International Journal of Business, Human and Social Sciences
ISSN: 2517-9411
Vol:9, No:8, 2015

Exploration and Exploitation within Operations

D. Gåsvaer, L. Stålberg, A. Fundin, M. Jackson, P. Johansson

***Abstract*—**Exploration and exploitation capabilities are both important within Operations as means for improvement when managed separately, and for establishing dynamic improvement capabilities when combined in balance. However, it is unclear what exploration and exploitation capabilities imply in improvement and development work within an Operations context. So, in order to better understand how to develop exploration and exploitation capabilities within Operations, the main characteristics of these constructs needs to be identified and further understood. Thus, the objective of this research is to increase the understanding about exploitation and exploration characteristics, to concretize what they translates to within the context of improvement and development work in an Operations unit, and to identify practical challenges. A literature review and a case study are presented. In the literature review, different interpretations of exploration and exploitation are portrayed, key characteristics have been identified, and a deepened understanding of exploration and exploitation characteristics is described. The case in the study is an Operations unit, and the aim is to explore to what extent and in what ways exploration and exploitation activities are part of the improvement structures and processes. The contribution includes an identification of key characteristics of exploitation and exploration, as well as an interpretation of the constructs. Further, some practical challenges are identified. For instance, exploration activities tend to be given low priority, both in daily work as in the manufacturing strategy. Also, the overall understanding about the concepts of exploitation and exploration (or any similar aspect of dynamic improvement capabilities) is very low.

***Keywords*—**Exploitation, Exploration, Improvement, Lean production, Manufacturing.

I. Introduction

WITH an ever increasing competition, it is of great importance that manufacturing companies strive to achieve not only incremental improvements, but also radical and innovative improvements within their production systems. This is emphasized by Mr. Watanabe, former CEO at Toyota Motor Company, stating that they, in today's reality, have no other choice but to carry through radical changes when the speed of change is too slow [1]. Thus, a manufacturing company's ability to compete on today's global market depends on its capability to combine (1) continuous incremental improvements, characterized by incrementally improving existing products and production processes, with (2) radical and innovative improvement, characterized by development of innovations and making use of new opportunities [2], [3].

Continuous improvement (CI), widely applied within manufacturing, previously used to focus on shop-floor level improvements only. However, the CI research scene has changed from focusing on merely continuous improvement, to focusing on continuous innovation instead, constituting not only incremental improvement, but learning, innovation and radical improvement as well [4], [5]. Further elaborating on this concept, [6, p.12] describes continuous innovation as "the on-going interaction between operations, incremental improvement, learning, radical innovation and strategy aimed at effectively combining operational effectiveness, innovation and strategic excellence, or exploitation and exploration."

Within the manufacturing context, however, improvement activities are usually related to operational excellence, indicating an efficient use of existing resources. Since there is a distinct focus on daily issues and operational efficiency, strategic issues are not always in focus [7]. The focus on operational day to day efficiency, the lack of strategic focus and long term perspective, makes the Operation unit develop good exploitation capabilities but poor exploration capabilities [8]. Making exploitation and exploration capabilities co-exist in synergy is however also a dilemma that many organizations face, as some scholars argue, since the inherent logics of exploitation and exploration counteract each other [9], [10].

Situating this dilemma in an empirical context, it translates well to the history and contemporary challenges at Company X, where Company X is an Operations unit belonging to a large global manufacturing corporation. During 2007–2009, Company X was undergoing major change towards a more Lean way of working. In the time following, 2010–2013, Company X took part in a research project focusing on (1) how to transition from major change into incremental yet continuous improvements [11], and (2) how to conduct more radical and innovative improvements [12]. Their current challenges relates to how to conduct more innovative improvements, as well as how to manage a holistic improvement system, similar to dynamic capabilities [13], and ambidextrous organization [14], which corresponds to the need of both exploitation and exploration capabilities.

Accordingly, exploration and exploitation capabilities are both needed within Operations. Usually, the concepts of exploration and exploitation are rather generally described in literature and since the unit of analysis varies greatly, the interpretation of the concepts get even more confusing. So, in order to better understand how to develop exploration and exploitation capabilities within Operations, the main characteristics of these constructs needs to be identified and further understood.

D. Gåsvaer is with the Department of Product Realization at Swerea IVF, Stockholm, Sweden and to the School of Innovation, Design and Engineering, Mälardalen University, Eskilstuna, Sweden (phone: +46 70 7806095, e-mail: daniel.gasvaer@swerea.se).

L. Stålberg, A. Fundin, M. Jackson, and P. Johansson are with the School of Innovation, Design and Engineering, Mälardalen University, Eskilstuna, Sweden (e-mail: lina.stalberg@mdh.se, anders.fundin@mdh.se, mats.jackson@mdh.se, peter.e.johansson@mdh.se).

Hence, the objective of the research is to increase the understanding about exploitation and exploration characteristics, to concretize what they translates to within the context of improvement and development work in an Operations unit, and to identify practical challenges.

II. Research Methodology

This study, specifically researching exploitation and exploration characteristics within a manufacturing context, is part of a larger, on-going, longitudinal study at Company X where the organizational improvement capability is being studied. Thus, the research team together holds relevant knowledge about the research area and Company X based on collaborative research conducted during the past five years as industrial PhD-candidates, as well as practical experience of improvement related work conducted at the company during the last decade. Also, continuous access to management and operations are guaranteed through close research collaboration and employment.

This specific study is a qualitative exploratory study including both a literature review and a case study, aiming to gain an increased understanding about exploitation and exploration characteristics, what they imply within a manufacturing context, including practical challenges. The case is delimited to the improvement and development work at Company X, and the unit of analysis is exploitation and exploration characteristics within the improvement and development structures and processes.

A literature review has been conducted, searching for high quality, well-cited journal articles related to the keywords *exploration* and *exploitation*. Databases used in the literature review were Google scholar and Scopus. The articles were reviewed with the aim to find definitions, interpretations and descriptions of the terms exploration and exploitation. The different interpretations and descriptions of exploration and exploitation from the literature review are compiled in Table I. Based on Table I, key characteristics of exploitation and exploration were identified, and are presented in the literature summary. Next, based on the key characteristics, a new, comprehensive, and personal interpretation of the concepts of exploitation and exploration was created.

The empirical data was collected mainly through semi-structured interviews and observations. The interview guide was based on questions related to Company X's improvement and development work. Example of questions: how do you work in your improvement and development processes? and what type of improvement and development work do you perform? The interviewees were chosen based on their insights in the improvement and development processes within the Operations context. The interviewees were the production development manager, two production developers and a change agent. The observations took place at a management level through three project-meetings and five strategy-meetings. The empirical data was analyzed using pattern matching logic according to [15], where the key characteristics and the emerged interpretation of the concepts of exploration and exploitation presented in the literature summary were used as the basis for analysis.

III. Theoretical Review: Interpretations of Exploration and Exploitation

The notion of exploitation and exploration has been widely researched since James March in his seminal article in the early 90s introduced the two concepts as follows: exploitation includes refinement, choice, production, efficiency, selection, implementation and execution. Exploration on the other hand, involves things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery and innovation. [9]

These two concepts have different objectives, and subsequently they require different strategies, processes, capabilities and structures, and may also have different impact on the organization's overall performance [16]. While exploitation is linked to a short term and more specific perspective, seeking to increase efficiency, reliability and establish standardized processes, exploration aims at achieving flexibility, creating new knowledge and new ways of doing things, often related to deep research and activities with greater risks for the company [16], [17].

March's initial work on exploitation and exploration originates from organisational learning, but in the last two decades, the concepts have been integrated in a wide range of management studies and literature, thus proven to be widely applicable management concepts [18]. For instance, considering the production system development context, Benner and Tushman was the first to address the dilemma of exploitation and exploration within the process management domain (Total Quality Management, ISO standardization, Business Process-reengineering and Six Sigma) when discussing how to achieve dynamic capabilities [18].

The theoretical framework on exploitation and exploration is however still under development, and a contemporary challenge is the generalizability of research findings, embracing the question of 'what constitutes the best conceptualization, operationalization, and context in which exploitation and exploration should be studied?' [19], [20]. This is further emphasized by [18] concluding that the discussion of exploitation and exploration has deviated into different academic perspectives as the top-ranked intellectual articles on exploitation and exploration are written by researchers from different disciplinary backgrounds. Li, et al. [21], further corroborates this challenge arguing that even though the notion of exploitation and exploration has been studied by a number of researchers from different perspectives ever since March's seminal work, there is still a lack of consistency in the interpretation of exploitation and exploration. The two main causes to this discrepancy in interpretation are: (1) the use of different levels of analysis, and (2), the fact that the understanding about what exploitation and exploration really is substantially differ among scholars, which is related to what exploitation and exploration is within a particular level of analysis [21]. This is also emphasized by

[22], arguing that variations in the unit of analysis may well affect the understanding about what exploitation and exploration really is.

Based on the literature review, and inspired by previously conducted high-quality theoretical reviews within the topic [18], [21], we present a list of interpretations and definitions of exploitation and exploration. Given the previous discussion, the list covers highly cited articles from different academic perspectives in order to get a wide-ranging insight into the constructs under study.

TABLE I
DIFFERENT SCHOLARS INTERPRETATIONS OF EXPLOITATION AND EXPLORATION

Authors	Exploration	Exploitation
Ahuja and Katila [23]	Path-creating search. The more diversified, the greater degree of exploration.	Exploitation corresponds more to the less diversified path-deepening search.
Argyres [24]	Exploration is about broadening the technological capability.	Exploitation is about deepening the technological capability.
Atuahene-Gima [25]	Exploration entails the development of new knowledge, experimenting to foster the variation and novelty needed for more radical innovation.	Exploitation hones and extends current knowledge, seeking greater efficiency and improvements to enable incremental innovation.
Auh and Menguc [26]	Double loop, generative, and product-innovation learning are closely aligned with exploration.	Single loop, adaptive, and production oriented learning are aligned with exploitation approach to learning.
Baum, et al. [27]	Learning occurs with processes of concerted variation, planned experimentation, and play.	Learning occurs through local search, experimental refinement, selection and reuse of existing routines.
Beckman [28]	Exploration activities are encouraged in firms with founding teams whose members have worked at many different companies, have unique ideas and contacts.	Exploitative activities are encouraged in founding teams whose members have worked at the same company, since they have shared understandings and can act quickly.
Benner and Tushman [29]	Exploratory patent category comprises patents that depart entirely from prior firm knowledge.	Firm's patenting efforts built on existing knowledge and process management involving efficiency, control, stability, and reliability.
Benner and Tushman [8]	Radical innovations, intended to match the needs of emerging customer or market.	Incremental innovations intended to satisfy demand of existing customer or market.
Bierly and Daly [30]	Exploration is experimenting with radical new ideas or ways of doing things.	Exploitation is about refinement and leveraging of existing knowledge and practice, focusing on efficiency.
Boer and Gertsen [4]	Strategic flexibility requires excellent exploration capabilities.	Operational effectiveness requires excellent exploitation capabilities.
Boer, et al. [31]	Radical innovation and change signifies exploration processes.	The ongoing interaction between operations, incremental improvement and learning signifies exploitation processes.
Chaharbaghi [32]	Exploration stresses privileges of diversification, emphasizing variety by regarding regeneration deriving from having ample choices.	Exploitation stresses intensification through heightened repetition, minimal deviation and maximum control with a view to achieving greater reward and payback in milking an existing opportunity.
Gibson and Birkinshaw [33]	Individual with exploration/creation-oriented actions will gear toward adaptability.	Individual with exploitation-oriented actions will gear toward alignment.
He and Wong [34]	Technological innovation aimed at entering new product-market domains.	Technological innovation activities aimed at improving existing product-market domains.
Holmqvist [35]	Exploration is concerned with creating variety in experience, and thrives on experimentation and free association.	Exploitation is about creating reliability in experience and thrives on productivity and refinement.
Jacobsen and Thorsvik [10]	Exploration, from an organisational perspective, is related to the learning of new things and identification of new possibilities. Exploration includes new products, or new production methods that substantially differ from previously accepted methods.	Exploitation, from an organisational perspective, relates to the knowledge associated with achieving a more efficient use of existing resources. Exploitation includes the knowledge and know-how resulting in more efficient routines and procedures, i.e. a more efficient production.
Jansen, et al. [36]	Exploratory innovation as effective strategy for dynamic market negatively affects with centralization.	Exploitative innovation as effective strategy for competitive environments and benefit to a unit's financial performance, it is positively influenced by formalization.
Levinthal and March [17]	Pursuit of new knowledge/ competence.	Use and further development of existing knowledge.
March [9]	Exploration includes search, variation, risk taking, experimentation, play, flexibility, discovery, and innovation.	Exploitation includes refinement, choice, production, efficiency, selection, implementation, and execution.
Miller, et al. [37]	Local search by individuals is more consistent with organization-level exploration.	Distant search by individuals facilitates the spread of knowledge and, hence, organization-level exploitation.
Mom, et al. [38]	Exploration activities include the search for new possibilities within product, service, process or market, which requires the learning of new things.	Exploitation activities include serving current customers with existing products using present knowledge and experience.
Perretti and Negro [39]	In term of composition, explorative team has greater level of newness of members, and newness of member combinations.	In term of composition, exploitative team has lower level of newness, and newness of member combinations.
Prange and Schlegelmilch [40]	Exploration refers to experimentation with new alternatives, having returns that are uncertain, distant, and often negative.	Exploitation describes the refinement and extension of existing competencies, technologies, and paradigms, exhibiting returns that are positive, proximate, and predictable.
Rosenkopf and Nerkar [41]	Exploratory innovation involves a shift to a different technological trajectory.	Exploitative innovations involve improvements in existing components and build on the existing technological trajectory.
Taylor and Greve [42]	Explorative team is defined as research and development team which is assigned to make a radical innovation.	Exploitative team which is assigned to improve an existing technology or product.
Vermeulen and Barkema [43]	Search for new knowledge.	Ongoing use of a firm's knowledge base.

A. Literature Summary

Based on the interpretations and definitions in Table I, key words describing the key characteristics of the concepts of exploration and exploitation have been derived.

Exploration characteristics:

- Experimentation/discovery
- Novelty (higher novelty of the ideas generated)
- Play
- Variation (concerted variation)
- Risk-taking/uncertainty
- Distant search/Path-creating search
- Pursuit of new knowledge
- Regeneration
- Adaptability
- Free association
- Ample choices
- Diversification

Exploitation characteristics:

- Refinement (experimental refinement)
- Use and extension of existing knowledge
- Local search
- Execution/Implementation
- Control/Stability/Reliability
- Repetition/Intensification/Extension
- Selection/choice
- Predictability/Proximation
- Minimal deviation
- Convergence/Alignment
- Productivity

Based on the key characteristics described above, the following interpretation of the concepts of exploitation and exploration has emerged:

Exploration is about experimentation and the pursuit of new knowledge. It is characterized by diversification, high novelty of the ideas generated, free association, and ample choice, thus also about uncertainty and taking risks. Consequently, exploration is set out to do, yet not limited to, something new (locally or globally).

Exploitation is about refinement and improvement of existing practice through the use and extension of existing knowledge. It is characterized by control, stability and predictability, achieved through convergence and alignment. Consequently, exploitation is about doing the same, but better.

IV. Empirical Results

Below, the empirical results are presented. First, the organizational structure is presented, including the different improvement related departments within the Operations unit and their roles. Secondly, challenges related to the concepts of exploitation and exploration within the Operations unit are highlighted.

A. Organizational Structure and Way of Working

The overall responsibility for the improvement and the development work is mainly related to two departments within the Operations unit; the production development department (PD department) and the company-specific production system and Operational Development department (XPS/OD department).

The PD department is responsible for the overall long-term development of the factory, realizing the production strategy and adapting the production system to new products. The department consists of a manager, three production developers, and two production methods specialists. In general, they work either alone or in pairs with smaller assignments, or in more extensive development projects led by themselves or other departments. Their work is mainly initiated by the product development organization, whereas the PD department's task is to adapt the production system to the new incoming products.

The PD department has discussed the question regarding to what extent they should work with daily issues versus new ideas and experimentation. They have not yet come to an agreement, but one interviewee estimates that a "fifty-fifty split" between "refining the existing" and "creating new" would be appropriate for the PD department. However, their ambitions are very different form their daily reality and even though they wish to increase their amount of explorative activities – "think new and create new solutions", they have not yet succeeded to combine their daily exploitative operational activities with more long term explorative activities.

The XPS/OD department has the overall responsibility for the daily improvement work (Kaizen). Today there is only one change agent working in the department. The XPS is a corporate improvement program based on Lean principles tailored specifically to Company X (for further explanation of XPS's see [44]). Accordingly, the XPS consists of several methods and tools aiming to optimize operations. The Operational Development (OD) program is an improvement program focusing on one important strategic focus at a time, the program is also tailored to create full employee participation. All employees in the Operations unit belong to an improvement team and today there are 93 active improvement teams.

The XPS/OD work is very focused on increasing efficiency in the production system, it is about making the production system work better and better all the time. One of the interviewees estimates that at the moment, "…99 per cent of the improvements are about refining existing equipment and processes", closely corresponding to exploitation activities [9], [10]. In line with previous statement, the interviewee express the idea that this might be due to the low level of investments, further adding to the importance of optimising existing equipment and processes.

B. Identified Challenges Related to Exploitation and Exploration

The production development department, accountable for the long-term development of the Operations unit, states that they are not only confused about the meaning/essence of exploitation and exploration (like refinement versus create new or incremental versus radical improvement) but also

about how it currently is run, as well as how it should be run. They do not know when to improve the existing, and when to create new. In fact explorative related activities seem instead to be intimidating – "fear for the unknown". Due to this confusion and unawareness, they do not put a lot of thought into this issue today and it is absent in the current manufacturing strategy.

Another contemporary challenge related to the concept of exploration is the fact that it tends to be given low priority, especially within the current stressful and hectic work environment. When daily issues and short-term problems occur within Operations they are given top priority, and explorative activities are simply put aside and not prioritised.

V. Discussion, Conclusion & Future Research

A. The Understanding of the Concepts Exploration and Exploitation

Based on the theoretical review of different interpretations of the concepts exploration and exploitation, key characteristics of the concepts as well as our interpretation of the concepts are presented in the literature summary. The interpretation and description of the concepts of exploration and exploitation is as follows:

Exploration is about experimentation and the pursuit of new knowledge. It is characterized by diversification, high novelty of the ideas generated, free association, and ample choice, thus also about uncertainty and taking risks. Consequently, exploration is set out to do, yet not limited to, something new (locally or globally).

Exploitation is about refinement and improvement of existing practice through the use and extension of existing knowledge. It is characterized by control, stability and predictability, achieved through convergence and alignment. Consequently, exploitation is about doing the same, but better.

Based on the emerged understanding of the concepts exploration and exploitation and the empirical results, it can be stated that exploitative activities mainly corresponds to the activities of the Lean based improvement system (XPS), and to the Operational Development program (OD). Explorative activities, however, are rarely applied, even though this kind of thinking clearly lies within the responsibility and role of the PD department. As described in previous research and in line with our findings, in terms of improvement work exploitation is strongly related to Operational excellence programs. Exploration within Operations is on the other hand much more related to departments, teams or functions that are responsible for long-term development of the production system and production development.

B. Industrial Challenges

One important finding is that neither the PD department, nor the XPS/OD department understands the importance of developing both exploitation and exploration capabilities, and the strategic signification of dynamic improvement capabilities. This emphasizes the need of increasing the awareness regarding development of dynamic capabilities such as both exploitation and exploration capabilities within Operations and further translating exploitation and exploration capabilities into industry applicable support.

Also, which were to be expected based on previous research, there is a distinct prioritization on daily operations, continuously striving for high efficiency and effectiveness [7]. Accordingly, exploration based activities tend to be given less priority as soon as daily issues and problems occurs. This issue appears to be a result of not only keen competition, but especially due to the lack of strategic intent and competence. Firstly, the issue of exploitation, exploration and how to balance them as means to achieve dynamic improvement capabilities are absent in the current manufacturing strategy. Secondly, the overall long-term success has to some extent been put aside in favour of short-term economic objectives, subsequently defining what activities to conduct (exploitation). Consequently, the concept of exploration as a complementary approach to improvement must be devoted priority at a strategic level.

C. Conclusion and Future Research

At an overall improvement process level it can be concluded that exploitative activities mainly are related to the lean based improvement program and to the OD program, both developing exploitation capabilities. Exploration related activities are rarely applied; however, this kind of thinking corresponds to the role and responsibility of the PD department.

The awareness of the concepts of exploration and exploitation is low in Operations. There are difficulties to understand how to apply both concepts and exploration activities are not prioritized due to daily issues; hence, it is a need to highlight this issue at a strategic level. In other words, industry applicable support needs to be developed that comprises how to develop both exploration and exploitation capabilities.

Hence, future research has three interests: (1) how to increase the awareness of exploration and exploitation capabilities and emphasize their importance in the strategic agenda? (2) how to support exploration in a manufacturing context? and (3), how to create ambidextrous organizations in a manufacturing context (balancing exploration and exploitation)?

Acknowledgments

This research work has been funded by the Knowledge Foundation within the framework of the INNOFACTURE Research School and the participating companies, and Mälardalen University. The research work is also a part of the initiative for Excellence in Production Research (XPRES) which is a joint project between Mälardalen University, the Royal Institute of Technology, and Swerea. XPRES is one of two governmentally funded Swedish strategic initiatives for research excellence in Production Engineering. The research work has also been partially funded by the Norwegian Research Council, financing a project focusing on how to conduct successful step-changes within a manufacturing

context as a mean for competition.

REFERENCES

[1] T. A. Stewart and A. P. Raman, "Lessons from Toyota´s Long Drive," *Harvard Business Review*, vol. 85, pp. 74-83, 2007.
[2] Y. Yamamoto, "Kaikaku in production," Licentiate thesis, School of innovation, design, and engineering, Mälardalen University, Västerås, 2010.
[3] D. Gåsvaer and J. von Axelson, "Kaikaku - Radical improvement in production," presented at the International Conference on Operations and Maintenance, Singapore, 2012.
[4] H. Boer and F. Gertsen, "From continuous improvement to continuous innovation: a (retro)(per)spective," *International Journal of Technology Management*, vol. 26, pp. 805-827, 2003.
[5] J. Bessant, S. Caffyn, and M. Gallagher, "An evolutionary model of continuous improvement behaviour," *Technovation*, vol. 21, pp. 67-77, 2001.
[6] A. Martini, B. T. Laugen, L. Gastaldi, and M. Corso, "Continuous innovation: Towards a paradoxical, ambidextrous combination of exploration and exploitation," *International Journal of Technology Management*, vol. 61, pp. 1-22, 2013.
[7] A. Hill and T. Hill, *Manufacturing operations strategy*: Palgrave Macmillan, 2009.
[8] M. J. Benner and M. L. Tushman, "Exploitation, exploration, and process management: The productivity dilemma revisited," *Academy of management review*, vol. 28, pp. 238-256, 2003.
[9] J. G. March, "Exploration and exploitation in organizational learning," *Organization science*, vol. 2, pp. 71-87, 1991.
[10] D. I. Jacobsen and J. Thorsvik, *Hur moderna organisationer fungerar*: Studentlitteratur, 2014.
[11] L. Stålberg, "A supportive framework for successful implementation of improvement work," ed: Mälardalen University, Västerås, Sweden, 2014.
[12] D. Gåsvaer, "Towards radical improvement in production systems," Licentiate Licentiate thesis, Department of Product Realization, Malardalen University, 2013.
[13] V. Ambrosini and C. Bowman, "What are dynamic capabilities and are they a useful construct in strategic management?," *International Journal of Management Reviews*, vol. 11, pp. 29-49, 2009.
[14] C. O'Reilly and M. Tushman, "Organizational ambidexterity: Past, present and future," *The Academy of Management Perspectives*, p. amp. 2013.0025, 2013.
[15] S. B. Merriam, *Qualitative Research: A Guide to Design and Implementation. Revised and Expanded from Qualitative Research and Case Study Applications in Education.* San Fransisco, CA: Jossey-Bass, 2009.
[16] J. G. March, "Continuity and change in theories of organizational action," *Administrative Science Quarterly*, pp. 278-287, 1996.
[17] D. A. Levinthal and J. G. March, "The myopia of learning," *Strategic management journal*, vol. 14, pp. 95-112, 1993.
[18] R. Almahendra and B. Ambos, "Exploration and exploitation: a 20-year review of evolution and reconceptualisation," *International Journal of Innovation Management*, 2014.
[19] D. Lavie, U. Stettner, and M. L. Tushman, "Exploration and exploitation within and across organizations," *The Academy of Management Annals*, vol. 4, pp. 109-155, 2010.
[20] D. Lavie and L. Rosenkopf, "Balancing exploration and exploitation in alliance formation," *Academy of Management Journal*, vol. 49, pp. 797-818, 2006.
[21] Y. Li, W. Vanhaverbeke, and W. Schoenmakers, "Exploration and exploitation in innovation: Reframing the interpretation," *Creativity and innovation management*, vol. 17, pp. 107-126, 2008.
[22] A. K. Gupta, K. G. Smith, and C. E. Shalley, "The interplay between exploration and exploitation," *Academy of management journal*, vol. 49, pp. 693-706, 2006.
[23] G. Ahuja and R. Katila, "Where do resources come from? The role of idiosyncratic situations," *Strategic Management Journal*, vol. 25, pp. 887-907, 2004.
[24] N. Argyres, "Capabilities, technological diversification and divisionalization," *Strategic Management Journal*, vol. 17, pp. 395-410, 1996.
[25] K. Atuahene-Gima, "Resolving the capability—rigidity paradox in new product innovation," *Journal of marketing*, vol. 69, pp. 61-83, 2005.
[26] S. Auh and B. Menguc, "Balancing exploration and exploitation: The moderating role of competitive intensity," *Journal of Business Research*, vol. 58, pp. 1652-1661, 2005.
[27] J. A. Baum, S. X. Li, and J. M. Usher, "Making the next move: How experiential and vicarious learning shape the locations of chains' acquisitions," *Administrative Science Quarterly*, vol. 45, pp. 766-801, 2000.
[28] C. M. Beckman, "The influence of founding team company affiliations on firm behavior," *Academy of Management Journal*, vol. 49, pp. 741-758, 2006.
[29] M. J. Benner and M. Tushman, "Process management and technological innovation: A longitudinal study of the photography and paint industries," *Administrative Science Quarterly*, vol. 47, pp. 676-707, 2002.
[30] P. E. Bierly and P. S. Daly, "Alternative knowledge strategies, competitive environment, and organizational performance in small manufacturing firms," *Entrepreneurship Theory and Practice*, vol. 31, pp. 493-516, 2007.
[31] H. Boer, J. Kuhn, and F. Gertsen, "Continuous innovation: managing dualities through co-ordination," *Continuous Innovation Network. WPS*, vol. 1, 2006.
[32] K. Chaharbaghi, "The problematic of strategy: a way of seeing is also a way of not seeing," *Management Decision*, vol. 45, pp. 327-339, 2007.
[33] C. B. Gibson and J. Birkinshaw, "The antecedents, consequences, and mediating role of organizational ambidexterity," *Academy of management Journal*, vol. 47, pp. 209-226, 2004.
[34] Z. L. He and P. K. Wong, "Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis," *Organization Science*, vol. 15, pp. 481-495, 2004.
[35] M. Holmqvist, "A dynamic model of intra-and interorganizational learning," *Organization studies*, vol. 24, pp. 95-123, 2003.
[36] J. J. Jansen, F. A. Van Den Bosch, and H. W. Volberda, "Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators," *Management science*, vol. 52, pp. 1661-1674, 2006.
[37] K. D. Miller, M. Zhao, and R. J. Calantone, "Adding interpersonal learning and tacit knowledge to March's exploration-exploitation model," *Academy of Management Journal*, vol. 49, pp. 709-722, 2006.
[38] T. J. Mom, F. A. Van Den Bosch, and H. W. Volberda, "Investigating Managers' Exploration and Exploitation Activities: The Influence of Top-Down, Bottom-Up, and Horizontal Knowledge Inflows*," *Journal of Management Studies*, vol. 44, pp. 910-931, 2007.
[39] F. Perretti and G. Negro, "Filling empty seats: How status and organizational hierarchies affect exploration versus exploitation in team design," *Academy of Management Journal*, vol. 49, pp. 759-777, 2006.
[40] C. Prange and B. B. Schlegelmilch, "The role of ambidexterity in marketing strategy implementation: Resolving the exploration-exploitation dilemma," *BuR-Business Research*, vol. 2, pp. 215-240, 2009.
[41] L. Rosenkopf and A. Nerkar, "Beyond local search: boundary-spanning, exploration, and impact in the optical disk industry," *Strategic Management Journal*, vol. 22, pp. 287-306, 2001.
[42] A. Taylor and H. R. Greve, "Superman or the fantastic four? Knowledge combination and experience in innovative teams," *Academy of Management Journal*, vol. 49, pp. 723-740, 2006.
[43] F. Vermeulen and H. Barkema, "Learning through acquisitions," *Academy of Management journal*, vol. 44, pp. 457-476, 2001.
[44] T. Netland, "Exploring the phenomenon of company-specific production systems: one-best-way or own-best-way?," *International Journal of Production Research*, vol. 51, pp. 1084-1097, 2013.