hint at exploration through the notions of agility and solution innovation, respectively. Exploitation is hinted at through the notions of stability and solution reuse, respectively.

2.2 Alignment – Adaptability

The second most important ambidexterity trade-off addressed by the research studies is between alignment-adaptability. Few exceptions (such as, Cao et al. 2013; Huang et al. 2015; Patel et al. 2013) aside, this duality has been studied at the business unit or team level. Alignment refers to the pursuit of the entire business unit to work towards the same goal. Adaptability refers to their ability to meet changing demands in the task environment. Business units require a conducive organizational context to carry out their tasks in order to meet the competing demands. Leaders of these units provide emphasis to ensure that such a context is created (Gibson & Birkinshaw 2004).

Generally, this trade-off has been made central in settings that are implicit with conflicting objectives. For instance, the studies on outsourced software development (e.g. Cao et al. 2013; Tiwana 2010) highlight the simultaneous ability of vendor to adhere to client needs and to address evolving client requirements. Such development work involves client-vendor relationship, where client operates from a distant location as that of vendor. It is bounded by a contract that needs to be fulfilled by the vendor. *Client needs* refer to the output expectations from vendor in terms of cost, scope and quality. *Evolving client requirements* refer to the frequent updates on the product that is getting developed. Thus, the setting provides an inherent conflicting demand for alignment and adaptability. In similar vein, the community of mobile workers face competing forces for taking decisions on the field that fit with the organizational strategies, and exercising a degree of freedom while deciding what needs to be done on the field (Kietzmann et al. 2013). For instance, garbage truck drivers that use running bins to collect waste can follow the organization rules but at the same time use their own discretion to take certain decisions (Kietzmann et al. 2013).

Most studies have addressed this notion based on the fundamental goals of the specific setting. In IS domain, studies on software organizations have addressed alignment towards improving the efficiency of development processes and adaptability to the emerging customer needs (Napier et al. 2011). The other notable studies, in the domain of IT outsourcing governance and control usage in IS implementation project, have presented alignment with formal governance/control and adaptability to informal governance/control (Cao et al. 2013; Gregory et al. 2014). These notions suggest that the studies have emphasized the trade-off based on the central elements of the context (such as formal and informal governance in an IT outsourcing governance study). An exception to this is provided by the study on agile distributed development (ADD) that has addressed the conflict between alignment and adaptation-oriented activities, rather than the fundamental elements that characterize agile and distributed development (cf. Ramesh et al. 2012).

Besides the two most widely discussed trade-offs, exploration-exploitation and alignment-adaptability, research seems fragmented on the other kinds of dualities. Some of them, such as flexibility-efficiency (Adler et al. 1999), controllability-responsiveness (Graetz & Smith 2005), are particularistic to the setting.

3   Organisational approaches to become ambidextrous

The approaches followed by organisations to address any form of trade-offs is largely based on the lens of ambidexterity. Two major forms of ambidexterity are: (1) Structural (Tushman & O'Reilly 1996), and (2) Contextual (Gibson & Birkinshaw 2004). Few studies (such as, Lee et al. 2006; Luo & Rui 2009) have suggested ambidextrous coping strategies at a broader level. Several of the exploration-exploitation trade-offs have been managed following the structural approaches, viz. creation of "dual structures" (e.g., Benner & Tushman 2003; O'Reilly & Tushman 2004; Tushman & O'Reilly 1996, 1997; Van Looy et al. 2005; Vanhaverbeke & Peeters 2005). Most of the alignment-adaptability trade-offs have been handled following the contextual approaches, viz. favourable context of a business unit enabling the adequate processes (e.g., Cao et al. 2013; Kietzmann et al. 2013; Patel et al. 2013; Ramesh et al. 2012; Tiwana 2008, 2010).

Apart from these two approaches, researchers have given some attention to temporal separation of competing activities. This notion has tentatively been termed as 'sequential ambidexterity' (cf. O'Reilly & Tushman 2013). The stream of research looking at sequential ambidexterity does not constitute the scope of this review.

3.1   Structural Ambidexterity

The approach followed by the organizations is to have physical separation between opposing strategies. Each separated unit follows its own unique processes, competencies and culture. Senior managers attempt to manage the connections between these units and to integrate them. They need to create different selection and search constraints for these units to make them effective (Levinthal & March 1993). They must also work towards developing unique and different processes that need to be followed by each of these units (Benner & Tushman 2003).

Each of the sub-unit differs to a large extent in the kind of activities performed (Benner & Tushman 2003). For example, the core business units are responsible to carry out the routine work on *existing* products, whereas the R&D units are responsible for *exploring* new products and markets (Birkinshaw & Gibson, 2004). It is this ability of the organizations to carry out breakthrough initiatives and conventional operation simultaneously through the creation of "dual structures" (Duncan 1976; Tushman & O'Reilly 1996) that drives the notion of 'structural ambidexterity'. One of the best

examples of an organization following this approach is presented by *USA Today* newspaper daily. Internet expansion over the last few decades caused a fundamental shift in the way news gets delivered. Newspaper industry faced competing demands to sustain print business and at the same time thrive on an online presence. *USA Today* successfully explored the online business through an independent division *USAToday.com*, while it simultaneously exploited its existing print business through an existing division (Boumgarden et al. 2012; O'Reilly & Tushman 2004). In essence, the structural separation is relied upon to manage tensions arising due to the simultaneous pursuit of conflicting demands within the organization. Researchers have studied these separations in the context of innovation (e.g., Benner & Tushman 2003; O'Reilly & Tushman 2004; Tushman & O'Reilly 1996, 1997; Van Looy et al. 2005) and corporate venturing (e.g., Vanhaverbeke & Peeters 2005). These studies have emphasized the role of "dual structures" as being central to effectively manage tensions.

Integration of the separated units generally occur at two levels: (1) Senior team, and (2) Organizational (Jansen et al. 2009). As per the survey study conducted by Jansen et al. (2009), senior team integration occurs in the form of preparedness to work together and provide support for each other. It encourages teams to openly discuss matters, goals of their associated competing units. Organizational integration occurs in the form of collaboration between competing units and knowledge exchanges between them. Formal, as well as informal mechanisms are followed to integrate the separate units. Formal integration mechanisms provide means to integrate the units through pre-established interfaces (Ghoshal et al. 1994), such as 'routines' followed by the specific groups. Informal integration mechanisms influence boundary spanning across the units (Tsai 2002). Boundary spanning individuals are those that establish the link across units.

In line with the above arguments, the literature from varied domains present interesting insights on the way dual structures are created and the role of top management in the overall execution. Specifically, the limited IS research on structural ambidexterity focuses on how to make tenets of different software development methodologies to come together. In a study by Vinekar et al. (2006), emphasis has been given to systems development organizations' need to utilize benefits from both the agile and the traditional approaches. Traditional approaches stand for prediction, verifiability and control whereas agile approaches focuses on the uniqueness, inherent ambiguity and complexity of software development (Moe et al. 2009). Thus, agile subunit would comprise of a decentralized, flexible structure where a small group of self-organizing developers work through constant interaction with the customer and other stakeholders. Traditional sub-unit would comprise of a hierarchical structure, with the project manager planning activities and delegating them to the individual developers. The two sub-units are buffered from each other to preserve their own culture. They are integrated through a governance structure at the top level. The top management would delegate projects to the specific sub-unit depending on the relative feasibility of the approaches for the project work. This approach has a strong reliance on the top managements' ability to establish the course of action. Top managers are responsible for the cohesion of the firm through integration of the separate units.

3.2   Contextual Ambidexterity

The focus shifts towards the individuals of a particular business unit. Coined by Gibson & Birkinshaw (2004), this approach relies on the ability of an entire business unit to simultaneously meet the competing demands. Consequently, individuals are expected to decide how to best divide their time between the opposing activities. A real-life example is presented by *Toyota production systems* where the efficiency as well as the problem-solving ability of the individuals at multiple levels assist the organization to preserve its identity while striving to expand (Takeuchi et al. 2008a).

This approach demands a favourable context, which is characterized by performance management as well as social elements, for individuals to carry out their work (Schulze et al. 2008). Performance elements are defined by the behaviour-framing attributes of *discipline* and *stretch*, whereas social elements are described via the attributes of *support* and *trust* (Gibson & Birkinshaw 2004; Ghoshal & Bartlett 1994). On the one hand, 'discipline' induces the team members to voluntarily strive to meet all the expectations generated by their explicit or implicit commitments, while 'stretch' induces them to voluntarily strive for more, rather than less, ambitious objectives. On the other hand, 'support' induces the members to lend assistance and countenance to others, while 'trust' induces them to rely on the commitments of each other. The interaction between these variables results in ambidextrous capabilities. Several studies explore these concepts through case studies to establish its significance in multiple organizational settings.

Previous research in the domain of organizational studies suggests that several initiatives taken by the organizations help to support the development of performance management as well as social context.

Formal job analysis program leads to the development of job descriptions to ensure person-job fit (Patel et al. 2013). Furthermore, organizations prefer to provide financial benefits to employees for exceeding goals and targets (Patel et al. 2013). These efforts, in sync with, formal rules and processes in place are crucial for the creation of effective performance management context. At the same time, organizational activities that lead to information sharing, participatory workshops, internal advancement opportunities and job security, assist in the development of a social context (Patel et al. 2013). In a study on innovation, Jansen et al. (2006) emphasize the role of 'densely connected social relations' within the organizational units. Furthermore, Corporate Venturing (CV) unit related studies suggest a need for supportive relational context, which comprises of a 'set of relationships with the key resource holders, internal and external to the organization' (Hill & Birkinshaw 2014). These efforts, in sync with, informal processes that emphasize cooperation are crucial for creation of an effective social context.

The research in other domains have presented focused explanations on the specific ways in which contextual ambidexterity is attained, contingent to the setting. Specifically, IS research has provided evidences from the context of software development (Cao et al. 2013; Ramesh et al. 2012; Tiwana 2010), innovation-seeking project alliances (Tiwana 2008), business units of R&D organizations (McCarthy & Gordon 2011), software organizations (Napier et al. 2011), mobile communities of practice (Kietzmann et al. 2013) and the influence of social media on communication in organizations (Huang et al. 2015).

IS studies within organizations have addressed issues that are central to the workforce. McCarthy & Gordon (2011) develop a framework of management control system, dependent on R&D organizational unit goals that lead to ambidexterity. Napier et al. (2011) conduct a longitudinal study of a small software firm to understand how the organization addressed contradictory strategic choices as they developed customized and packaged solutions for the market. Their findings emphasize the crucial role of coordination groups to build appropriate performance management and social context in an iterative manner to address the challenge. In another study, Kietzmann et al. (2013) conduct multiple case studies to understand mobile workers of organizations. Building on the notion of contextual ambidexterity, they introduce four types of mobile communities of practice (CoP) depending on the level of exploration and exploitation of mobile work practices. In a recent study, Huang et al. (2015) place emphasis on the impact of social media in communication within organization. They address the tension between multivocality and univocality that occur due to the organizationally produced content and the user generated content, at the same time. Enabling mechanisms, such as ways in which communication is governed, directed and cultivated contribute to the attainment of 'communicational ambidexterity' (Huang et al. 2015).

Cross-boundary studies that have addressed the notion of ambidexterity are limited in IS literature. Inter-firm alliances have been studied to understand the ways to generate and implement innovative ideas. In this regard, Tiwana (2008) suggests that a network of collaborators with strong ties has greater capacity to implement innovative ideas. On the other hand, a network with bridging ties has greater capacity to generate innovative ideas. The complementary nature of strong and bridging ties requires organizations to strike a balance between them, which results in attainment of 'alliance ambidexterity', a form of contextual ambidexterity (Tiwana 2008).

In the context of software development, IS governance issues have been central in the research investigations that have been carried out (e.g., Cao et al. 2013; Tiwana 2010). Tiwana (2010) report that contractual governance and relational governance, in line with the notions of formal control and informal control (cf. Kirsch 1997) respectively, are needed in conjunction for smooth execution of the outsourced software projects. Balance of practices that focus on efficiency and cost reduction with those that focus on mutual understanding and collaboration builds ambidextrous capabilities (Cao et al. 2013). Other notable study by Ramesh et al. (2012) explore the role of project context in achieving contextual ambidexterity within the ADD setting. This study presents certain practices which help mitigate the process-oriented conflict (i.e., demands to follow formal processes vs informal processes) of agile and distributed environments. The findings of this study helps to develop a preliminary understanding of the setting. In line with the call by Patel et al. (2013), future studies should tease out the connections between practices and contextual elements. Establishing these connections would help to understand how practices actually lead to the attainment of ambidexterity.

4   Conclusion

This review attempts to understand the different kinds of ambidexterity trade-offs embraced by the organizations and approaches that are followed by them to become ambidextrous. Figure 1 presents

the conceptual framework based on the synthesis of this review. The conclusions derived from the review are as follows.

The literature in strategy domain has significantly paid attention to the exploration-exploitation trade-off. The common unit of analysis is at an organizational level. Generally, these studies have focused on issues faced by the organization while maintaining an internal fit between strategy and processes, and at the same time harnessing an external fit as a response to environmental challenges. In complete contrast, the literature in IS domain has significantly paid attention to the alignment-adaptability trade-off. The common unit of analysis is at a business unit/team level. Generally, these studies have addressed specific ways in which the business units align their activities towards a common goal, and at the same time adapt to changes in their environment.
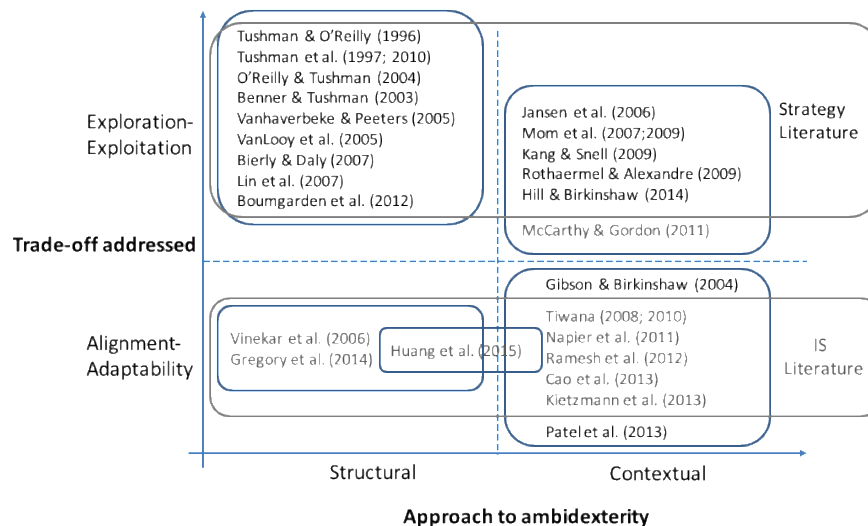

Figure 1: Conceptual Framework

The research on ambidexterity has been embraced by multiple, and an ever-increasing research stream. Such an increasing variety of research works in the domain has led to diverse understanding of the notion of ambidexterity (Birkinshaw & Gupta 2013). This review clearly suggests that the context of study shapes these ambidextrous models. Hence, future research needs to theorize ambidexterity precisely, contingent on the domain.

The existing literature presents evidence for structural and contextual mechanisms as ways to establish ambidexterity. There exists a need to address specific tensions at the appropriate unit, rather than generalizing solutions at an organizational level. As evident from this review, majority of the studies, esp. in strategy domain, have been conducted at a macro-level to understand how organizations deal with the specific trade-offs. Following the seminal work by Gibson & Birkinshaw (2004), the focus has somewhat shifted towards the individuals of a particular business unit. This has created multiple avenues for IS research to address dualities experienced in practise. Most of the IS challenges involve deeper intervention at an individual level to balance the competing needs experienced in the setting. For example, Ramesh et al. (2012) advocates for a novel project context which enables individuals to decide how to balance the alignment and adaptability requirements for an agile distributed development setting. A bigger implication of such findings is that dualities that have been commonly addressed in IS research (such as, alignment-adaptability, solution use-reuse) are better suited for contextual approaches rather than structural approaches.

Recent years have witnessed several debates around the conceptualisation of ambidexterity. Benner and Tushman (2015) addressed the critiques and suggested the need to take a closer look at how ambidexterity is exercised in varied settings. In line with their articulation, the main discourse in ambidexterity literature continues to focus on how such a capability is developed. Huang et al. (2014) points out that despite an overarching emphasis on the structural and contextual strategies, "few studies have explained what people actually do to accomplish ambidexterity". They present evidence for *site-shifting* leading to the creation of ambidexterity. Through an empirical study, they describe the emergence of practices from being transactional at the onset to being more relational in the subsequent phases. This 'shift' in the site over time, through the development of a relationship

between IT-related practices and practitioners, serves to explain how ambidexterity is achieved in the setting.

In a similar vein, Gregory et al. (2015) conduct a micro-foundational level study to explain the paradoxes faced by managers in IT transformation programs, and how they deal with them. They present managerial responses that involve a mutual blending of IT and business interests to achieve IT transformation objectives. Another empirical study by Zimmermann et al. (2018) on corporate innovation initiatives provide evidence for how frontline managers assign less significance to senior managers ambidextrous strategic choices. Instead, the findings suggest that frontline managers prefer to keep the focus on configurational practices to cope with competing forces. In line with the call by Nosella et al. (2012) and recent findings by Zimmermann et al. (2018), future research needs to analyze ambidexterity at a micro level, through the lens of organizational practices and routines. This calls for a deeper look at the enablers that have been established by organizations, business units and teams to handle the duality in contemporary settings.

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