Understanding ambidexterity in product development: The case of supply network management

Kim Sundtoft Hald (ksh.om@cbs.dk)
Copenhagen Business School, Department of Operations Management

Chiara Nordio
Copenhagen Business School, Department of Operations Management

Abstract

This study explores how a firm, when engaged in new product development activities, may be understood to be successful in achieving an ambidextrous organisation and an ambidextrous supply network. A case study approach was adopted with the ambition to develop new theoretical insight. The case shows how the ability to balance exploration and exploitation internally and in the supply network is formed by a combination of internal organisational alignment concerns and the ability to integrate suppliers in product development. This expands our knowledge on how ambidexterity can be understood to work in new product development projects.

Keywords: Ambidexterity, product development, supply network management

Introduction

By enhancing productivity and operations excellence, firms may become rigid and, subsequently, may become fragile (Adler et al., 2009). In particular, in his *Productivity Dilemma*, Abernathy (1978) stated that a firm's focus on productivity gains blocked its capacity to find new and innovative solutions in order to adapt to environmental changes. The juxtaposition between efficiency and innovation is often characterised as a choice between exploitation and exploration (March, 1991; Gupta et al., 2006). Exploitation manifests itself when a process follows a pattern stored in organisational memory; exploration occurs when there is no template to observe. One crucial issue is to find a balance between these two strategies. Hence the relevance of *ambidexterity*, which can be understood as the ability to successfully manage both exploration and exploitation (O'Reilly and Tushman, 2008).

Although research has now appeared seeking to incorporate findings from organisational theory to explore ambidexterity as part of operations management (e.g. Adler et al., 2009; Kortmann et al., 2014; Salvador et al., 2014; Tamayo-Torres et al., 2017), more studies are needed to understand how ambidextrous capabilities may be created or otherwise constrained in processes within and across firms when engaging in operations- and supply chain management activities.

The aim of the present research is to explore how a firm when engaged in product development activities may be understood to be successful or un-successful in achieving an ambidextrous supply network. Specifically we are interested in understanding how

firms may take into account the balancing between exploration and exploitation when engaged in product development activities. Especially, our interest lies in the identification of the factors and processes that enable or constrain the firm in reaching a balance between exploitation and exploration in its supply network management activities. What are the organisational and managerial practices that enable or constrain the firm in reaching a satisfactory balance between exploitation and exploration internally and in the supply network, when engaged with product development?

A set of theoretical relationships between emerging constructs has been identified. Specifically our analysis led to the development of a theoretical model which proposes how focal firm organisational processes and managerial practices influence the ability to reach ambidexterity in product development projects inside the focal organisation and in the wider supply network. In particular, we find that both supplier integration and internal organisational alignment are foundational to the ability of reaching ambidexterity. Moreover, a range of other factors are found to influence or moderate the ability to reach a proper balance between exploration and exploitation internally and in the supply network. Specifically, protection of intellectual property, absorptive capacity, project organisation, reward structure, allocation of responsibilities, the project manager, industry, supply network structure and culture are found to be influential.

The present research enriches our understanding of ambidexterity by explaining how ambidextrous capabilities may be created or otherwise constrained in processes within and across firms in operations and supply chains. This helps to integrate already established recent organisational- and managerial theory into the domain of operations management. While most studies have focussed their attention on understanding the processes of achieving ambidexterity inside the firm (Gibson & Birkinshaw, 2004; Raisch et al., 2009) the present study extends this concern to include also a concern for the inter-organisational domain, thereby complementing the few studies that share a similar concern (Aoki and Wilhelm, 2017; Narasimhan and Narayanan, 2013).

The paper is structured as follows. The next section presents relevant literature. The third section describes the research methodology, while the fourth presents case study findings and develops the theoretical model. The last section draws the conclusions.

Literature Review

Ambidexterity literature is characterised by a substantial change that has occurred during its development as a concept. While early researchers showed a trade-off between exploitation and exploration (March, 1991), more recently scholars have reverted the trade-off suggesting that companies can achieve both exploration and exploitation objectives, giving birth to the concept of ambidexterity (Tushman and O'Reilly, 1996; Adler et al., 1999; Gupta et al., 2006, Raisch et al., 2009; Kortmann, 2015). In the supply chain context, exploitation can be described as the sum of actions that can lead the supply chain to be able to minimise costs and achieve a more efficient use of skills and resources, while exploration can be seen as the aim towards the development of innovative solutions to existing issues (Kristal et al., 2010).

Some operations management researchers have used the term ambidexterity as the definition of a supply chain ability to establish fruitful relationships with both buyers and suppliers (Tokman et al., 2007; Im and Rai, 2008; Azadegan and Dooley, 2010; Chiu, 2014; Hernandez-Espallardo et al., 2011). However, the majority of the scholars tend to focus on the ambidexterity capability of improving a company's performance over time (Tushman and O'Reilly, 1996; Gibson and Birkinshaw, 2004; Raisch et al., 2009; Kristal et al., 2010; Blome et al., 2013). Moreover, there seems to be an analogy between supply chain exploration-exploitation and the strategy literature: in fact, supply

chain exploitation is concentrated on maintaining an efficient relationship with the actual suppliers, whereas SC exploration tries to find new ways to deliver a product that is aligned to customer expectations (Kristal et al., 2010; Patel et al., 2012)

Antecedents to ambidexterity in organisations

Reviewing the numerous articles related to ambidexterity and its clear connection to an enhanced firm performance, the question on how ambidexterity can be effectively reached arises. What are the elements, processes and managerial practices that lead an organisation to become ambidextrous? In our research we have the ambition to identify and categorise these *enabling factors* that are necessary, in conjunction with the firm's willingness, to foster ambidexterity. In our literature review we have found 35 antecedents that have been examined and studied by different scholars coming from different areas of Business, Management and Economics (Table 1). The sample was characterised by different streams of literature, different points of view, but generally the focus was on the single firm dealing with the exploration-exploitation trade-off. In organising the enabling factors that we have found in the literature, we have recognised that they could be grouped in broader, more general antecedents' types. Indeed, in our coding of the literature we have identified 7 categories. Each category points towards different foundational theories and concerns in reaching an ambidextrous organisation.

Table 1 –Antecedents to ambidexterity identified in the literature.

CATEGORY	ANTECEDENTS	REFERENCES
Leadership Style	▪ Top management team behavioural integration ▪ Top management involvement ▪ Transformational leadership ▪ Managers' paradoxical leadership ▪ CEO's regulatory focus ▪ Senior team ability to build dynamic capabilities ▪ Top management team's shared leadership	Jansen et al. (2008) Kammerlander et al. (2015) Kauppila and Tempelaar (2016) Kortmann (2015) Mihalache et al. (2014) Ojha et al. (2017) O'Reilly III and Tushman (2008) O'Reilly III and Tushman (2011) Schulze et al. (2008) Sinha (2016) Venugopal et al. (2018) Yitzhack et al. (2015)
Strategic Human Resource Management	▪ Human/social capital attributes ▪ Human resource flexibility ▪ Supportive environment ▪ Combination of organisational, human and social capital ▪ Fluid intelligence, flexibility and divergent thinking ▪ Individual employees competencies/capability of the lower level agents ▪ Self-efficacy of the employees ▪ Employees empowerment ▪ High performance work systems (HPWS)	De la Lastra et al. (2017) Garaus et al. (2016) Good and Michel(2013) Kauppila and Tempelaar (2016) Lin et al. (2017) Renzl et al. (2013) Sinha (2016) Sok and O´Cass (2015) Úbeda-García et al. (2017) Venugopal et al. (2018) Wang and Jiang (2009) Yitzhack et al. (2015)
Organisational Culture	▪ Organisational culture ▪ Discipline ▪ Stretch ▪ Support ▪ Trust	Gibson and Birkinshaw (2004) Nosella et al. (2012) Tinoco (2014)
Organisational Structure	▪ Innovation and Efficiency champions across the hierarchy ▪ Business Model Innovation ▪ Supply Chain capability in building processes ▪ Formal and Informal structural mechanisms	Bøe-Lillegraven (2014) Lee and Rha (2016) Nosella et al. (2012) Sinha (2016)
Job Design	▪ Strategic sub-processes ▪ Cross-functional coopetition ▪ Organisational units with densely connected social relations	Jansen et al. (2005) Kortmann (2015) Strese et al. (2016)
Dynamic Capabilities	▪ Dynamic capabilities ▪ Dynamic supply chain capability building process ▪ Alignment capability ▪ Ability to differentiate	Chandrasekaran et al. (2012) Eltantawy (2016) Lee and Rha (2014) O'Reilly and Tushman (2008)
Others (outside of the organisation)	▪ Knowledge sharing between buyer and supplier ▪ Perceived slack resources ▪ Availability of necessary resources	Cao et al. (2009) Im and Rai (2008) Sok and O'Cass (2015)

Design/Methodology/Approach

Given the explorative nature of our research a case study approach was adopted with the ambition to develop new theoretical insight (Eisenhardt, 1989). We decided to focus on the mechanisms a buying firm uses to balance exploration with exploitation to achieve ambidexterity within strategic buyer-supplier relationships in new product development projects. Therefore, we relied on an inductive case study design, selecting the relationship between the research and development department and the global sourcing department, as well as the relationship between NewTech (an acronym for confidentiality reasons) and two of its most innovative strategic suppliers.

16 semi-structured interviews were conducted with the focal firm and with its suppliers. The interviews were based on a set of theory driven questions, regarding the balancing of exploration and exploitation objectives, the organisation of product development projects, the value and performance of suppliers, information sharing mechanisms, supplier involvement practices and the supplier network. Additional data on the involved firms' ambidextrous practices were collected from archival documents. We mixed data from these heterogeneous sources to be able to analyse the issue from different perspectives and to find an inductive return.

In order to analyse data we applied principles outlined in Miles and Huberman (1994). Specifically we proceeded with a three-step approach: First, we analysed the data with the aim of separating explorative activities from those routinized. Second, we analysed with a focus on instances of what seemed like conflicts between the dual objectives. Finally, with a view towards identifying a set of clustered casual factors, we compared the outcomes of our first two analyses. Each of the authors performed the coding separately. Subsequently outcomes were compared and discussed until a consensus coding emerged.

Case study findings

NewTech, our case company, manufactures and sells advanced high tech electronic products. NewTech is characterised by a competitive focus where innovations and bringing new innovative products to the market faster than its competitors is a key objective. According to product engineers, characteristics such as size, artificial intelligence and calculation microchip capacity are central in ambitions to win market shares. Competition is increasingly focussed on the ability to innovate, develop and deliver new products to the market. Therefore, the supply chain is characterised by a continuous flow of product introductions and new products with short life cycles.

In relation to new product development and the focus on our research, two departments are highly involved. First, there is the research and development department (PD). Within PD, the product development specialists/engineers and in general the whole department is responsible for running the new product development projects and allocating a project manager as responsible for the task. The project manager is responsible for bringing the new product to the market fast and according to plans. Second, is the global sourcing department (GS), which comprises strategic supply category managers and commercial experts. The department is responsible for suppliers and thus holds the key account responsibility for all suppliers. In addition to that, the main focus of the department is to source and maintain a balanced supply network with the ability to fulfil the current and future business needs of NewTech.

473 suppliers deliver components to NewTech. Suppliers are classified using risk as the primary parameter. In order to identify strategic suppliers a "risk assessment" is performed by GS together with the quality department. The risk assessment includes a dual concern. Whilst 50% of the risk score is allocated to quality concerns with a view

towards safety for the end-user, the other 50% considers commercial parameters with a view towards complexity and other types of business risks in the supply chain setup.

Although not explicit in its strategy, from our analysis it is apparent that NewTech is striving to strike a balance between exploration and exploitation. Exploration is at the core of the firms' competitive strategy, but exploitation and a view towards efficiency and stability is also eminent in its organisation, and in its approach towards suppliers.

No explicit strategies, procedures or processes are in place to balance the dual objectives of exploitation and exploration. However, based on our analysis we conclude that the balance between these objectives emerges as a consequence of interactions between the internal departments in NewTech, and as a result of interactions with the suppliers. Specifically, from the coding of interviews we identify a set of factors that influence the ability to both explore and exploit. These factors are therefore enabling or constraining the potential of having ambidexterity to emerge internally in NewTech and externally in the wider supply network when developing new products. We now turn to discuss our findings in relation to each of these factors.

Organisation of product development projects

In NewTech product development projects are organised into three major phases. This is illustrated in table 2. First, there are core knowledge projects. These projects are focussed on developing new ideas for products or versions of products that can be commercialised at some point in the future. This is explained by a product development engineer: *"What is it? How new is it? Ok, we are saying we need a completely new type of material we haven't used before. That's a core knowledge project. That's where our specialists are working, that's where we start all the preliminary work to identify: "Ok, what can we actually do? Do we go left, do we go right?".* At this stage a major concern is creativity and idea generation. Project risk is very high. Normally there will be 3-4 core knowledge projects running in NewTech at the same time. Second, there are concept projects. These projects are mainly concerned with exploration and development of new core technologies and their subsequent implementation in components. Here it is often a dual concern and a balance between finding solutions that will maintain research and development opportunities, but at the same time secure that future efficiency and risks are reduced wherever possible. Project risk is high. Often there will be 1-2 concept projects running in NewTech at the same time. Third, there are delivery projects with a strict focus on the final product. Here the main concern is bringing the product to the market on time, with the right quality and, when possible, with an attention to cost.

Table 2 –Organisation of product development projects in NewTech.

PROJECT PHASE	NO. OF PROJETS RUNNING	RISK FOR NEWTECH	FOCUS	PLANNED ACTIVITIES	MAIN OBJECTIV.
Core Knowledge Projects	3-4	Very high	Creativity, New innovative ideas	NewTech Scans the market in order to get innovative ideas	Exploration
Concept Projects	1-2	High	Technology; Future R&D opportunities; Future efficiency and risk implications	Maturing and implementing new core technology. Different sourcing strategies are analysed and discussed. Many conflicting views between PD and GS	Negotiation: Exploration vs. Exploitation
Delivery Projects	5-7	Medium	Product Time to market Quality Cost	Supplier is selected and instructed. All the "support" operations (e.g., Marketing) are performed at this stage. Heavy collaboration between PD and GS with a focus on getting the product to the market	Exploitation

Ambidexterity, the ability to manage both exploration and exploitation (O'Reilly and Tushman, 2008), seems to be emerging successfully when NewTech gives room for a dual concern for exploration and exploitation, albeit in different distinct phases of product development. That is, time is a factor that separates the two concerns. In core knowledge projects, exploration seems to dominate. In delivery projects exploitation is found to be dominating. However in concept projects the formalised process still involves a simultaneous dual concern for exploration and exploitation that often materialises in negotiation-like situations, sometimes even conflicts, and as a test of strengths between PD and GS. In one interview, the project development manager explains that there are both commercial and innovation concerns: *"Who should be our suppliers? Do we have one, do we have two? Can they produce what they are reviewing, for us, can they be coherent so that we don't have to do too much work in the actual final product to fit in two different components? So here you have a heavy collaboration between sourcing and the R&D"*. The timing of the involvement of GS and commercial concerns in the projects seemed to be one such constant battleground. Our data shows several instances where PD and GS would push for different involvement strategies. "*Where the commercial perspective comes in? Perhaps that's where we're not good enough to discuss the commercial aspect because does it matter to discuss the commercial aspect if the technology has proven not mature enough? So that's a conflict that we have here if we start talking too much who should be the supplier then we might not end up having a solution because we select a supplier who couldn't really do the technology."* The quote shows how the timing of concerns related to future exploitation and involvement of specific suppliers is perceived as potentially hindering or killing abilities to explore.

Internal alignment

Although we found evidence that NewTech is indeed mainly successful in organising product development in a way that often leads to the successful management of both exploration and exploitation, we also found challenges. These challenges originated from a set of different factors which can be related to organisational misalignment, and they created friction. We found evidence that internal misalignment often resulted in imbalances between exploration and exploitation. In these instances exploration and exploitations were seen as in opposition and as trade-offs, and thus where perceived as impossible to reach simultaneously.

The reward structure and the allocation of responsibilities between functions inside NewTech presented themselves as major factors producing misalignment. First, in relation to the rewarding system it was evident that the different departments involved had contrasting success criteria and performance measures on which they were measured on. This is expressed by the global procurement manager: "*I am being measured on one thing, and that's cost. And the last two years there has been an even more intense focus on cost and I think it will continue*". And from another interview with a commercial category manager: *"Basically, I want to reduce business risk, its price, delivery, and all other aspects related to future potential risks. That is my main aim, not just cost reduction. It is actually business risk".* Sometimes GS saw it as their main task to educate PD in also incorporating a concern for issues related to subsequent exploitation: *"Our job is also to try and raise their [PD´s] awareness of costs. When you look at this little component and it's only 30 cents it will increase, it doesn't look like a lot. But it is a lot".* Second, in relation to the allocation of responsibilities, there were different types of organisational setups. In one component area (e.g. prints), the

responsibility for product development and the subsequent production phase were both located within the PD department. In another instance, PD was only responsible for bringing the product to the market fast and according to the plan. *"In this case the responsibility for cost optimisation in mass production still lies in the R&D, and here I see another way of working with them, when in the other part of the development department it is just "getting the product out".* The quote illustrates how the different setups in relation to allocation of responsibilities affected the working relationship between the departments, and how it also affected to willingness to find appropriate balances between exploration and exploitation. A final finding related to internal alignment issues is concerned with the role of the project manager. Our coding highlights the personalities and approaches of the project managers as important in finding compromises. *"Some of them are basically just more "seeking consensus", they want to please everybody. And some of them are much more focussed on getting the product out. But it is not like there's not a dialogue, it is just different people".*

Supplier integration

Supplier integration refers to the degree to which the firm is linked with its network of suppliers (potential and current) in exchanging shared ideas and solutions. Existence of shared mechanisms and common knowledge bases are important components of supplier integration (Narasimhan and Narayanan, 2013). Our data analysis shows how issues related to when and how much to involve suppliers were central in striking an appropriate balance between exploration and exploitation. Especially concerns of involving suppliers too much were related to issues with protecting proprietary knowledge. Sometimes there were concerns for suppliers being too active in exploring how the component they delivered fitted into modules, the overall system and the final product. Specifically there were concerns related to talking too much and too openly with suppliers. The dilemma was that some of the central and most innovative suppliers also delivered to NewTech's competitors. NewTech sought innovations from these suppliers, but if too much knowledge was given away in the process, they feared this could easily be spread to the competitors. These concerns paved the way to a *closed* innovation process, where innovation activities are confined within the firm (Chesbrough, 2006). The PD manager highlights the trade-off and the balancing issue in this quote from one of our interviews: "*I would assume that from a sourcing prospective it can be an advantage to accumulate different strategic components with one supplier instead of having ten different suppliers. That enables better negotiating prices because (…) it becomes the dealing business to business that is in focus. But from an R&D prospective that can actually be a drawback, because it could be that a supplier has an interest in not just selling parts, but also an interest in learning more the key elements of what we actually do in R&D. So therefore there is a fine line between negotiating good prices and keeping our knowledge secret*". However data also demonstrates how GS pushed some more passive strategic suppliers to move into new technologies: *"Sometimes we even have to push suppliers to technologies, and say you need to go into this new technology because otherwise you will be too costly, the product will be too expensive. You need to change".* In this case it was GS pushing for innovations from suppliers. PD sometimes saw a change in technology as posing a risk in respect to reaching their target on time to market. This is highlighted in this quote from an interview with the purchasing manager: "*PD is measured on getting the product out, it is adding a risk to their projects when we request suppliers to move into new technology".*

Absorptive capacity

Absorptive capacity is defined as a firm's "ability to recognize the value of new external information, assimilate, and apply it to commercial ends" (Cohen & Levinthal, 1990). In our analysis of collected data we found evidence that supports our opinion that absorptive capacity is an important variable when the ambition is to understand how exploration and exploitation can be successfully balanced. First, in our coding of data we identified issues related to the mistiming of innovative supplier ideas and suggestions. When innovative ideas from suppliers emerged at a time where product development projects were delayed or in risk of delays, these ideas were not taken into account. However, they were put on hold until the product was launched. These innovative ideas risked to be "forgotten" due to the fact that a lot of resources were already allocated on other projects running in that moment. Also issues related to the complexity of understanding long term business impacts of suppliers' innovative suggestions were identified as affecting NewTech's absorptive capacity. "*So when they come up with something, then somebody need to catch it, and understand whether this would be good for our business, but doing this fast can be challenging, because it is quite complex. We might be able to see if it is good for the product in relation to innovation, but we also need to understand business risk impact, and this is more complex".* This quote illustrates how a concern related to exploitation (e.g. business risk impact) can be seen as affecting NewTech's absorptive capacity and ultimately the balance between exploration and exploitation. In summary we found absorptive capacity to be a moderating variable in the relation between supplier integration and exploration success as well as a variable affecting NewTech's ability balancing exploration and exploitation to reach a state of ambidexterity.

We summarise our case study findings in the theoretical model shown in Figure 1.

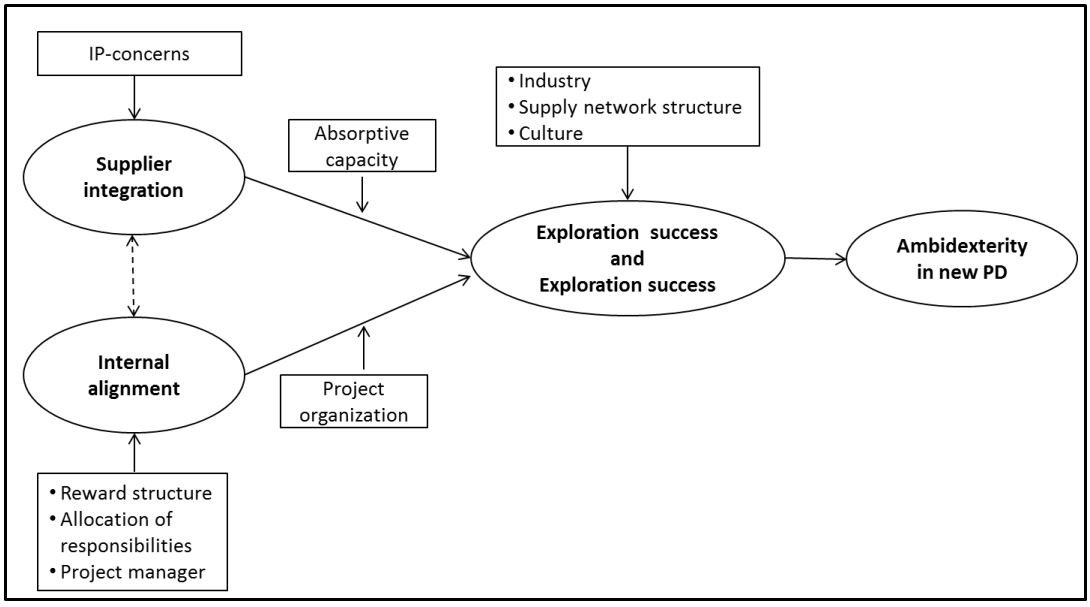

Figure 1 – Theoretical Model of Ambidexterity in product development

Conclusion

The presented research adds to our understanding of how ambidextrous capabilities may be created or otherwise constrained in processes within and across firms in operations and supply chains. This helps integrating already established recent organisational- and managerial theory into the domain of operations management. While most studies have focussed their attention on understanding the processes of achieving ambidexterity

inside the firm (Gibson & Birkinshaw, 2004; Raisch et al., 2009), the present study extends this concern to include also a concern for the inter-organisational domain, thereby complementing the few studies that share a similar concern (Aoki and Wilhelm, 2017; Narasimhan and Narayanan, 2013). Compared to previous research on achieving ambidexterity inside the firm as outlined in table 1, we find evidence that supports the relevance of some of these factors also in the context explored in this study. Specifically we find that organisational structure and job design (Kortmann, 2015; Sinha, 2016), dynamic capabilities in the form of alignment capabilities (Eltantawy, 2016), and all the antecedents in the category "Others" outside of the organisation (Cao et al., 2009; Im and Rai, 2008; Sok and O'Cass, 2015) were important in reaching ambidexterity inside the firm and in the supply network in relation to new product development processes.

As all researches, our study presents some limitations. Although following several new product development projects, the qualitative case-based approach applied here using a single case study is a limitation. However future research is urged to do more empirical research on the factors that potentially enable or constrain the emergence of ambidexterity in supply networks. Also future research could, based on the model presented here, formulate and test a set of hypothesis to confirm and extend the framework of factors affecting the ability to reach a state of ambidexterity internally as well as in the supply networks, in relation to new product development projects.

A final remark is warranted. The findings presented here have implications for product development managers and supply chain managers. Findings show how managers should find it rewarding to reach some form of internal organisational alignment in relation to rewards structures and the allocation of responsibilities in relation to new product development. Another concern should be related to the processes and procedures that are in place in order to integrate important innovative suppliers and to strengthen the organisations absorptive capacity.

References

Abernathy, W.J. (1978). "The productivity dilemma:Roadlock to innovation in the automobile industry". Baltimore: Johns Hopkins.

Adler, P.S., Benner, M., Brunner, D.J., MacDuffie, J.P., Osono, E., Staats, B.R., & Winter, S.G. (2009). "Perspectives on the productivity dilemma", *Journal of operations management*, Vol.27, No.2, pp.99-113.

Aoki, K., & Wilhelm, M. (2017). The Role of Ambidexterity in Managing Buyer–Supplier Relationships: The Toyota Case. *Organisation science*, Vol.28, No.6, pp.1080-1097.

Azadegan, A., & Dooley, K. J. (2010). "Supplier innovativeness, organisational learning styles and manufacturer performance: An empirical assessment", *Journal of Operations Management*, Vol.28. No.6, pp. 488–505

Blome, C., Schoenherr, T., & Kaesser, M. (2013). Ambidextrous Governance in Supply Chains: The Impact on Innovation and Cost Performance, *Journal of Supply Chain Management*, Vol.49, No.4, pp. 59–80.

Bøe-Lillegraven, T. (2014). "Untangling the Ambidexterity Dilemma through Big Data Analytics", *Journal of Organisation Design*, Vol.3, No.3, pp. 27-37.

Cao, Q., Gedajlovic, E., & Zhang, H. (2009). "Unpacking Organisational Ambidexterity: Dimensions, Contingencies, and Synergistic Effects", *Organisation Science*, Vol.20, No.4, pp. 781–796.

Chandrasekaran, A., Linderman, K., & Schroeder, R. (2012). "Antecedents to ambidexterity competency in high technology organisations", *Journal of Operations Management*, Vol.30, No.1–2, pp. 134–151.

Chesbrough, H. W. (2006). *Open innovation: The new imperative for creating and profiting from technology*, Boston, MA: Harvard Business Press.

Chiu, Y. C. (2014). "Balancing exploration and exploitation in supply chain portfolios", *IEEE Transactions on Engineering Management*, Vol.61, No.1, pp. 18–27.

Cohen, W. M., & Levinthal, D. A. (1990). "Absorptive capacity: A new perspective on learning and innovation", *Administrative Science Quarterly*, Vol.35, No.1, pp. 128–152.

Eisenhardt, K.M., (1989), "Building theories from case studies", *Academy of management review*,Vol.14, No.4, pp.532–550.

Eltantawy, R.A. (2016). "The role of supply management resilience in attaining ambidexterity: a dynamic capabilities approach", *Journal of Business & Industrial Marketing*, Vol.31, No.1, pp. 123–134.

Fengbin, W., & Hong, J. (2009). "Innovation paradox and ambidextrous organisation: A case study on development teams of air conditioner in Haier", *Frontiers of Business Research in China*, Vol.3, No.2, pp. 271–300

Fernández-Pérez de la Lastra, S., García-Carbonell, N., Martín-Alcázar, F., & Sánchez-Gardey, G. (2017). "Building ambidextrous organisations through intellectual capital: A proposal for a multilevel model", *Intangible Capital*, Vol.13, No.3, pp. 668–693.

Garaus, C., Güttel, W. H., Konlechner, S., Koprax, I., Lackner, H., Link, K., & Müller, B. (2016). "Bridging knowledge in ambidextrous HRM systems: empirical evidence from hidden champions", *International Journal of Human Resource Management*, Vol.27, No.3, pp. 355–381.

Gibson, C.B., & Birkinshaw, J. (2004). "The antecedents, consequences, and mediating role of organisational ambidexterity", *Academy of management journal*, Vol.47, No.2, pp.209-226.

Good, D., & Michel, E. J. (2013). "Individual ambidexterity: Exploring and exploiting in dynamic contexts", *Journal of Psychology: Interdisciplinary and Applied*, Vol.147, No.5, pp. 435–453.
Gupta, A.K., Smith, K.G., & Shalley, C.E. (2006). "The interplay between exploration and exploitation", *Academy of management journal*, Vol.49, No.4, pp.693-706.
Hambrick, D. C. (2015). *CEOs*, Wiley Encyclopedia of Management, Chichester, UK.
Heirati, N., O'Cass, A., & Sok, P. (2017). "Identifying the resource conditions that maximize the relationship between ambidexterity and new product performance", *Journal of Business & Industrial Marketing*, Vol.32, No.8, pp.1038–1050.
Hernandez-Espallardo, M., Sanchez-Perez, M., & Segovia-Lopez, C. (2011). "Exploitation- and exploration- based innovations: The role of knowledge in inter-firm relationships with distributors", *Technovation*, Vol.31, pp. 203–215.
Jansen, J.J.P. (2005). *Ambidextrous organisations: a multiple-level study of absorptive capacity, exploratory and exploitative innovation and performance*. Erasmus Research Institute of Management (ERIM).
Jansen, J. J. P., George, G., Van Den Bosch, F. A. J., & Volberda, H. W. (2008). "Senior team attributes and organisational ambidexterity: The moderating role of transformational leadership", *Journal of Management Studies*,Vol.45, No5,pp.982–1007.
Kammerlander, N., Burger, D., Fust, A., & Fueglistaller, U. (2015). "The Effect of CEOs' Regulatory Focus on Exploration and Exploitation in Small and Medium-sized Enterprises", *Journal of Business Venturing*, Vol.30, No.4, pp. 1–49.
Kauppila, O. P., & Tempelaar, M. P. (2016). "The Social-Cognitive Underpinnings of Employees' Ambidextrous Behaviour and the Supportive Role of Group Managers' Leadership", *Journal of Management Studies*, Vol.53, No.6, pp. 1019–1044.
Kortmann, S. (2015). "The Mediating Role of Strategic Orientations on the Relationship between Ambidexterity-Oriented Decisions and Innovative Ambidexterity", *Journal of Product Innovation Management*, Vol.32, No.5, pp. 666–684.
Kortmann, S., Gelhard, C., Zimmermann, C., & Piller, F.T. (2014). "Linking strategic flexibility and operational efficiency: The mediating role of ambidextrous operational capabilities", *Journal of operations management*, Vol.32, No.7/8, pp.475-490.
Kristal, M. M., Huang, X., & Roth, A. V. (2010). "The effect of an ambidextrous supply chain strategy on combinative competitive capabilities and business performance", *Journal of Operations Management*, Vol.28, No.5, pp. 415-429.
Lee, S. M., & Rha, J. S. (2016). "Ambidextrous supply chain as a dynamic capability: building a resilient supply chain", *Management Decision*, Vol.54, No.1, pp.2–23.
Lin, H. E., McDonough, E. F., Yang, J., & Wang, C. (2017). "Aligning Knowledge Assets for Exploitation, Exploration, and Ambidexterity: A Study of Companies in High-Tech Parks in China", *Journal of Product Innovation Management*, Vol.34, No.2, pp. 122–140.
March, J.G. (1991). "Exploration and exploitation in organisational learning", Organisation science, Vol.2, No.1, pp.71-87.
Mihalache, O. R., Jansen, J. J. P., Van den Bosch, F. A. J., & Volberda, H. W. (2014). "Top management team shared leadership and organisational ambidexterity: A moderated mediation framework", *Strategic Entrepreneurship Journal*, Vol.8, No.2, pp. 128–148.
Miles, M.B. and Huberman, A.M. (1994). *"Qualitative Data Analysis – An Expanded Sourcebook",* Sage, London.
Narasimhan, R., & Narayanan, S. (2013). "Perspectives on supply network–enabled innovations". *Journal of Supply Chain Management*, Vol.49, No.4, pp. 27-42.
Nosella, A., Cantarello, S., & Filippini, R. (2012). "The intellectual structure of organisational ambidexterity: A bibliographic investigation into the state of the art", *Strategic Organisation*, Vol.10, No.4, pp. 450–465.
O'Reilly, C. A., & Tushman, M. L. (2011). "Organisational Ambidexterity in Action: How Managers Explore and Exploit", *California Management Review*, Vol.53, No.4, pp. 5–22.
O'Reilly, C.A., & Tushman, M.L. (2008). "Ambidexterity as a dynamic capability: Resolving the innovator's dilemma", *Research in organisational behavior*, Vol.28, pp.185-206.
Ojha, D., Acharya, C., & Cooper, D. (2018). "Transformational leadership and supply chain ambidexterity: Mediating role of supply chain organisational learning and moderating role of uncertainty", *International Journal of Production Economics*,Vol.197, pp. 215-231.
Patel, P. C., Terjesen, S., & Li, D. (2012). "Enhancing effects of manufacturing flexibility through operational absorptive capacity and operational ambidexterity", *Journal of Operations Management*, Vol.30, No.3, pp. 201–220.
Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M.L. (2009). "Organisational ambidexterity: Balancing exploitation and exploration for sustained performance", *Organisation science*, Vol.20, No.4, pp.685-695.
Renzl, B., Rost, M., & Kaschube, J. (2013). "Facilitating ambidexterity with HR practices - a case study of an automotive supplier", *International Journal of Automotive Technology and Management*, Vol.13, No.3, pp. 257–272.
Salvador, F., Chandrasekaran, A., & Sohail, T. (2014). "Product configuration, ambidexterity and firm performance in the context of industrial equipment manufacturing", *Journal of operations management*, Vol.32, No.4, pp.138-153
Schulze, P., Heinemann, F., & Abedin, A. (2008). "Balancing Exploitation and Exploration", *Academy of Management Annual Meeting Proceedings*, Vol.8, No.1, pp. 1–6.
Sinha, S. (2016). "Managing an ambidextrous organisation: balancing innovation and efficiency", *Strategic Direction*, Vol.32, No.10, pp. 35–37.
Strese, S., Meuer, M. W., Flatten, T. C., & Brettel, M. (2016). "Examining cross-functional coopetition as a driver of organisational ambidexterity", *Industrial Marketing Management*, Vol.57, pp. 40–52.
Tamayo-Torres, J., Roehrich, J.K., & Lewis, M.A. (2017). "Ambidexterity, performance and environmental dynamism", *International journal of operations & production management*, Vol.37, No.3, pp.282-299.
Tinoco, J. K. (2014). Double dealing: the influences of diverse business processes on organisational ambidexterity", *Academy of Strategic Management Journal*, Vol. 13, No.2, pp. 87-110.
Tushman, M. L., & O'Reilly, C. A. (1996). "Ambidextrous Organisations: Managing Evolutionary and Revolutionary Change", *California Management Review*, Vol.38, No.4, pp. 8–29.
Úbeda-García,M., Claver-Cortés, E., Marco-Lajara, B., & Zaragoza-Sáez, P. (2016). "Toward Organisational Ambidexterity in the Hotel Industry: The Role of Human Resources", *Cornell Hospitality Quarterly*, Vol.57, No.4, pp. 367–378.
Venugopal, A., T.N., K., & Kumar, M. (2018). "Identifying the focal role of top management paradoxical cognition in ambidextrous firms", *Management Decision*, Vol.56, No.1, pp. 47–63.
Yitzhack Halevi, M., Carmeli, A., & Brueller, N. N. (2015). "Ambidexterity in SBUs: TMT Behavioral Integration and Environmental Dynamism", *Human Resource Management*, Vol.54, pp. 223–238.