

## ***The Role of Knowledge Assets in Ambidextrous Project Learning***

### **1. Abstract**

This paper addresses how March's (1991) concepts of exploratory and exploitative learning are evolving in the emerging paradigm of ambidexterity. A systematic review of this literature shows that although the organisational benefits of ambidexterity have been empirically analysed, there is a need for a greater theoretical and empirical basis to understand the microfoundations of this concept in organisational practice.

We contribute to the ongoing conversation by proposing an *input-process-output* perspective, where knowledge assets (in terms of intellectual capital) are inputs to the process of ambidextrous learning, and the output is evaluated in terms of performance. To operationalise these concepts, the context of project management is utilised, since this can provide a complex environment in which ambidexterity is argued to be beneficial. This paper covers the theoretical foundations of this argument, and a proposed research plan.

Keywords: *ambidexterity, explore, exploit, intellectual capital, project management.*

### **2. Introduction**

This paper builds on the seminal work of March (1991) who conceived of organisational learning in terms of *exploitation* (refining existing knowledge) and *exploration* (developing new solutions). As March identified, short-term benefit may be obtained by exploitation, whereas longer-term benefit is obtained by exploration, although this is can be a more uncertain path. These can be considered as mutually exclusive if they compete for scarce organisational resources, and so the requirement is for the firm to simultaneously exploit current competencies and resources to secure efficiency benefits, whilst also creating variation through exploratory innovation to generate future returns (Benner and Tushman, 2003; Levinthal and March, 1993). The need to practically balance operational excellence with continuous innovation is becoming increasingly important for firms in all markets, and

this management problem is receiving significant attention. An emerging body of scholarly work has shown that they can be achieved together by an *ambidextrous* organisation.

### 3. Literature Review

To understand work that has taken place to date in this field, a systematic review of the literature has been undertaken. This has been developed from the field of medicine, and provides a basis for rigorously and systematically examining the existing literature in line with a pre-defined search and evaluation strategy. It should be “systematic, transparent, and reproducible” (Tranfield et al., 2003:209). The systematic review question was proposed as: *“What is known about ambidexterity in terms of theoretical conceptualisations, operationalised research and empirical findings?”*

A review protocol was designed to identify and assess previous work, consisting of inclusion/exclusion criteria, paper evaluation criteria, quality and relevance assessment tools, and a data extraction protocol. This provides transparency in the research process, so that the study can be replicated at a future date. In terms of data location, the search question was limited to peer-reviewed academic literature, however, it was accepted that some practitioner-focused journals are likely to contain useful information. The search databases were *ABI/Inform Proquest* and *EBSCO*, since they contain the major journals in which this subject is discussed. However, books, working papers, conference proceedings and theses were also considered. The primary search term was ‘ambidex\*’ (to include ‘ambidextrous’ and ‘ambidexterity’), although other cited explore/exploit literature was also utilised. This was sufficient, as it was apparent that ‘conversations’ were occurring under this terminology, and that a paradigm was emerging (Raisch and Birkinshaw, 2008). The search returned 81 papers and also one relevant PhD, and these were synthesised through a meta-analysis of the data (Dixon-Woods et al., 2004). A breakdown of the types of papers is given in Figure 1.

The use of the word ‘ambidexterity’ in scholarly debate has risen rapidly in recent years (Raisch et al., 2009) covering multiple areas of research (Simsek, 2009). Although generically

it means the ability to pursue two different paths, a consistent definition is, however, not apparent (Cao et al., 2009; Gupta et al., 2006). A summary of some of the definitions is given in Table 1. The identified papers were reviewed, categorised as either theoretical or empirical, and rated according to the predefined protocol. Some were eliminated due to irrelevance, including interviews, summaries of other papers and reviews, guides to glove manufacturers in healthcare, etc. A total of 71 papers were retained, and a summary of the journals in which these were published is given in Table 2.

The argument of ambidexterity of that a firm must balance exploitative knowledge refinement (such as TQM, Six-Sigma, BPR, ISO9000 and so forth) with complementary exploratory practices. Benner and Tushman (2003) argue that a focus on process management can increase organisational efficiency in the short term, but can stifle exploratory innovation, diminishing long-term competitive advantage. However, Van Looy et al. (2005) argue that compared to focused organisations, ambidextrous organisations, *ceteris paribus*, tend to be inferior in terms of financial returns, jeopardising their sustainability. Ambidexterity, therefore, is not an intrinsically obvious state for an organisation to attempt to attain. It can imply additional resources, as higher levels of managerial and organisational complexity are being introduced (see also Adler et al., 2009). These issues have led to significant debate as to the methods of implementing ambidexterity, and three major forms have been identified.

### **3.1 Forms of Ambidexterity**

Tushman and O'Reilly (1996) show that during periods of incremental, evolutionary, improvement, an organisation can focus on exploitative learning, becoming better at serving its markets. However, many markets experience discontinuous, revolutionary, change, with a radical organisational response required. This represents a *temporal* strategy, where exploitative and exploratory modes are distinguished by time. O'Reilly and Tushman (2004) also identify *structural* ambidexterity, whereby firms use separate business units to perform either standard operations or radical innovations. Resources are allocated to each group, but it

is important to ensure that separate and appropriate processes are followed by each, since existing (bureaucratic) systems may be wholly inappropriate for exploratory activities. The top management team are responsible for reconciling and responding to the tensions between these two activities. Gibson and Birkinshaw (2004) take a different view, and identify business-unit level *contextual* ambidexterity, which they define as “the behavioural capacity to simultaneously demonstrate alignment and adaptability” (2004:209). The former refers to coherent business activities working towards a common goal, whereas the latter refers to the capacity to reconfigure those activities as required by the task environment. They argue that a context characterised by a combination of *stretch*, *discipline*, *support* and *trust* facilitates this contextual ambidexterity, and the results of their quantitative survey support the link between this and organisational success.

### **3.2 Theoretical Issues**

Gupta et al. (2006) debate whether the concepts of exploration and exploitation represent a continuum, or whether they are in fact orthogonal. Under conditions of structural ambidexterity where resources are separate and pursuing one path necessitates lack of investment in the other, as March (1991) contends, then the rationale of each of the units is clear and each represents an end of a unidimensional continuum (Figure 2a). Under conditions of simultaneous exploitation and exploration within a single organisational unit, though, it is reasonable to argue that there is no specific resource trade-off (Raisch et al., 2009; Cao et al., 2009; Gupta et al., 2006) but that these are orthogonal dimensions of learning, enabled by contextual ambidexterity (Figure 2b). This is supported by the empirical evidence of He and Wong (2004), and the authors of this paper support the orthogonal view. However, this still gives an incomplete theoretical representation of the possibilities discussed by Benner and Tushman (2003). Theory would suggest that there is in fact a continuum between ‘full’ structural ambidexterity (characterised by unit separation and managerial oversight), and high structural integration. Ambidexterity in this latter option may be achieved by contextual

ambidexterity, although these should not be considered as polar alternatives. Between these extremes is multi-level sub-unit coupling, which does not feature prevalently in the literature. So, whilst the ‘end-points’ of structural and contextual ambidexterity may be theoretically well-conceived, there is still ambiguity over other manifestations. Benner and Tushman (2003:242) argue for lower-level analysis of this capability, where “ambidextrous organizations are composed of multiple tightly coupled subunits that are themselves loosely coupled with each other. Within subunits the tasks, culture, individuals, and organizational arrangements are consistent, but across subunits tasks and cultures are inconsistent and loosely coupled.” Gupta et al. (2006) also point out that exploratory R&D units can work effectively with more slowly-moving and standardised manufacturing and sales groups within an organisation, so the boundary can be considered as less distinct in this case. This is represented in Figure 3, showing that structural ambidexterity is itself on a continuum, and it is not clear that the central area on that line is well understood theoretically.

This may be an issue with the nature of the empirical research performed to date, and the conception of multiple levels of hierarchy. Raisch and Birkinshaw (2008) argue that contention can be resolved one organisational layer down, yet this may be insufficient when considering complicated organisational reality. When multiple coalitions, functions and departments interact, structural boundaries can become blurred, and it becomes harder to ‘manage’ that structure. The more levels of hierarchy we attempt to consider within an organisation, the less clear it is that a single model of ambidexterity can be usefully applied. In line with Gupta et al. (2006) and Raisch and Birkinshaw (2008), we argue that the lack of multi-level, multi-domain analysis of ambidexterity is limiting our understanding of the concept, and hence this represents an inadequacy within existing theory.

### **3.3 Empirical Studies**

There have been numerous empirical studies that have examined the concept of ambidexterity. Analysis of the literature via the systematic review shows that they can be

broadly categorised under the themes of ‘organisation and structure’ (OS), ‘managerial role’ (MR) and ‘social and individual’ (SI), or a combination of these. It is accepted that these headings do not fully distinguish between the studies, but this provides a thematic structure and suitable framework for analysis and categorisation, as shown in Figure 4.

Much of the literature highlights the organisational and structural (OS) nature of ambidexterity, and a number of perspectives are taken. Katila and Ahuja (2002) operationalise ambidexterity in terms of patent searches, where exploitation is identified as *depth* (revisiting existing knowledge), and *scope* is defined in terms of the exploration of new knowledge. Their research shows that the interaction is positively related to the number of new products introduced. Evidence has been found of the benefit of structural partitioning (Grover et al., 2007; Vinekar et al., 2006; Visscher and De Weerd-Nederhof, 2006), and Sarkees and Hulland (2009) find that an ambidextrous firm strategy has a positive effect on four dimensions of performance: revenues, profits, customer satisfaction, and new product introductions. This is echoed by Ahn et al. (2006), who consider new product development in terms of both business performance and knowledge performance. O’Connor et al. (2006) also show that pure structural separation may be inadequate, and recommend a model of *discovery – incubation - acceleration* to support commercialisation. The market orientation context has been a strong source of research findings (2008; Hughes et al., 2008; Morgan and Berthon, 2008), and studies have also explored the role of the firm within its industrial network (Im and Rai, 2008; Lin et al., 2007; Riccaboni and Moliterni, 2009). However, we must be careful in proposing that ambidexterity is always beneficial. Ebben and Johnson (2005) studied small firms and found that those that followed efficiency or flexibility strategies outperformed those that attempted both. This is not entirely surprising, and can be considered as being in line with the theory discussed earlier.

Ambidexterity may be underpinned by social factors (OS-SI in Figure 4) that act to accommodate the inherent paradoxes (Andriopoulos and Lewis, 2009), as successful

ambidextrous structures involve nurturing the social context (Ambos et al., 2008; Chang et al., 2009; Graetz and Smith, 2005; Gulati and Puranam, 2009; Sethi and Sethi, 2009). Jansen and colleagues (Jansen et al., 2005; Jansen et al., 2006) find that a higher level of centralisation lowers exploratory learning, and a higher level of formalisation is associated with an increase in exploitative learning. They also find that dense social relations have a significant positive effect on both exploratory and exploitative innovation, and, interestingly, that informal coordination mechanisms are more important than formal ones in predicting both types of innovation. Similarly, Tiwana (2008) looks at the effect of bridging ties and strong ties in inter-firm alliances and argues that a “network of collaborators with strong ties has greater capacity to implement innovative ideas, but has inherently lower capacity to generate them; a network that is rich in structural holes (i.e., greater bridging ties) has greater capacity to generate new ideas, but has a lower capacity to implement them... In other words, strong ties should complement bridging ties” (Tiwana, 2008:251-2). This is in line with Subramaniam and Youndt’s (2005) findings that a firm’s social capital enables its capability to develop incremental and radical innovations.

The management role (MR) has emerged as a key contributor to managing ambidexterity (Benner and Tushman, 2003; O’Reilly and Tushman, 2008). Lubatkin et al. (2006) find that top management team behavioural integration positively influences ambidexterity, which positively influences firm performance. Jansen et al. (2008) identify that if exploratory and exploitative business units are structurally separated and are integrated at the senior manager level, this may lead to conflict if individuals within the senior management team are responsible for those units. Their research showed that a strong and compelling shared vision helps resolve those conflicts, aiding both exploratory and exploitative efforts. Mom et al. (2009) show that managers’ decision-making authority and also participation in cross-functional interfaces is positively related to ambidexterity. They emphasise the relatively large effect of personal coordination compared to more formal mechanisms and additionally

show that the interaction effects of the formal mechanisms with the personal coordination mechanisms are greater than the sum of their parts – the complementary contributions aid ambidexterity. Matson and Prusak (2003) also show the need for balancing organisational ‘best practices’ with managerial discretion, and Jansen et al. (2009) build on their previous work to show the beneficial effects of *informal* senior team social integration mechanisms together with *formal* organisational integration mechanisms. (i.e. cross-functional interfaces). This is important in showing in some detail how both formality and informality are required to be balanced to achieve ambidexterity.

At the social and individual (SI) level, Gibson and Birkinshaw (2004:210) conceive of contextual ambidexterity as “building a set of processes or systems that enable and encourage individuals to make their own judgments about how to divide their time between conflicting demands for alignment and adaptability”. Brown (2004) describes a form of ambidexterity where the firm must not only look after its core business, but also be cognisant of events at the periphery that may become mainstream. This may be accomplished by establishing ‘listening posts’, communities of practice and social software tools. Along similar lines, McLaughlin et al. (2008), Güttel and Konlechner (2009) and Katz (2005) highlight the significance of organisational culture, social norms and motivation, and Ketkar and Sett (2009) and Güttel et al. (2009) emphasise the role of HR.

#### **4. Theoretical Framework and Identification of Research Gap**

It is apparent from the literature review, and highlighted in Figure 4, that there is an imbalance in the nature of the studies performed, with a lower proportion of ‘micro-level’ studies of the mechanisms by which ambidexterity is achieved, and how this can lead to superior performance. We therefore draw upon the model of Simsek (2009), who provides a suitable framework which considers *inputs*, *processes* and *outputs*.

Considering the empirical evidence in this manner, relatively few studies can be categorised as following this structure in terms of their studies of ambidextrous phenomena. These are

identified in Table 3, and it is apparent that the underlying micro-mechanisms of ambidexterity still remain relatively elusive. A more detailed understanding can be obtained by considering the enablers of ambidexterity by way of organisational *knowledge assets*. This is based on resource-based view of the firm (Barney, 1991; Wernerfelt, 1984) and extended to consider the role of a firm's organisational knowledge (Grant, 1996; Harris, 2001; Liebeskind, 1996; Spender, 1996). Kang and Snell (2009) use the concepts of *intellectual capital* (IC) to classify organisational knowledge, allowing it to be understood in terms of its subcomponents (for a review, see Swart, 2006). In this model, knowledge is understood in terms of *stocks* (Dierickx and Cool, 1989; Starbuck, 1992), whereas learning is more associated with the *flow* of that knowledge (Bontis et al., 2002; Crossan et al., 1999). Whilst it is beyond the scope of this paper to characterise the IC literature in detail, Kang and Snell (2009) contribute to the understanding of ambidexterity by considering the role of three IC subcomponents: *human capital* (HC), *social capital* (SC) and *organisational capital* (OC).

Human capital is the knowledge in the minds of the individuals (Bontis, 1998; Hayek, 1945; Hedberg, 1981; Simon, 1991), and may be tacit or explicit (Nonaka, 1994; Polanyi, 1966). In terms of human capital ambidexterity, the work of Gibson and Birkinshaw (2004) has shown that contextual ambidexterity can itself be facilitated by individuals.

Social capital can be understood in terms of the resources embedded within the relationships between individuals and groups (Adler and Kwon, 2002; Andriessen and Gubbins, 2009; Inkpen and Tsang, 2005; Oh et al., 2006). Kogut and Zander (1992; 1996) propose that the firm be understood as a social community specialising in the creation and transfer of knowledge, and SC is the mechanism whereby the effectiveness of group knowledge is generated. Nahapiet and Ghoshal (1998) offer a model with three key dimensions of SC that enable the combination and exchange of knowledge. The *structural* dimension covers the social network, and also how transferable the SC is between contexts, the *cognitive* dimension

refers to the resources providing shared language and systems of meaning amongst participants, and the *relational* dimension encompasses trust and group norms.

As Daft and Weick (1984:285) argue: “Individuals come and go, but organizations preserve knowledge, behaviors, mental maps, norms, and values over time”, whilst Holmqvist (2009:278) writes that “Organizations learn by encoding inferences from experience into organizational routines, standard operating procedures and other ‘organizational rules.’” This represents the *organisational capital*, which Stewart (1998:108) describes as “knowledge that doesn’t go home at night.” This includes the processes, procedures and codified knowledge, as well as the organisational routines.

Kang and Snell (2009) use these three levels to develop the framework of Figure 5, whereby they consider the forms of IC in terms of their exploitative and exploratory factors. They advise that *generalist* HC is more associated with exploratory learning, and *specialist* HC is more associated with exploitative learning. They distinguish between *cooperative* SC (denser social ties, close-knit groups for complex knowledge transfer) and *entrepreneurial* SC (weaker ties, a wide range of contacts facilitating access to new knowledge), for exploitative and exploratory learning, respectively, and this is discussed in more detail by Kang et al. (2007). Finally, for OC, Kang and Snell (2009) argue that this construct can be understood as an *organic* or *mechanistic* configuration (Burns and Stalker, 1961).

They further build this argument into advocating two distinct ambidextrous architectures: *refined interpolation* requires specialist HC, cooperative SC and organic OC, whereas *disciplined extrapolation* utilises generalist HC, entrepreneurial SC and mechanistic OC. This is a powerful argument, yet there are contexts in which such architectures may not be sufficient. Kang and Snell (2009) propose that organisational ambidexterity may be achieved by combining either exploratory or exploitative elements (i.e. points at the end of a single-domain continuum) in order to create an orthogonal construct. Choosing one of the forms of HC in Figure 5 implies that there is a trade-off in the decision when applied to one of two

architectural choices, and that one is preferential over another under particular circumstances. This tends towards the conception of HC for a particular firm as a unidimensional construct, as in Figure 6[a]. Whilst functional departments may contain mainly specialists, most organisational contexts also have a need for generalists to link the work of specialists. Therefore, using the firm as the unit of analysis, we can conceive of HC as manifesting itself in two orthogonal dimensions, as in Figure 6[b]. This is also in line with the argument of ambidexterity itself being an orthogonal construction (Gupta et al., 2006), and as such it follows that the subcomponents of ambidexterity can also have a consistent representation. Drawing on the work of Kang and Snell (2009), we believe that this is a step forward in theorising, understanding and conceptualising ambidexterity when considered within more complicated environments.

Similar arguments can be made for social capital. Strong network ties for *cooperative* SC can be balanced with weak ties for *entrepreneurial* SC, and this is line with the work of Tiwana (2008) and Beckman (2006). It is not necessarily the case that the forms of SC be *either* exploitative *or* exploratory, they need not be mutually inconsistent. Consider, for example, the case of a technical product development group with close ties of specialists, but also weaker links to other departments within the firm, outside suppliers, and so forth. These ties need to be managed appropriately, though. For example, Pisano and Shih (2009) assert that outsourcing the manufacturing function weakens the R&D / manufacturing links, thereby weakening R&D capability itself, since these functions benefit by greater connectedness. The argument can be extended to the affective and cognitive dimensions (Kang et al., 2007) where these can also be conceived as complementary.

Finally, the OC organic / mechanistic distinction neglects the option for both of these forms to be balanced. Organisational rules and procedures can act as a framework in which new knowledge is created, and for complicated environments where the solutions to problems are not immediately apparent, this can readily be envisaged and is supported by the ambidexterity

literature. Visscher and De Weerd-Nederhof (2006) argue that uncertain situations demand 'bricolage', the ability to improvise with the resources at hand, where the value of planning is limited. Simsek (2009:603) also supports the simultaneity, arguing that "their joint pursuit should enhance performance by enabling an organization to be innovative, flexible, and effective without losing the benefits of stability, routinization, and efficiency."

This argument proposes that the simultaneous pursuit of both exploratory and exploitative learning at the human, social and organisational capital levels (i.e. all six factors in Figure 5) may lead to superior performance. This diverges from the conceptual model proposed by Kang and Snell (2009) who advocate organisational design using three of six factors. We argue that by considering each IC domain as an orthogonal construct, an organisation need not necessarily trade off one tendency for another. This can also be represented as in Figure 7.

To understand why these frameworks differ, it is insightful to consider the role of organisational complexity. We argue that organisations which can benefit from all six IC elements in Figure 5, represent *complex knowledge fit* (Reus et al., 2009), whereas the refined interpolation or disciplined extrapolation architectures may be suitable for less complex organisations benefitting from a more *simple knowledge fit* (for example, a functional department with relatively homogeneous staff, within a relatively stable organisation). Note that *complexity* here is intended only as a metaphor for difficulty, ambiguity, complicatedness and uncertainty, as this represents another evolving body of literature and is beyond the scope of this work to examine in detail.

From these arguments, and based on Kang and Snell (2009), we can therefore hypothesise that: [1] The three exploratory intellectual capital elements within Figure 5 each lead to exploratory learning, and the three exploitative elements each lead to exploitative learning; [2] The combination of both exploratory and exploitative forms of learning (for each of the three IC elements) leads to ambidextrous learning, and [3] Ambidextrous learning is associated with superior organisational performance.

## 5. Method: Research Model and Operationalisation

In order to operationalise these concepts, the context of the research is to be that of *complex projects* (Davies and Brady, 2000; Maylor et al., 2008). This is an important issue, given the widespread ‘projectification’ of work methods (Maylor et al., 2006) and the fact that many are seen as failures, often in the public spotlight (Cicmil and Hodgson, 2006). There is a need to understand learning mechanisms in this environment in order that we may contribute to improvement (Love et al., 2005; Lycett et al., 2004; Thiry, 2002; Williams, 2008). Using the project as the unit of analysis (as demonstrated in Figure 8) offers an interesting research proposition as the project may comprise more than one firm, and hence knowledge can reside in the network of interacting firms (Kogut and Zander, 1996; Gulati et al., 2000). However, projects are not ‘islands’ (Engwall, 2003), but are embedded within organisations, and this supports requests in the ambidexterity literature that network structures and boundaries be considered in research (Raisch and Birkinshaw, 2008; Simsek, 2009).

Due to this context, the organisational-level IC construct of OC has been replaced by the concept of ‘project capital’ (PC), and this environment has been chosen since it offers particular challenges for the participants. Firstly, project organisations often comprise multiple interconnected disciplines and departments, generating a complicated structure, as indicated in Figure 3. Secondly, since all projects are, to a greater or lesser extent, unique, their execution requires both expertise in the particular domain, yet also problem-solving capability to overcome any issues that arise. Figure 9 indicates the relationship between the themes derived from the literature review, and the link to the three levels of intellectual capital. We therefore pose the following research question: “*How does intellectual capital enable ambidextrous project learning?*”

The research model to test is shown in Figure 10, highlighting how the knowledge asset inputs can enable ambidextrous learning, and that this is hypothesised to lead to superior project performance. In line with previous empirical ambidexterity studies using a senior,

knowledgeable, respondent, the project manager is chosen as the target of this research. This is also an underexplored area (Scott-Young and Samson, 2008). His/her responses at the individual level can provide data for the HC and SC levels, and he/she can provide informed responses for project capital due to a position of oversight and influence.

Exploitative and exploratory project learning can be understood at the project level, and epistemologically, the 'process' term here represents active, action-oriented behaviour, with project learning understood in the context of execution (Edmondson, 2008). Note that the learning aspects here refer to in-project learning, rather than at the higher organisational level (although this must also be considered). In the project, exploitation therefore refers to refining and modifying behaviour based on experience, previous projects, client feedback, and so forth, whereas exploration can include such ideas as responding to project-specific issues, experimenting with new ideas and innovative problem-solving.

The evaluation of project 'success' is akin to getting a group of people to agree on the definition of 'good art' (Jugdev and Muller, 2005), since stakeholders may hold significantly different views (Agarwal and Rathod, 2006; Atkinson, 1999; Bryde and Robinson, 2005; Karlsen et al., 2005; Procaccino et al., 2005). Careful consideration is therefore required when evaluating the performance aspect in Figure 10, and multiple factors must be included.

A quantitative approach has been planned to gather research data from a wide range of projects in the IT sector, at multiple points in their life cycle (necessitating an evaluation of the project at a point in time before completion). Support and access from a global IT-services firm is in place. To develop a survey tool, two approaches are being pursued. Firstly, the instruments published as part of the empirical analysis (total 22) were reviewed, and key themes and questions were extracted and re-phrased for the project management context (see Table 4). These have subsequently been reviewed with senior academics and also via three rounds of interviews with experienced practitioners. The second path is to use qualitative semi-structured interviews with project managers to determine their understanding of the

concepts represented in the research model, and this is underway. The data will be used to augment the initial questionnaire such that a final, context-sensitive, instrument can be developed. The proposed research method is shown in Figure 11. The questionnaire will be piloted and analysed, and then the main study will be undertaken within the IT-services firm. A minimum of 200 responses are targeted, with results analysed via confirmatory factor analysis to ensure construct validity. The hypotheses will be tested using multivariate analysis, and this might show unexpected results, so it may be appropriate to perform a cross-case comparison, contrasting 'representative' results with one or more 'outlier' examples.

## **6. Contribution**

Project operations require that a balance be struck between applying and refining existing knowledge, and generating new knowledge (Adler et al., 2009). Ambidexterity is therefore an appropriate theoretical perspective to apply to this environment. The use of the project as the unit of analysis allows processes to be understood and examined at the project level, encompassing a complicated and potentially dynamic network structure, and this is advantageous in both building theory and informing practice. Testing at points in the lifecycle is not full longitudinal analysis, but is a step toward addressing the issue of a lack of research in this area (Raisch and Birkinshaw, 2008; Güttel and Konlechner, 2009; Simsek et al., 2009).

The research is being approached from an *input-process-output* perspective, building on the theory of Kang and Snell (2009), to address issues of micro-level analysis at multiple levels (Raisch and Birkinshaw, 2008; Gupta et al., 2006). This is intended to test the theoretical argument that both ambidexterity and, crucially, its intellectual capital subcomponents can be understood in terms of orthogonal constructs within the context of projects, and that this can be linked to project performance. Finally, the use of the project manager as respondent also offers a beneficial line of research, as this facilitates a better understanding of the role of this individual in generating project outcomes, itself an underexplored area of interest to both scholars and practitioners.

**Tables****Table 1 – Definitions of Ambidexterity**

Author(s)	Definition
Tushman and O'Reilly (1996)	Able to manage both incremental and revolutionary change
Gibson and Birkinshaw (2004)	'Contextual ambidexterity' as adaptability and alignment.
Benner and Tushman (2003)	Exploitative and exploratory innovation.
O'Reilly and Tushman (2004)	Structural ambidexterity, separation between exploratory and exploitative units.
Danneels (2006)	Ambidextrous firms can develop and market both sustaining and disruptive innovations.
Achrol (1991)	Simultaneous efficiency, innovation and flexibility.
Gratton and Erickson (2007)	Leaders need to be task- and relationship-oriented.
Seely Brown (2004)	Firm must not only look after its core business, but also be cognisant of events at the periphery that may become mainstream.
Graetz and Smith (2005)	Controllability and responsiveness.
Sarkees and Hulland (2009)	Innovation and efficiency.
Lin et al. (2007)	The simultaneous and balanced presence of both existing and new partners in a firm's network of alliances.
Sethi and Sethi (2009)	Two dimensions of innovativeness in new product development, namely novelty and appropriateness.
Lee et al. (2006)	Balancing flexibility and rigour in global software development,
Ahn et al. (2006)	New product development both in terms of business performance and knowledge performance.
Lee and MacMillan (2008)	Deploying both <i>procedural</i> and <i>coordinative</i> knowledge-sharing.

**Table 2: Sources of Referenced Papers and ABS 2009 Journal Rating**

Qty	Journal	Qty	Journal
10	Organization Science (4*)	1	Creativity and Innovation Mgt. (1*)
6	Academy of Management Journal (4*)	1	European Journal of Marketing (3*)
6	Journal of Management Studies (4*)	1	IEEE Trans. Eng. Management (3*)
3	Harvard Business Review (3*)	1	Industrial Marketing Management (3*)
3	Jour. Prod Innov. Management (4*)	1	Industry and Innovation (2*)
3	Management Science (4*)	1	Information Sys. Mgt. (2*)
2	California Management Review (3*)	1	International Business Review (2*)
2	Int. Journal of HR Management (3*)	1	Int. Journal of HR Dev. & Mgt. (--)
2	Int. Journal of Technology Mgt (2*)	1	Int. Journal of Innovation Mgt. (2*)
2	Journal of Change Management (1*)	1	Jour. Enterprise Culture (--)
2	Journal of Management (4*)	1	Journal of Marketing (4*)
2	Leadership Quarterly (4*)	1	Management Decision (1*)
2	Long Range Planning (3*)	1	R&D Management (--)
2	MIT Sloan Management Review (3*)	1	Research Tech Management (2*)
2	Schmalenbach Business Review (2*)	1	Research Policy (4*)
1	Business Horizons (1*)	1	Strategic Management Journal (4*)
1	Canadian Jour Admin Sciences (2*)	1	Strategic Org (2*)
1	Communications of the ACM (3*)	1	Strategy and Leadership (1*)
		1	PhD (--)
			<i>TOTAL: 71</i>

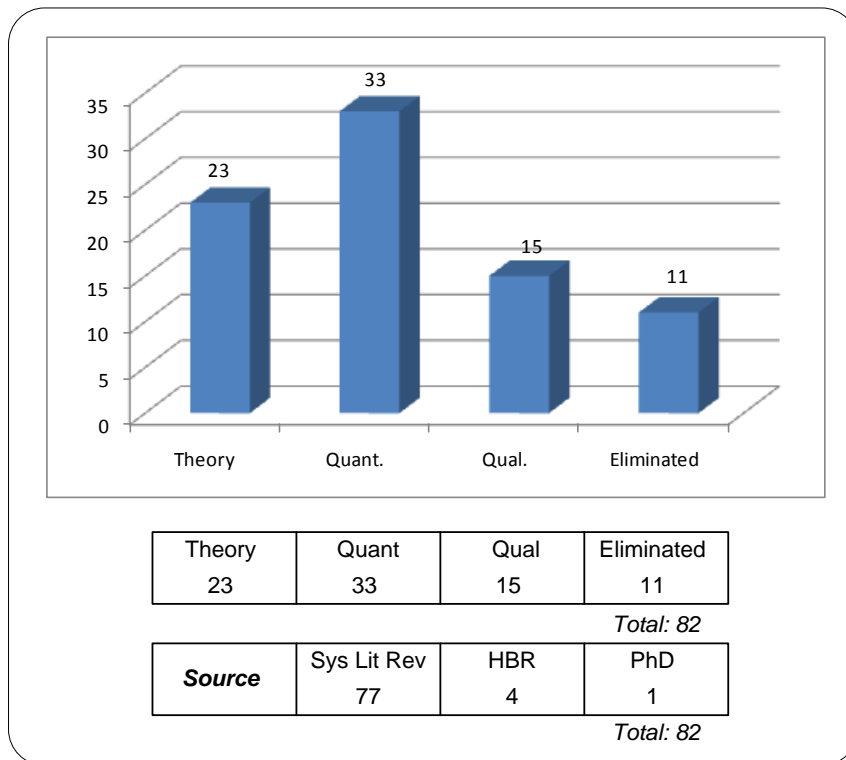
**Table 3: Input-Process-Outputs Papers from Review**

<i>Paper</i>	<i>Input</i>	<i>Process</i>	<i>Output</i>
Gibson and Birkinshaw (2004)	Performance management, social context (stretch, discipline, support and trust)	Ambidexterity as alignment and adaptability.	Business unit performance.
Han (2007)	Standardisation + many countries; few subsidiaries + customisation; centralisation + decentralisation	Ambidexterity as simultaneous pro-growth and pro-profit strategies.	Above average financial and market performance.
Im and Rai (2008)	Contextual ambidexterity and ontological commitment.	Exploitative and exploratory knowledge sharing in long-term organisational relationships.	Relationship performance.
Jansen et al. (2006)	Firm centralisation and formalisation, 'connectedness' amongst members, environmental dynamism and competitiveness.	Ambidexterity (exploitation and exploration innovation).	Organisational unit profitability.
Lubatkin et al. (2006)	Top management team behavioural integration.	Ambidexterity (exploitation and exploration).	Firm performance (inc. sales and mkt share growth, returns on equity and total assets).
Morgan and Berthon (2008)	Market orientation and generative learning.	Exploitative and exploratory innovation strategy, respectively.	Competitive position, sales growth, profit per customer, ROI, overall firm performance.
Sethi and Sethi (2009)	Quality orientation and encouragement to take risks.	'Novelty' and 'Appropriateness' in new product development.	Product performance (sales, market share, profit).

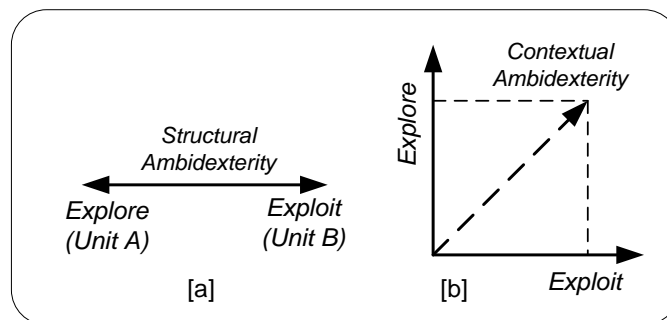
**Table 4 – Source of Instrument Questions**

<b>Factor</b>	<b>Source(s)</b>
Human Capital	Kang (2006), Ketkar and Sett (2009)
Social Capital [3]	Jansen et al. (2006), Kang (2006), Tiwana (2008)
Project Capital	Im and Rai (2008), Kang (2006), Ketkar and Sett (2009)
Exploratory Learning	Im and Rai (2008), Kang (2006), Lubatkin et al. (2006), Nemanich and Vera (2009)
Exploitative Learning	Ci-Rong Li et al. (2008), Im and Rai (2008), Jansen et al. (2006), Kang (2006), Lubatkin et al. (2006), Morgan and Berthon (2008), Nemanich and Vera (2009)
Outcome	Cegarra-Navarro and Dewhurst (2007), Geraldi et al. (2009), Gibson and Birkinshaw (2004), Ketkar and Sett (2009), Tiwana (2008)

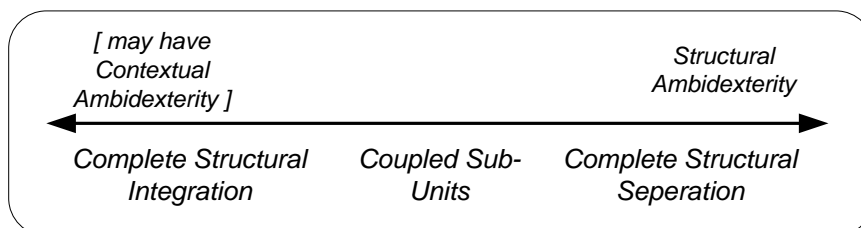
**FIGURES**



**Figure 1: Literature Themes from 'Ambidexterity' Systematic Review**



**Figure 2: Dimensions of Ambidexterity**



**Figure 3: Continuum of Structural Ambidexterity**

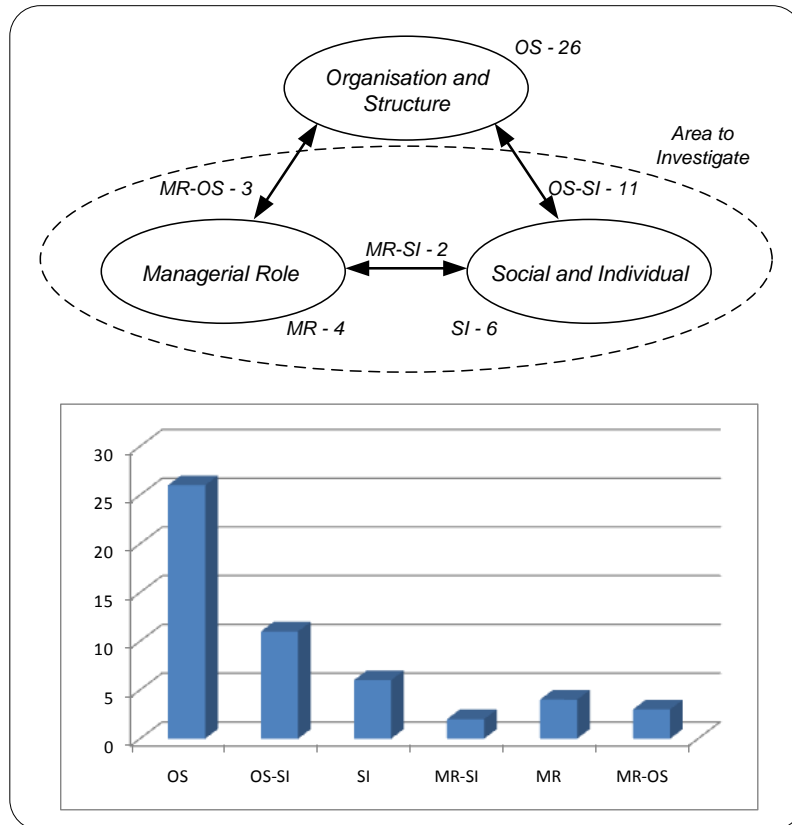


Figure 4: Literature Themes from Review of Empirical Data

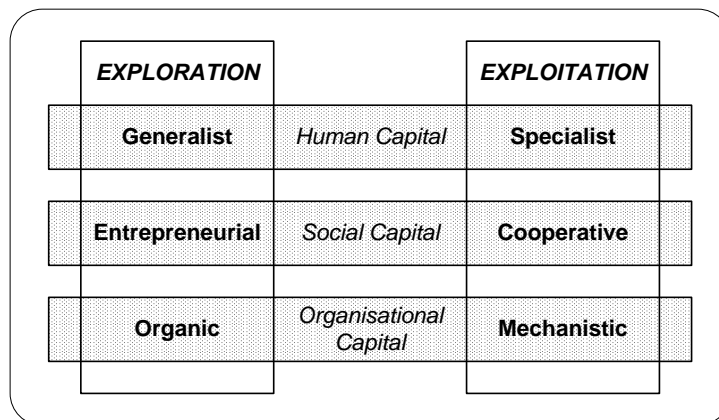


Figure 5: Ambidextrous Architectures (Kang and Snell, 2009)

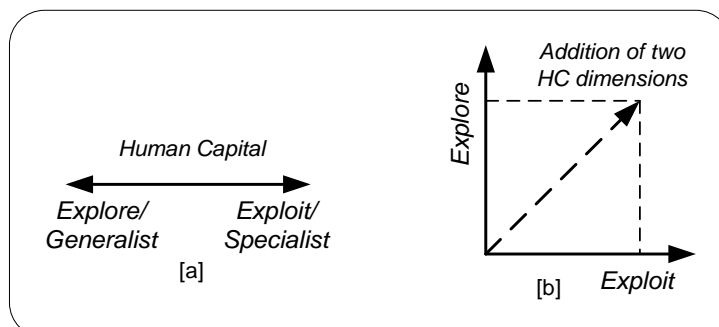
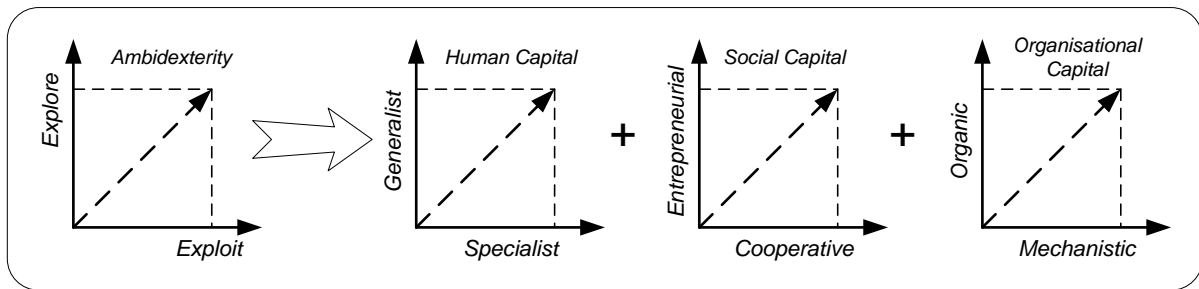
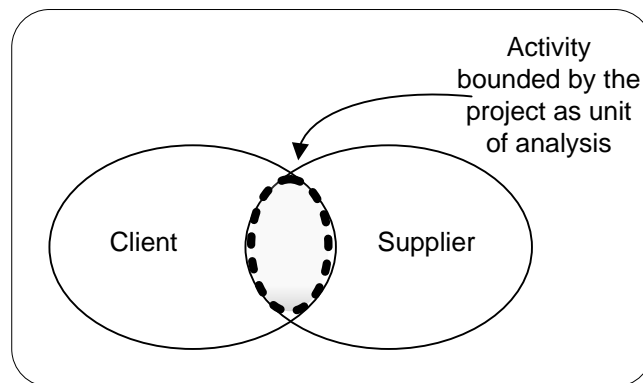


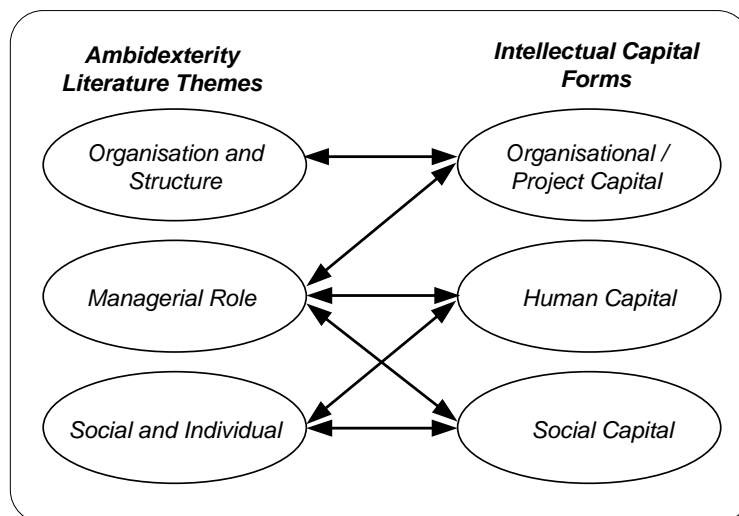
Figure 6: Orthogonality of Human Capital Ambidexterity



**Figure 7: Subcomponents of Ambidexterity**



**Figure 8: Project as the Unit of Analysis**



**Figure 9: Literature Themes and Relationship to IC**

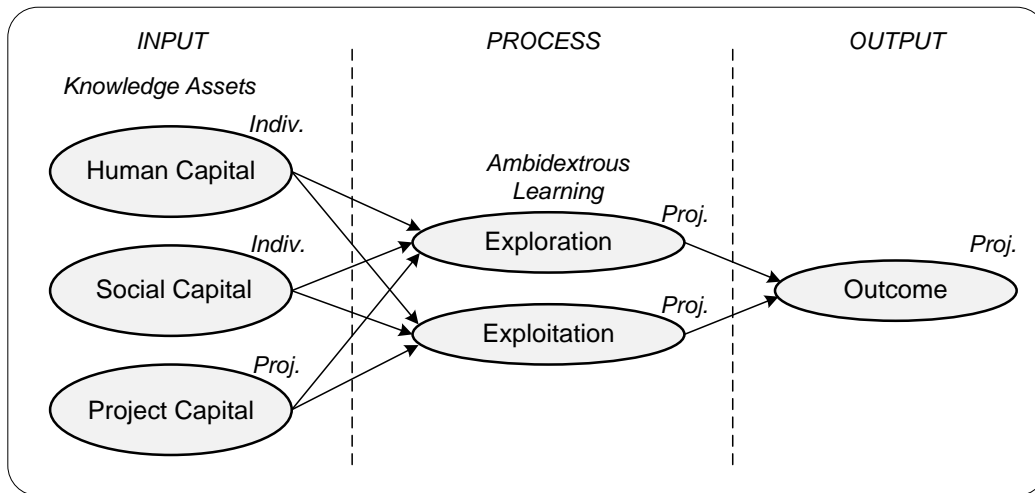


Figure 10: Research Model

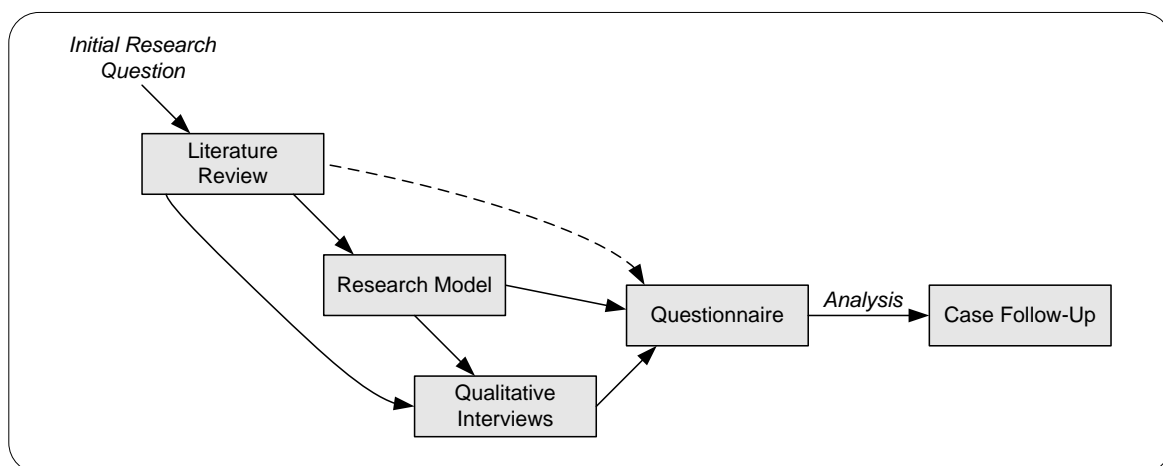


Figure 11: Proposed Research Process

## References

- Achrol, R. S. (1991), "Evolution of the Marketing Organization: New Forms for Turbulent Environments", *Journal of Marketing*, vol. 55, no. 4, pp. 77-93.
- Adler, P. S. and Kwon, S. (2002), "Social Capital: Prospects for a New Concept", *Academy of Management Review*, vol. 27, no. 1, pp. 17-40.
- Adler, P., Benner, M., Brunner, D., MacDuffie, J., Osono, E., Staats, B., Takeuchi, H., Tushman, M. and Winter, S. G. (2009), "Perspectives on the Productivity Dilemma", *Journal of Operations Management*, vol. 27, no. 2, pp. 99-113.
- Agarwal, N. and Rathod, U. (2006), "Defining 'success' for software projects: An exploratory revelation", *International Journal of Project Management*, vol. 24, no. 4, pp. 358-370.

- Ahn, J., Lee, D. and Lee, S. (2006), "Balancing Business Performance and Knowledge Performance of New Product Development: Lessons from ITS Industry", *Long range planning*, vol. 39, no. 5, pp. 525-542.
- Ambos, T. C., Mäkel, K., Birkinshaw, J. and D'Este, P. (2008), "When Does University Research Get Commercialized? Creating Ambidexterity in Research Institutions", *Journal of Management Studies*, vol. 45, no. 8, pp. 1424-1447.
- Andriessen, D. and Gubbins, C. (2009), "Metaphor Analysis as an Approach for Exploring Theoretical Concepts: The Case of Social Capital", *Organization Studies (01708406)*, vol. 30, no. 8, pp. 845-863.
- Andriopoulos, C. and Lewis, M. W. (2009), "Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation", *Organization Science*, vol. 20, no. 4, pp. 696-717.
- Atkinson, R. (1999), "Project management: cost, time and quality, two best guesses and a phenomenon, its time to ..", *International Journal of Project Management*, vol. 17, no. 6, pp. 337.
- Barney, J. (1991), "Firm Resources and Sustained Competitive Advantage", *Journal of Management*, vol. 17, no. 1, pp. 99.
- Beckman, C. M. (2006), "The Influence of Founding Team Company Affiliations on Firm Behavior", *Academy of Management Journal*, vol. 49, no. 4, pp. 741-758.
- Benner, M. J. and Tushman, M. L. (2003), "Exploitation, Exploration, and Process Management: the Productivity Dilemma Revisited", *Academy of Management Review*, vol. 28, no. 2, pp. 238-256.
- Bontis, N. (1998), "Intellectual capital: An exploratory study that develops measures and models", *Management Decision*, vol. 36, no. 2, pp. 63.

- Bontis, N., Crossan, M. M. and Hulland, J. (2002), "Managing an Organizational Learning System by Aligning Stocks and Flows", *Journal of Management Studies*, vol. 39, no. 4, pp. 437-469.
- Bryde, D. J. and Robinson, L. (2005), "Client versus contractor perspectives on project success criteria", *International Journal of Project Management*, vol. 23, no. 8, pp. 622-629.
- Burns, T. and Stalker, G. (1961), *The Management of Innovation*. Tavistock, London.
- Cao, Q., Gedajlovic, E. and Zhang, H. (2009), "Unpacking Organizational Ambidexterity: Dimensions, Contingencies, and Synergistic Effects", *Organization Science*, vol. 20, no. 4, pp. 781-796.
- Cegarra-Navarro, J. and Dewhurst, F. (2007), "Linking organizational learning and customer capital through an ambidexterity context: an empirical investigation in SMEs", *International Journal of Human Resource Management*, vol. 18, no. 10, pp. 1720-1735.
- Chang, Y., Yang, P. Y. and Chen, M. (2009), "The determinants of academic research commercial performance: Towards an organizational ambidexterity perspective", *Research Policy*, vol. 38, no. 6, pp. 936-946.
- Cicmil, S. and Hodgson, D. (2006), "Making Projects Critical: an Introduction", in Hodgson, D. and Cicmil, S. (eds.) *Making Projects Critical*, Palgrave MacMillan, Basingstoke, Hampshire.
- Ci-Rong Li, Chen-Ju Lin and Chi-Peng Chu (2008), "The nature of market orientation and the ambidexterity of innovations", *Management Decision*, vol. 46, no. 7, pp. 1002-1026.
- Crossan, M. M., Lane, H. W. and White, R. E. (1999), "An Organizational Learning Framework: from Intuition to Institution", *Academy of Management Review*, vol. 24, no. 3, pp. 522-537.

- Daft, R. L. and Weick, K. E. (1984), "Toward a Model of Organizations as Interpretation Systems", *Academy of Management Review*, vol. 9, no. 2, pp. 284-295.
- Danneels, E., (2006), *Dialogue on the Effects of Disruptive Technology on Firms and Industries*, Blackwell Publishing Limited.
- Davies, A. and Brady, T. (2000), "Organisational capabilities and learning in complex product systems: towards repeatable solutions", *Research Policy*, vol. 29, no. 7, pp. 931.
- Dierickx, I. and Cool, K. (1989), "Asset Stock Accumulation and Sustainability of Competitive Advantage", *Management Science*, vol. 35, no. 12, pp. 1504-1511.
- Dixon-Woods, M., Agarwal, S., Young, B., Jones, D. and Sutton, A. (2004), *Integrative Approaches to Qualitative and Quantitative Evidence*, , NHS Health Development Agency.
- Ebben, J. J. and Johnson, A. C. (2005), "Efficiency, Flexibility, Or Both? Evidence Linking Strategy to Performance in Small Firms", *Strategic Management Journal*, vol. 26, no. 13, pp. 1249-1259.
- Edmondson, A. C. (2008), "The Competitive Imperative of Learning", *Harvard business review*, vol. 86, no. 7, pp. 60-67.
- Engwall, M. (2003), "No project is an island: linking projects to history and context", *Research Policy*, vol. 32, no. 5, pp. 789.
- Gibson, C. B. and Birkinshaw, J. (2004), "The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity", *Academy of Management Journal*, vol. 47, no. 2, pp. 209-226.
- Graetz, F. and Smith, A. (2005), "Organizing forms in change management: The role of structures, processes and boundaries in a longitudinal case analysis", *Journal of Change Management*, vol. 5, no. 3, pp. 311-328.

- Grant, R. M. (1996), "Toward a Knowledge-Based Theory of the Firm", *Strategic Management Journal*, vol. 17, pp. 109-122.
- Gratton, L. and Erickson, T. J. (2007), "8 Ways to Build Collaborative Teams", *Harvard business review*, vol. 85, no. 11, pp. 100-109.
- Grover, V., Purvis, R. L. and Segars, A. H. (2007), "Exploring Ambidextrous Innovation Tendencies in the Adoption of Telecommunications Technologies", *IEEE Transactions on Engineering Management*, vol. 54, no. 2, pp. 268-285.
- Gulati, R., Nohria, N. and Zaheer, A. (2000), "Strategic Networks", *Strategic Management Journal*, vol. 21, no. 3, pp. 203.
- Gulati, R. and Puranam, P. (2009), "Renewal Through Reorganization: The Value of Inconsistencies Between Formal and Informal Organization", *Organization Science*, vol. 20, no. 2, pp. 422-440.
- Gupta, A. K., Smith, K. G. and Shalley, C. E. (2006), "The Interplay between Exploration and Exploitation", *Academy of Management Journal*, vol. 49, no. 4, pp. 693-706.
- Güttel, W. H. and Konlechner, S. W. (2009), "Continuously Hanging by a Thread: Managing Contextually Ambidextrous Organizations", *Schmalenbach Business Review (SBR)*, vol. 61, no. 2, pp. 150-172.
- Guttel, W.H., Konlechner, S., Kohlbacher, F. and Haltmeyer, B., (2009), *Strategies against competency obsolescence: the case of R&D-intensive organisations.*
- Han, M. (2007), "Achieving Superior Internationalization through Strategic Ambidexterity", *Journal of Enterprising Culture*, vol. 15, no. 1, pp. 43-77.
- Harris, R. G. (2001), "The knowledge-based economy: intellectual origins and new economic perspectives", *International Journal of Management Reviews*, vol. 3, no. 1, pp. 21.

- Hayek, F. A. (1945), "The use of Knowledge in Society", *American Economic Review*, vol. 35, no. 4, pp. 519.
- Hedberg, B. (1981), "How Organisations Learn and Unlearn", in Nystrom, P. C. and Starbuck, W. H. (eds.) *Handbook of Organisational Design*, Cambridge University Press, London, pp. 3.
- Holmqvist, M. (2009), "Complicating the Organization: A New Prescription for the Learning Organization?", *Management Learning*, vol. 40, no. 3, pp. 275-287.
- Hughes, P., Morgan, R. E. and Kouropalatis, Y. (2008), "Market knowledge diffusion and business performance", *European Journal of Marketing*, vol. 42, no. 11, pp. 1372-1395.
- Im, G. and Rai, A. (2008), "Knowledge Sharing Ambidexterity in Long-Term Interorganizational Relationships", *Management Science*, vol. 54, no. 7, pp. 1281-1296.
- Inkpen, A. C. and Tsang, E. W. K. (2005), "Social Capital, Networks, and Knowledge Transfer", *Academy of Management Review*, vol. 30, no. 1, pp. 146-165.
- Jansen, J. J. P., George, G., Van, d. B. and Volberda, H. W. (2008), "Senior Team Attributes and Organizational Ambidexterity: The Moderating Role of Transformational Leadership", *Journal of Management Studies*, vol. 45, no. 5, pp. 982-1007.
- Jansen, J. J. P., Tempelaar, M. P., van, d. B. and Volberda, H. W. (2009), "Structural Differentiation and Ambidexterity: The Mediating Role of Integration Mechanisms", *Organization Science*, vol. 20, no. 4, pp. 797-811.
- Jansen, J. J. P., Van, D. B. and Volberda, H. W. (2006), "Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators", *Management Science*, vol. 52, no. 11, pp. 1661-1674.
- Jansen, J. J. P., Van, D. B. and Volberda, H. W. (2005), "Exploratory Innovation, Exploitative Innovation, and Ambidexterity: the Impact of Environmental and Organizational Antecedents", *Schmalenbach Business Review (SBR)*, vol. 57, no. 4, pp. 351-363.

- Jugdev, K. and Muller, R. (2005), "A Retrospective Look at our Evolving Understanding of Project Success", *Project Management Journal*, vol. 36, no. 4, pp. 19-31.
- Kang, S. (2006), *Managing the Intellectual Capital Architecture: An Examination of the Influence of Human Resource Management on Bilateral Learning in Law Firms* (unpublished PhD thesis), Cornell University, .
- Kang, S., Morris, S. S. and Snell, S. A. (2007), "Relational Archetypes, Organizational Learning, and Value Creation: Extending the Human Resource Architecture", *Academy of Management Review*, vol. 32, no. 1, pp. 236-256.
- Kang, S. and Snell, S. A. (2009), "Intellectual Capital Architectures and Ambidextrous Learning: A Framework for Human Resource Management", *Journal of Management Studies*, vol. 46, no. 1, pp. 65-92.
- Karlsen, J. T., Andersen, J., Birkely, L. S. and Ødegård, E. (2005), "What Characterizes Successful it Projects", *International Journal of Information Technology & Decision Making*, vol. 4, no. 4, pp. 525-540.
- Katila, R. and Ahuja, G. (2002), "Something Old, Something New: a Longitudinal Study of Search Behavior and New Product Introduction", *Academy of Management Journal*, vol. 45, no. 6, pp. 1183-1194.
- Katz, R. (2005), "Motivating Technical Professionals Today", *Research Technology Management*, vol. 48, no. 6, pp. 19-27.
- Ketkar, S. and Sett, P. K. (2009), "HR flexibility and firm performance: analysis of a multi-level causal model", *International Journal of Human Resource Management*, vol. 20, no. 5, pp. 1009-1038.
- Kogut, B. and Zander, U. (1996), "What Firms Do? Coordination, Identity, and Learning", *Organization Science*, vol. 7, no. 5, pp. 502-518.

- Kogut, B. and Zander, U. (1992), "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology", *Organization Science*, vol. 3, no. 3, pp. 383-397.
- Lee, G., Delone, W. and Espinosa, J. A. (2006), "Ambidextrous Coping Strategies in Globally Distributed Software Development Projects", *Communications of the ACM*, vol. 49, no. 10, pp. 35-40.
- Lee, J. Y. and MacMillan, I. C. (2008), "Managerial knowledge-sharing in chaebols and its impact on the performance of their foreign subsidiaries", *International Business Review*, vol. 17, no. 5, pp. 533-545.
- Levinthal, D. A. and March, J. G. (1993), "The Myopia of Learning", *Strategic Management Journal*, vol. 14, pp. 95-112.
- Liebeskind, J. P. (1996), "Knowledge, Strategy, and the Theory of the Firm", *Strategic Management Journal*, vol. 17, pp. 93-107.
- Lin, Z. (., Yang, H. and Demirkan, I. (2007), "The Performance Consequences of Ambidexterity in Strategic Alliance Formations: Empirical Investigation and Computational Theorizing", *Management Science*, vol. 53, no. 10, pp. 1645-1658.
- Love, P., Fong, P. and Irani, Z. (eds.) (2005), *Management of Knowledge in Project Environments*, Elsevier, Oxford.
- Lubatkin, M. H., Simsek, Z., Ling, Y. and Veiga, J. F. (2006), "Ambidexterity and Performance in Small- to Medium-Sized Firms: The Pivotal Role of Top Management Team Behavioral Integration", *Journal of Management*, vol. 32, no. 5, pp. 646-672.
- Lycett, M., Rassau, A. and Danson, J. (2004), "Programme management: a critical review", *International Journal of Project Management*, vol. 22, no. 4, pp. 289.
- March, J. G. (1991), "Exploration and Exploitation in Organizational Learning", *Organization Science*, vol. 2, no. 1, pp. 71-87.

- Matson, E. and Prusak, L. (2003), "The Performance Variability Dilemma", *MIT Sloan Management Review*, vol. 45, no. 1, pp. 39-44.
- Maylor, H., Brady, T., Cooke-Davies, T. and Hodgson, D. (2006), "From projectification to programmification", *International Journal of Project Management*, vol. 24, no. 8, pp. 663-674.
- Maylor, H., Vidgen, R. and Carver, S. (2008), "Managerial complexity in project-based operations: A grounded model and its implications for practice", *Project Management Journal*, vol. 39, pp. S15-S26.
- McLaughlin, P., Bessant, J. and Smart, P. (2008), "Developing an organisation culture to facilitate radical innovation", *International Journal of Technology Management*, vol. 44, no. 3, pp. 298-323.
- Mom, T. J. M., van, d. B. and Volberda, H. W. (2009), "Understanding Variation in Managers' Ambidexterity: Investigating Direct and Interaction Effects of Formal Structural and Personal Coordination Mechanisms", *Organization Science*, vol. 20, no. 4, pp. 812-828.
- Morgan, R. E. and Berthon, P. (2008), "Market Orientation, Generative Learning, Innovation Strategy and Business Performance Inter-Relationships in Bioscience Firms", *Journal of Management Studies*, vol. 45, no. 8, pp. 1329-1353.
- Nahapiet, J. and Ghoshal, S. (1998), "Social Capital, Intellectual Capital, and the Organizational Advantage", *Academy of Management Review*, vol. 23, no. 2, pp. 242-266.
- Nemanich, L. A. and Vera, D. (2009), "Transformational leadership and ambidexterity in the context of an acquisition", *Leadership Quarterly*, vol. 20, no. 1, pp. 19-33.
- Nonaka, I. (1994), "A Dynamic Theory of Organizational Knowledge Creation", *Organization Science*, vol. 5, no. 1, pp. 14-37.

- O'Connor, G. C. and DeMartino, R. (2006), "Organizing for Radical Innovation: An Exploratory Study of the Structural Aspects of RI Management Systems in Large Established Firms", *Journal of Product Innovation Management*, vol. 23, no. 6, pp. 475-497.
- Oh, H., Labianca, G. and Chung, M. (2006), "A Multilevel Model of Group Social Capital", *Academy of Management Review*, vol. 31, no. 3, pp. 569-582.
- O'Reilly, C. A. and Tushman, M. L. (2004), "The Ambidextrous Organization", *Harvard business review*, vol. 82, no. 4, pp. 74-81.
- O'Reilly, C. A. and Tushman, M. (2008), "Ambidexterity as a Dynamic Capability: Resolving the Innovator's Dilemma", *Research in Organizational Behavior*, vol. 28, pp. 185-206.
- Pisano, G. P. and Shih, W. C. (2009), "Restoring American Competitiveness", *Harvard business review*, vol. 87, no. 7, pp. 114-125.
- Polanyi, M. (1966), *The Tacit Dimension*, University of Chicago Press, Chicago.
- Procaccino, J. D., Verner, J. M., Shelfer, K. M. and Gefen, D. (2005), "What do software practitioners really think about project success: an exploratory study", *Journal of Systems & Software*, vol. 78, no. 2, pp. 194-203.
- Raisch, S. and Birkinshaw, J. (2008), "Organizational Ambidexterity: Antecedents, Outcomes, and Moderators", *Journal of Management*, vol. 34, no. 3, pp. 375-409.
- Raisch, S., Birkinshaw, J., Probst, G. and Tushman, M. L. (2009), "Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance", *Organization Science*, vol. 20, no. 4, pp. 685-695.
- Reus, T. H., Ranft, A. L., Lamont, B. T. and Adams, G. L. (2009), "An Interpretive Systems View of Knowledge Investments", *Academy of Management Review*, vol. 34, no. 3, pp. 382-400.

- Riccaboni, M. and Moliterni, R. (2009), "Managing technological transitions through R&D alliances", *R&D Management*, vol. 39, no. 2, pp. 124-135.
- Sarkees, M. and Hulland, J. (2009), "Innovation and efficiency: It is possible to have it all", *Business horizons*, vol. 52, no. 1, pp. 45-55.
- Scott-Young, C. and Samson, D. (2008), "Project success and project team management: Evidence from capital projects in the process industries", *Journal of Operations Management*, vol. 26, no. 6, pp. 749-766.
- Seely Brown, J. (2004), "Minding and Mining the Periphery", *Long Range Planning*, vol. 37, no. 2, pp. 143.
- Sethi, R. and Sethi, A. (2009), "Can Quality-Oriented Firms Develop Innovative New Products?", *Journal of Product Innovation Management*, vol. 26, no. 2, pp. 206-221.
- Simon, H. A. (1991), "Bounded Rationality and Organizational Learning", *Organization Science*, vol. 2, no. 1, pp. 125-134.
- Simsek, Z. (2009), "Organizational Ambidexterity: Towards a Multilevel Understanding", *Journal of Management Studies*, vol. 46, no. 4, pp. 597-624.
- Simsek, Z., Heavey, C., Veiga, J. F. and Souder, D. (2009), "A Typology for Aligning Organizational Ambidexterity's Conceptualizations, Antecedents, and Outcomes", *Journal of Management Studies*, vol. 46, no. 5, pp. 864-894.
- Spender, J. -. (1996), "Making Knowledge the Basis of a Dynamic Theory of the Firm", *Strategic Management Journal*, vol. 17, pp. 45-62.
- Starbuck, W. H. (1992), "Learning by Knowledge-Intensive Firms", *Journal of Management Studies*, vol. 29, no. 6, pp. 713-740.
- Stewart, T. (1998), *Intellectual Capital - The New Wealth of Organizations*, Nicholas Brealey, Clerkenwell, London.

- Subramaniam, M. and Youndt, M. A. (2005), "The Influence of Intellectual Capital on the Types of Innovative Capabilities", *Academy of Management Journal*, vol. 48, no. 3, pp. 450-463.
- Swart, J. (2006), "Intellectual capital: disentangling an enigmatic concept", *Journal of Intellectual Capital*, vol. 7, no. 2, pp. 136.
- Thiry, M. (2002), "Combining value and project management into an effective programme management model", *International Journal of Project Management*, vol. 20, no. 3, pp. 221.
- Tiwana, A. (2008), "Do bridging ties complement strong ties? An empirical examination of alliance ambidexterity", *Strategic Management Journal*, vol. 29, no. 3, pp. 251-272.
- Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review", *British Journal of Management*, vol. 14, no. 3, pp. 207-222.
- Tushman, M. L. and O'Reilly, C. A. (1996), "Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change", *California Management Review*, vol. 38, no. 4, pp. 8-30.
- Van Looy, B., Martens, T. and Debackere, K. (2005), "Organizing for Continuous Innovation: On the Sustainability of Ambidextrous Organizations", *Creativity & Innovation Management*, vol. 14, no. 3, pp. 208-221.
- Vinekar, V., Slinkman, C. W. and Nerur, S. (2006), "Can Agile and Traditional Systems Development Approaches Coexist? an Ambidextrous View", *Information Systems Management*, vol. 23, no. 3, pp. 31-42.
- Visscher, K. and De Weerd-Nederhof, P. C. (2006), "Rise and Fall of an Innovative Organisation:: the Innovation Journey of Ericsson Enschede", *International Journal of Innovation Management*, vol. 10, no. 3, pp. 217-235.

Wernerfelt, B. (1984), "A Resource-based View of the Firm", *Strategic Management Journal*, vol. 5, no. 2, pp. 171-180.

Williams, T. (2008), "How Do Organizations Learn Lessons From Projects---And Do They?", *IEEE Transactions on Engineering Management*, vol. 55, no. 2, pp. 248-266.

Zi-Lin He and Poh-Kam Wong (2004), "Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis", *Organization Science*, vol. 15, no. 4, pp. 481-494.