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CONTINUOUSLY HANGING BY A THREAD: MANAGING CONTEXTUALLY AMBIDEXTROUS ORGANIZATIONS**

ABSTRACT

Ambidexterity can be defined as an organization's ability to simultaneously reconcile exploration and exploitation. In this paper, we focus on contextual ambidexterity, i.e. ambidexterity that derives from the creation of a context that allows employees to pursue exploratory and exploitative activities. Building on empirical case study data from contextually ambidextrous organizations, we describe their idiosyncratic characteristics and we explain how their mode of knowledge transmission between exploratory and exploitative domains, based on fluid project structures, serves to generate competitive advantage. Furthermore, we analyze the role of balancing and orchestrating capabilities for enabling the firm to perform concurrently in exploration and exploitation.

JEL-Classification: L2.

Keywords: Ambidexterity; Change; Dynamic Capabilities; Exploration/Exploitation; Strategic Contradictions.

1 INTRODUCTION

Organizations must continuously adapt to a dynamic environment and generate innovations to meet or create future demand. At the same time, to benefit from replicating (Winter and Szulanski (2001)) their existing business models, organizations need to sustain stability and preserve their identity to ensure steady performance. However, innovation and adaptation, and replication and optimization, all represent modes of organizational development that follow different logics (March (1991)). Therefore, organizations must resolve tensions between these antagonistic development modes to evolve.

The contradiction between exploratory and exploitative learning modes is highlighted in the research on ambidexterity, which is defined as an organization's ability to simultane-

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** We would like to thank two anonymous referees for their valuable comments and suggestions.

ously reconcile exploration and exploitation (Benner and Tushman (2002); Tushman and O'Reilly (1996); Jansen, van den Bosch, and Volberda. (2005)). Empirical results suggest that there are two different types of ambidexterity (Gibson and Birkinshaw (2004)): structural ambidexterity, i.e., ambidexterity achieved by the structural division of exploitative and exploratory tasks; and contextual ambidexterity, i.e., ambidexterity that arises from the cultural values and norms of the organizational context. Since early works on ambidexterity focused almost exclusively on the features of structural ambidexterity, contextual ambidexterity has remained an under-researched issue (Raisch and Birkinshaw (2008)).

In this paper, we focus on contextually ambidextrous organizations. Based on a case study approach, we analyze contextually ambidextrous organizations in depth. By doing so, we *reveal the methods of creating and maintaining this type of ambidexterity*. Contextual ambidexterity is much like continuously hanging by a thread, since one learning mode could at any time crowd out the other (Benner and Tushman (2002)), leading to a collapse of the ambidextrous business model. However, we identify specific mechanisms that serve to balance the contradictory forces of exploration and exploitation. Thus, those mechanisms contribute to the governance of contextually ambidextrous organizations, and they enable a fast knowledge transmission between both learning domains, which in turn generates innovative and applicable solutions quickly.

2 THEORETICAL BACKGROUND

A central concern in strategic decision-making is finding the appropriate relation between the antagonistic learning modes of exploration and exploitation (March (1991)). However, most scholars agree that to preserve both short-term efficiency and long-term innovation (March (1991); Levinthal and March (1993)), organizations need to balance exploitation and exploration. Although the appropriate relation between exploratory and exploitative learning may differ among organizations with varying objectives, research shows that pursuing both learning modes is necessary to ensure long-term organizational success and survival. On the one hand, an exclusive focus on exploration can lead to failure if firms never reap the profits of their investments (Chesbrough and Rosenbloom (2002); Levinthal and March (2003)). Focusing solely on exploration can also lead firms to neglect improvement and adaptation of existing routines (March (1991)), and may prevent the organization from benefiting from economies of scale. On the other hand, extensive research has shown that “an organization that engages exclusively in exploitation will suffer from obsolescence” (Levinthal and March (1993, 105)). If investing in new technologies seems uncertain, then firms may prefer to stick to already established routines. Too much exploitation can crowd out exploration (Benner and Tushman (2002)), which then leads to competency traps (Herriott, Levinthal, and March (1985); Levitt and March (1988)) and core competencies become instead core rigidities (Leonard-Barton (1992)). Since organizations must gain and sustain competitive advantage, the trade-off between exploitative and exploratory activities is critically important. Although the idea that organizations must perform both exploratory and exploitative tasks if they are to survive is neither new nor surprising, how organizations should pursue both development modes is still a major point of discussion.

There are two competing answers to this discussion. The “punctuated equilibrium” approach builds on the assumption that (revolutionary) periods of exploration alternate with (evolutionary) periods of exploitation (Burgelman (2002); Siggelkow and Levinthal (2003); Vermeulen and Barkema (2001)). The competing view is best described as a “continuous change” perspective (Brown and Eisenhardt (1997); Smith and Tushman (2005); Tushman and O’Reilly (1996)). Continuous change is based on the assumption that organizations can perform both exploratory and exploitative activities simultaneously; either they decouple by the means of specialized subunits or they decouple temporally by alternating between exploration and exploitation (Greve (2007)). Such organizations are described as ambidextrous. As Raisch and Birkinshaw (2008) state in their recent synopsis of ambidexterity research, various research streams have contributed to the discussion of organizational ambidexterity. For example, issues related to ambidexterity are discussed in the fields of organizational learning, technological innovation, organizational adaptation, strategic management, and organizational design.

Early studies on ambidexterity focus mainly on organizational design and regard ambidexterity as the balanced relation among several “monodextrous” units (i.e., units that focus almost exclusively on either exploratory or exploitative activities) (e.g., Duncan (1976)). Ideas about establishing different structures for exploration and exploitation (“spatial separation”) are based on the assumption that “the mindsets and organizational routines needed for exploration are radically different from those needed for exploitation, making a simultaneous pursuit of both all but impossible” (Gupta, Smith, and Shalley (2006, 695)). Burns and Stalker (1961) suggest that organizations can implement mechanic and organic structures to ensure efficiency and innovation, respectively. Duncan (1976), who is actually the first to use the term ambidexterity in relation to organizations, claims that dual structures are necessary for organizational success. Christensen and Bower (1996) and Christensen (1997) also argue that to assure innovation, exploratory units need to be separated from units with merely exploitative tasks. In addition to the dual structures that are separate from single “monodextrous” units, researchers have also discussed “parallel structures”, which allow people to switch between different structures that may be directed either towards exploration or towards exploitation (McDonough and Leifer (1983)).

The concept of ambidexterity is closely related to the discussion of organizational microevolution, i.e. the coevolution of intrafirm resources, capabilities and competencies (Lewin and Volberda (1999)). The microevolutionary approach builds on the assumption that organizations can internalize the evolutionary processes of variation-selection-retention. In order to deliberately create variation, organizations may use corporate venturing (Burgelman (1983; 1994)) or spinning off new business ventures as independent divisions (Stopford and Baden-Fuller (1994); Dess et al. (2003)). Burgelman (1991) showed with case studies at Intel how approving variation and accepting a coevolution of routines within different units of the organization created an “internal selection environment”, which actually accounted for the company’s shift from memory chips to microprocessors. As the internal selection environment makes exploration feasible, large organizations can spread their risk by running several experiments at the same time. This relates not only to the case where different departments of one firm coevolve (Intel), but also to the coevolu-

tion of different subsidiaries of one multi-national companies (Madhok and Liu (2006)) or different outlets of a replicator organization (Bradach (1997)).

Although the structural antecedents of ambidexterity have long been at the center of research interest, other predecessors of ambidexterity, such as leadership-based (Floyd and Lane (2000); Volberda, Baden-Fuller, and van den Bosch (2001); Smith and Tushman (2005); Beckman (2006); Jansen et al. (2008)) and contextual antecedents have recently moved into the spotlight. Adler, Goldoftas, and Levine (1999) describe how individuals balance efficiency (exploitation) and innovation (exploration) in a car plant. They describe how switching between different tasks in the course of a day's work allows the workers to balance antagonistic demands. Building on Ghoshal and Bartlett (1994), Gibson and Birkinshaw (2004) have coined the term "contextual ambidexterity", which can be described as a form of ambidexterity that derives from the organizational context rather than from implementing dual structures, and is therefore quite different from "structural ambidexterity". The authors describe contextual ambidexterity as being achieved "by 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" (Gibson and Birkinshaw (2004, 211)).

Research on structural ambidexterity has hitherto focused predominantly on the critical role of top management teams (TMT) and their function as an intermediary between competing frames of reference, as described by Gilbert (2006) in his case study of competing frames at USA Today (resulting from the newspaper's entry into digital business). Similarly, Tushman, and O'Reilly (1997) describe how spatial separation works at Ciba Visions. They argue that although single units that are focused either on exploratory or on exploitative activities may be separated from each other, integration across the units must be achieved at the senior management level. O'Reilly and Tushman (2008) and Smith and Tushman (2005) also stress the role of TMT in integrating exploration and exploitation. However, a structural division of units that pursue heterogeneous learning modes results in specialization and, therefore, low levels of absorptive capacity (Cohen and Levinthal (1990)) between heterogeneous units within the organization. Even the TMT integration seems to be difficult, as intra-firm knowledge transfer is a difficult task (Szulanski (1996)). In contrast, contextual ambidexterity requires collective sense-making, a common mindset, and mutual absorptive capacity among individuals with broad background knowledge on heterogeneous tasks as a prerequisite for being able to alternate temporarily between exploration and exploitation. In this sense the differentiation between structural and contextual ambidexterity resembles the distinction between administrative and holistic renewal in multiunit firms (Volberda and Lewin (2003)).

The ambidexterity discussion is closely related to issues of knowledge production and application. In their seminal work "The New Production of Knowledge", Gibbons and his colleagues (1994) distinguish between mode 1 and mode 2 of knowledge production. Mode 1 refers to the traditional disciplinary and autonomous production of knowledge in an academic context, whereas mode 2 refers to new forms of knowledge production that are transdisciplinary, based on multiple quality control indicators and that take place in the context of application (for a review see Hessels and van Lente (2008)). Although

Ambos et al. (2008, 1424) show that universities create dual structures to “manage the tensions between academic and commercial demands”, the descriptions of practices of mode 2 knowledge production provided by Harvey, Pettigrew, and Ferlie (2002) indicate that mode 2 knowledge production is enabled by contextual ambidexterity (see also Savory (2006)).

Despite those parallels, *research on ambidexterity has focused rather on the performance implications of applying structurally or contextually ambidextrous organizational designs* (Gibson and Birkinshaw (2004); He and Wong (2004); Lubatkin et al. (2006)), *than on how (especially contextual) ambidexterity is achieved and under which circumstances it is successful*. This unilateral focus on performance implications of ambidexterity is probably mainly due to the concept’s anchorage in March’s (1991) distinction between exploration and exploitation and the basic assumption that a combination of both learning modes is necessary to ensure organizational survival.

Organizational learning is generally based on routines. *Exploration and exploitation can be conceptualized as organizational learning routines which pull in opposite directions* (Benner and Tushman (2002); Smith and Tushman (2005)). Therefore, questions of exploring and exploiting organizational knowledge (March (1991); Gupta et al. (2006)) and considerations about organizational learning (Argote (1999)) are related to the research on organizational routines in general and the nature of dynamic capabilities in particular. Since exploration/exploitation is strongly connected to the organization’s development, we draw from research on dynamic capabilities (Teece, Pisano, and Shuen (1997); Eisenhardt and Martin (2000); Zollo and Winter (2002); Teece (2007)) to examine organizational dynamics.

Raisch and Birkinshaw (2008) suggest that considering dynamic capabilities as forces of organizational development might enhance our understanding of ambidexterity. Drawing on the concept of organizational routines a dynamic capability can be defined as “a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness” (Zollo and Winter (2002, 340)). Research on dynamic capabilities shows, that their configuration is dependent on environmental dynamics (Eisenhardt and Martin 2000)) and that different types of capabilities can be distinguished and organized in a hierarchy (Collis (1994); Zollo and Winter (2002); Winter (2003); Zahra, Sapienza, and Davidsson (2006)). High-order (or second-order) dynamic capabilities govern the change of (first-order) dynamic capabilities and operational routines (Collis (1994); Zollo and Winter (2002); Winter (2003)). Therefore, high-order dynamic capabilities influence high-order organizational learning and determine the trajectory of the organization’s development.

The link between the dynamic capabilities framework and the issue of exploration, exploitation and ambidexterity has recently been stressed by various scholars. Researchers discuss dynamic capabilities (Ancona et al. (2001); He and Wong (2004)), meta-capabilities (Gibson and Birkinshaw (2004)), meta-routines (Adler et al. (1999)), and high-order principles (Volberda and Lewin (2003)) in this context. Lavie and Rosenkopf (2006) describe “second-order exploitation” routines, which they define as enabling experience accumu-

lation and balancing the trade-off between exploration and exploitation. Building on Teece (2007), who emphasizes coordination/integration, learning and reconfiguration as “orchestration processes”, O’Reilly and Tushman (2008) explain the link between dynamic capabilities and ambidexterity conceptually. Following their logic, ambidexterity can be understood as a dynamic capability that is not itself a source of competitive advantage but facilitates new resource configurations that can offer a competitive advantage. Since the tensions that arise from the complexity of integrating contradicting learning modes are especially prevalent within contextually ambidextrous organizations and business units that compete in dynamically diverse markets, the function of high-order routines is best observed within such organizations.

In this paper, we study how organizations enable and govern contextual ambidexterity. Moreover, we investigate structural and cultural antecedents of contextual ambidexterity, and we show how organizations maintain that kind of ambidexterity. The advantage of contextually ambidextrous organizations is that contextually ambidextrous organizational designs permit a fast knowledge transmission between exploratory and exploitative learning domains, which is necessary for the rapid development of innovative and applicable solutions. Since the successful governance of contextual ambidexterity depends on finding an appropriate balance between exploration and exploitation, we also examine the mechanisms that firms implement to maintain balance between these conflicting pursuits.

3 METHODS

We answer our research questions empirically by using data from research-intensive firms. We apply a case-study research design (Creswell (2007); Eisenhardt (1989); Siggelkow (2007)) that comprises two distinctive stages. First, we conducted an embedded case study (Yin (2003, 42-45)) in one large multi-unit research organization that focuses primarily on applied research. In a second stage, we utilized the data from the embedded case study to advance our theoretical framework, and to select other research-intensive organizations as further cases (Eisenhardt and Graebner (2007); Suddaby (2006)). In this way, we gathered information about the methods firms use to enable, govern and thus maintain contextual ambidexterity.

The embedded case study: We conducted our embedded case study within a large European multi-unit research firm, to which we give the fictional name of RCA. RCA is divided into five departments (health technologies, materials technologies, information technologies, mobility and energy, and nuclear research), and consists of 14 subdivisions in total. RCA has about 1,000 employees, organized in approximately 60 groups (we note that these data vary because of the long observation period). Each of the groups operates within very different areas of research, service, and market structures. Conducting contract research and applying for basic research funding are necessities for RCA because, even though it is partly (50%) controlled by the government, it must nevertheless finance two thirds of its activities itself. This funding structure is also obligatory for all of the subdivisions, which have to finance at least two thirds of their budgets by market activities.

In 1999 we participated in the strategy development process of a consulting project that involved all 14 subdivisions. We conducted five interviews with senior managers and experts (scientists) in each subdivision who were responsible for strategy development or who were able to provide deep insights into capabilities, technologies, or markets. We additionally carried out three workshops on strategy analysis and development at every subdivision. Because the subdivisions differed substantially in the market dynamics in which they operated, their organizational structures, and the specific organizational cultures they adopted, each subdivision faced different opportunities and threats, and therefore required specific capabilities to cope with upcoming challenges.

On the basis of an analysis of data elicited in 1999, we returned to RCA in 2005, 2006 and 2008. We selected seven subdivisions (systems research, life sciences, mobility, smart systems, functional materials, nuclear engineering, and electrochemistry) for further investigation by using theoretical sampling (Glaser and Strauss (1967)). We use these subdivisions as units of analysis, since they display the characteristics such as autonomy in strategic decision-making, freedom of discretion on structural and processual arrangements, distinctive values and norms, or independency in their HR practices that we find in fully independent organizations. Although RCA is the holding company for these divisions, we refer to these division as organizations, because RCA itself is not structurally ambidextrous. Rather, it contains these fully independent units, some of which are contextually ambidextrous where others are focused exclusively on exploration or exploitation.

We conducted 18 semistructured interviews to supplement and refine our data from the strategy development process and to investigate the strategic positioning of and operating principles within each unit. To do so, we also studied management reports, strategic reports, consulting reviews, HR policies, research foresight reports, and intellectual capital statements. Because we focus on contextual ambidexterity, we concentrated on each subdivision's activities in research and service. We analyzed how the balance between both was decided, (i.e., either by the members or the senior management); how the experts divide their efforts between different activities; and how the divisions integrated different learning modes of exploration and exploitation. Our interviews with heads of department and divisions, group leaders, members of the HR department, employees, and trade union representatives lasted approximately 90-120 minutes each.

Advancing the framework: The results of the embedded case study enabled us to create a preliminary theoretical framework. We expanded this framework by adding further cases from other research-intensive organizations, basing the selection of these firms on theoretical sampling. We collected data by conducting interviews and by analyzing management reports from specialized firms dealing in molecular pathology (160 employees), statistical analysis (900 employees), and child cancer (100 employees in non-hospital departments); and from multi-unit research organizations (three Europe-based organizations with 1,900, 5,000, and 12,000 employees, respectively). The additional findings helped us to modify our framework by comparing contextually ambidextrous organizations with other types that were dominated by only one learning mode. Thus, we were able to clearly identify the unique features of contextual ambidexterity, while at the same time refining our framework.

Distinguishing between monodexterity and ambidexterity and among different kinds of ambidexterity: During the research process we were able to distinguish between monodextrous units and ambidextrous units. We used several sources to classify a division, unit, or firm as being one or the other. These sources included key figures, such as revenues from applied research projects, the ratio of contract research to basic research, the number of patents, and the number of publications in refereed journals. However, the data collected from our interviews and on-site observations were of the utmost importance. We differentiated between monodextrous organizations, monodextrous units of structurally ambidextrous organizations, and contextually ambidextrous organizations and focused our research on contextually ambidextrous units or firms, in which at least a significant percentage of individuals switch between exploratory and exploitative activities.

4 RESULTS

In this section, we summarize the shared characteristics of the contextually ambidextrous research-intensive organizations in our sample by distinguishing the achievement of an ambidextrous business model, their organizational design and cultural values and norms as well as their efforts to govern exploration and exploitation in a balanced mode.

4.1 ACHIEVING AN AMBIDEXTROUS BUSINESS MODEL

The contextually ambidextrous organizations we analyzed are equally active both in research and service. This business model both facilitates and requires the integration of different and opposing expectations, such as innovativeness in research and predictability in service.

The scientific community sets the standard for the advancement of knowledge for these organizations. Risk-taking and risk tolerance in complex areas characterize the daily work of experts in this domain, since the ambidextrous organizations in our sample compete primarily with universities. Employees enjoy a great degree of individual freedom in research, as long as their results are useful to the scientific community and are applicable in the service field. Research takes place in the context of application. Advancements in the research field are frequently exploited by the organization, to develop new service offerings, and thus enhance the organization's overall reputation. New service offerings signal the ability to provide outstanding solutions. Research enhances the organization's unique selling proposition, which helps differentiate it from competitors in the service domain, such as consulting firms.

The expectations that business firms and governmental institutions have of the service environment differ from expectations of the research field. The ambidextrous organizations in our study replicate approved routines in their standardized consulting projects, such as: IT-security consulting for SMEs, quantitative scenario analysis of complex environments for multinationals, implementation of smart video surveillance suites, or laboratory tests, for example, analyzing doping checks, tumor diagnostics, and

microbial diagnostic microarrays. In these fields the organizations' main competitors are business firms such as consulting firms, high-tech companies, and biotech laboratories. This domain is characterized by the need for reliability, consistency and risk avoidance, and uses only already established procedures. The standardization and replication of established routines is necessary in business, since clients request established and approved solutions. Consequently, the need for exploratory learning and developing new approaches is lower than in research. Compared to exploratory activities, individual freedom in the service domain is relatively limited; external business clients set very precise expectations.

The ambidextrous organizations in our sample face a "catch 22" situation. On the one hand, to ensure sufficient funding for research projects that must be well received by the scientific community, they need to replicate existing solutions in the service field. On the other hand, the development of reliable cutting-edge solutions through close connection with the scientific community is a prerequisite for acquiring service projects. In other words, success in both research and service is required to attract research funds and business clients.

"In principle we have independent research and we have contract research, [...] the independent research follows the scientific logic, synchronized with the dimension of technology-policy, and contract research follows customer satisfaction as main criterion. That means it is our aim to carry out projects in such a way that clients will be our client for a second time as well and not only for once." [Senior manager on the ambidextrous business model]

Our study shows that ambidextrous organizations often become monodextrous if they fail to keep pace in one domain, usually research, and they focus on the service domain exclusively. As a consequence, they then have to compete in an industry in which the price level for standardized non-cutting-edge solutions is considerably lower, which forces the organizations to confront severe cost and efficiency problems. Because of this situation, the contextually ambidextrous organizations in our sample displayed a constant and high reciprocal dependency on research and service, and between the underlying principles of exploration and exploitation.

4.2 FORMAL STRUCTURES AND CULTURAL VALUES AND NORMS IN CONTEXTUALLY AMBIDEXTROUS ORGANIZATIONS

As we have explained above, the challenge for organizations with an ambidextrous business model lies on creating an internal environment that facilitates the continuous and balanced performance of exploratory and exploitative activities. Otherwise, such organizations run the risk of becoming monodextrous and losing their privileged market position. Therefore, they must constantly manage tensions and avoid overemphasizing one learning mode. Establishing this balance appears to be difficult, since exploitation usually requires tight structures and exploration usually requires loose structures.

Formal structures: Contextual ambidexterity is supported by formal structures that facilitate switching between exploratory and exploitative learning on the organizational, team,

and individual levels. We identify four formal structural elements that keep ambidextrous organizations in line: operationalized business model and target agreements, semistructures, fluid project-based structures, and HR systems.

Operationalized business model and target agreements: In ambidextrous organizations of our sample, the TMT defines a strategic corridor that specifies the trade-off between exploration and exploitation. Intellectual capital statements, balanced score cards, or other strategic controlling indicators are used to define joint objectives in research and in service. The organization's main objectives are translated to the individual level by the use of target agreements, such as management by objectives (MbO) and performance reviews that define the corridor for individual activities within strategic boundaries. MbO frameworks support decisions on finding the right balance on heterogeneous tasks, for example, using 70% of available man-days for research and 30% for service. The organization defines the framework in terms of resources (e.g., time) and expected results. Moreover, a continuous stretch of strategic objectives based on TMT decisions serves as a means to prevent specialization on project team or employee level.

“Defining strategic goals is the job of the Top Management. They define a frame and we have to act within this frame. But it is difficult if you have to re-orientate every three or four years.” [Scientist on the strategic frame provided by the TMT]

Semistructures: In some areas, such as responsibilities, project structures, career paths, recruiting and promotion, strategic planning, performance monitoring and reporting, contextually ambidextrous organizations use detailed procedures, structures, and processes which they create on the basis of formal rules that determine these activities. In the remaining areas, such as making decisions about when to engage in research or service or even choosing a research topic, there are only a few simple rules that govern behavior (for the distinction between complex rule systems and simple rules, see Eisenhardt and Martin (2000)). Teams and employees in these areas are free to decide how they will meet objectives and external expectations. This loose-tight relationship, described as “semistructure” by Brown and Eisenhardt (1997), keeps the organization flexible enough to conduct various projects with different demands, but also provides enough structure to preserve organizational cohesion.

Semistructures allow a flexible adaptation and facilitate solutions that are not in accordance with the general alignment of the organization but are necessary to explore new opportunities. In some units we observe a general practice of substantially adapting strategic objectives every three to five years. Employees are committed to accomplishing objectives (e.g. creating new methods that are to be applied in the business environment) within this time frame. However, one group of employees explored the opportunity to apply Luhmann's work on social systems (e.g. Luhmann (1995)) for dealing with complexity in scenario analyses in turbulent environments. After the time scheduled for the project was running out, a continuous interaction between the group and the unit's senior management modified the objectives to provide enough resources (time) for advancing the methods but keeping the process aligned enough to meet the goals, which (in this case) were realized with two years delay.

Fluid project-based structure: We found formal project-based working structures at all ambidextrous organizations we investigated. The use of a modular project structure fosters equilibrium between research and service and exploration and exploitation. Moreover, the fluid project structure enables evolutionary adaptation to changing conditions. When there is a demand for a service project or the opening for a research project, the organization can easily establish a project at any level to seize those opportunities. However, strategic guidelines provide information on how such projects should emerge; the TMTs make the final decision in all cases. Occasionally, projects are established by the TMT without any external funding. TMTs do so to shore up the exploration or exploitation side of things, for example, to develop novel approaches for business firms or investments for entering new research fields. To keep up innovation, the TMT creates internal competition for additional research funding, thereby stimulating variation within the organization.

“This is very competitive. Basically you compete against all of your colleagues. All employees are requested to write proposals and the heads of department and the scientific advisory board selects the winners.” [Scientist on internal competition on research funds]

HR systems: The contextually ambidextrous organizations in our sample constantly need to ensure that staff competencies are appropriate for performing exploration and exploitation in both research and service. Thus, employees require similar background knowledge both from education and from experience. Staffing decisions play an important role. Exploitation is performed by a core staff that accumulates the learning experience necessary to replicate and optimize existing procedures and routines. The structure of the core staff is determined and controlled by frequent recruiting. Flexibility is gained through the employment of young experts and research assistants. Planned, but limited, turnover rates facilitate experience accumulation on the one hand and innovation through “*fresh blood*” on the other. Selection procedures take place in the earlier career stages, and the best employees are awarded a permanent employment contract (tenure), after verifying his or her ability to perform in research and in service successfully.

“... in general there are only one-year-contracts to start with; afterwards he or she will be given a tenure position [if he or she shows attractive performance in both domains].” [HR Manager on career paths]

Employee integration within the scientific community and participation in research networks are the mechanisms that ensure innovation while they constantly have to perform also in the service domain. Since there are two kinds of governing logic, performance is assessed based on dual criteria as well.

“I believe that my employees rate their success on the following: on how they manage their talks at international conferences, on the acceptance of their papers in refereed journals, if they wrote a book or an article in a book. That means, they rate part of their success on their scientific performance [...] The second part of their success, I believe, depends on how they manage to carry out projects, what approval they meet, the client satisfaction.” [Manager on criteria for success in contextually ambidextrous organizations]

Cultural values and social norms: Cultural values and social norms comprise an important aspect of the contextually ambidextrous organizations in our sample. Research on the compatibility of exploratory and exploitative learning emphasizes that pursuing heterogeneous learning modes may require different mindsets and routines (Gupta et al. (2006)). However, cultural values and social norms differ among organizations and often also among subcultures, for example, on the level of different units within one firm, where some units perform more in an exploratory and others more in an exploitative mode. Thus, it is difficult to generalize about them. Particularly in cases in which there are employees from diverse academic disciplines within one organization, organizational subcultures are frequently characterized by the main values and norms of those academic professions. Nevertheless, we identify two overarching cultural characteristics in our sample of contextually ambidextrous organizations, performance orientation and group norms, and an integrative frame of reference.

Performance orientation and group norms: The organization is composed of various project teams who deal with different subjects, each of which has specific objectives and time frames, and which consists of varying team members. Employees usually participate in more than one project team concurrently. Within a concrete project team, an employee's contribution to the group's performance is visible to other group members. Accordingly, the main governance mechanism in such project groups is the group itself, as in Ouchi's (1979; 1980) concept of clan control. In other words, the group pressure exercised within team-based working structures fosters the observance of social (group) norms. These social norms keep the employees' learning and performance standards high, facilitating continued competency in the areas of research and service. The social control mechanisms create high responsiveness to opportunities on all levels within the organization, as every employee can anticipate possible projects and readily seize opportunities. Additionally, due to low spans of control, superiors are constantly aware of the competencies of their subordinates and try to employ them in diverse projects to make sure that their broad skill base is preserved and a specialization either on exploration or on exploitation is prevented.

“Most of the time, we are invited to try something new. If you have many very similar projects going on at the same time, it may happen that your boss comes around and says, ‘So you're actually doing the same thing again and again’. And with time, you learn what makes up a good project [i.e. to explore new fields].” [Scientist on expectations from the senior management]

In all the ambidextrous organizations in our study, research and service are perceived as equally valuable. The ambidextrous organizations' value systems are performance oriented, since typical core values emphasize high performance expectations in both research and service. The following examples from our interviews demonstrate these expectations: “be successful in both environments”, “show results”, “be integrated into the scientific community [and] be able to acquire and conduct consulting projects”, “show your added-value through a dual anchorage in science and in business”.

Integrative frame of reference: Working in project teams that perform both research and service triggers the emergence of an integrative frame of reference. The continuous

participation in research and service projects and interaction with team members in both domains almost naturally encourages the assimilation of shared perceptions among employees. A basic understanding of the overall business model and the continuous participation in diverse project teams creates an integrated frame of reference and enables the development of an “ambidextrous mindset” that favors exploration and exploitation in an equal balance, a shared language, and mutual understanding.

“For sure, there is an immense danger (...). The danger that both things drift apart. And that the organization focuses either on business or on research. Yes. And for avoiding this, we try to do a few things. We [try to] use the same theories, heuristics, methods, models, indicators (...) and data in both domains. One could say that we use the same core competencies.” [Manager on the challenge to maintain contextual ambidexterity]

There is a close interplay between structural arrangements and the creation of a common frame of reference, since semistuctures and modular project-based working structures act as facilitators. The collective frame of reference in contextually ambidextrous organizations facilitates communication and continuous learning. Knowledge and information is usually transferred directly among employees as they participate in various project teams concurrently. Therefore, in comparison to structurally ambidextrous organizations, where the TMT needs to bridge exploratory and exploitative knowledge, in contextually ambidextrous organizations projects serve as “knowledge bridges”. Frame-integration in contextually ambidextrous organizations occurs not only on the TMT level, but especially on the employee level. In our cases, integration is accomplished both on the TMT and on the individual level.

4.3 GOVERNING CONTEXTUAL AMBIDEXTERITY

We described above which formal structures are used and which cultural values and norms are needed to enable exploratory and exploitative learning and to perform concurrently in markets with different dynamics. However, the question remains how do ambidextrous organizations moderate the trade-off between exploration and exploitation in the face of contradictory environmental demands and learning modes? We identified routines that organizations use to orchestrate exploration and exploitation and to balance the antagonistic tendencies resulting from the pursuit of contradicting learning modes. These strategic governance and monitoring routines are based on the organizations’ specific formal structures, and cultural values and social norms, and are tailored to enable them to fully profit from the complex ambidextrous business model. The interplay of routines and structures fulfills the function of conflict regulation and cohesion and enables a connection of exploration and exploitation.

Strategic governance and monitoring: To govern the organizational development the TMT develops assumptions about an adequate overall allocation of resources to exploitative and exploratory activities, and defines a strategic corridor that specifies the trade-off between the two. TMTs use mission statements, strategic plans, intellectual capital statements, or MbO procedures to align the entire organization with the ambidextrous business model

and to explicitly communicate resource allocation decisions to their main stakeholders. Projects can be carried out within the defined strategic corridor quite easily, as long as the organization acquires external funding from business firms or research funds. TMTs in contextually ambidextrous organizations define the boundaries and reflect on the necessary balance between exploration and exploitation to maintain the ambidextrous business model. Thus, they are freed from constantly having to integrate exploratory and exploitative activities. Nevertheless, given the heterogeneous environmental expectations, TMTs systematically *monitor* the internal consistency of the organization's capability development. Whenever the TMT perceives an unbalance in the organization's development, it adopts additional projects for exploring fields that hold future promise. However, there is room only for a limited number of such exploratory projects in the ambidextrous organizations in our sample, since the financial constraints are considerable. Nevertheless, investing in exploratory projects serves as a means to balance exploration and exploitation in accordance to strategic objectives.

Conflict regulation and cohesion: The contextually ambidextrous organizations in our study must navigate the diverse expectations associated with research and service. Since decisions about the trade-off between exploratory and exploitative activities are frequently made on the individual level, organizations need mechanisms to mitigate conflicts caused by contradictory demands. Mechanisms for conflict regulation are based on two cornerstones. On the one hand, contextually ambidextrous organizations use formal structures (semistruktures) to loosely couple project teams. On the other hand, an integrative frame of reference based on commonly accepted values and social norms shapes TMT and employee perceptions and provides a social foundation for moderating conflicts.

Since all interviewees on that level were able to describe the perceived strategic challenge in detail, without being explicitly asked, we know that TMTs are aware of the necessity for balancing contradicting learning modes. To translate strategic aims to the individual level, contextually ambidextrous organisations use MbOs, or functional equivalents such as budget decisions, at all levels. Doing so enables them to signal to employees the expectations about the trade-off between exploration and exploitation. On the project team level, the use of a modular project-based structure reduces tensions between exploration and exploitation and between research and service respectively. A strategic corridor specifies how to allocate the efforts in both domains, such as acquisition targets, research output, man-hours spent in exploratory and exploitative projects, and sets the boundaries for the evolutionary development of diverse project teams in accordance with external demands.

Connecting exploration and exploitation: A main challenge in all kinds of organizations is the transfer of knowledge between exploratory and exploitative domains. By connecting learning experiences from both fields, the research-intensive contextually ambidextrous organizations in our sample profit fully from performing contradictory learning modes. Knowledge flows constantly and quasi-automatically as employees participate in exploratory and exploitative project teams, usually simultaneously. Employees have similar background knowledge from previous experience and from current working structures. Moreover, the active integration of employees into both environments facilitates the

creation of new knowledge in research and refines existing knowledge in service. Most research projects deal with topics perceived as relevant for exploitation – at least in the long run. Therefore, all contextually ambidextrous organizations in our sample have developed mechanisms to transform scientific knowledge, generated through exploration, into applicable knowledge that can be exploited. Thus, experienced employees can identify immediate customer needs and also the lack of appropriate solutions.

The staffing of projects constantly connects employees with diverse experience from other often concurrently performed research and service projects. A common understanding of the prerequisites in both domains and similar background knowledge allow these diverse project team members to collaborate immediately, without costly team building activities. Knowledge application is facilitated as employees carry knowledge beyond project boundaries by participating in projects in both research and service.

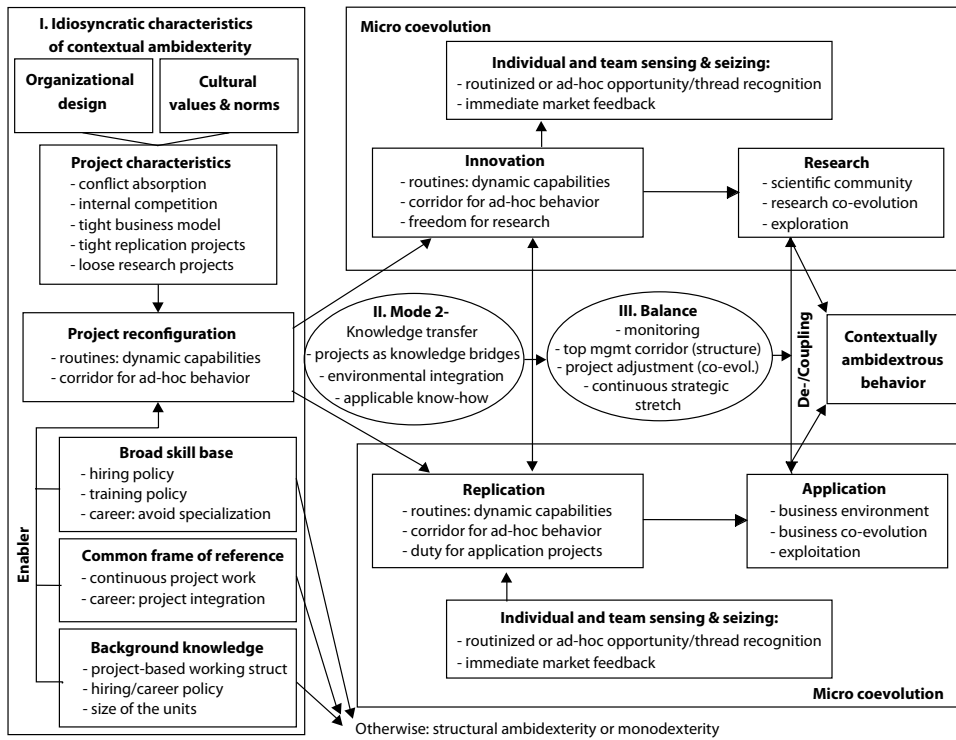
Clearly, the modular project-based structure supports a constant flow of knowledge and information between research and service. The ability to absorb, extract, and process knowledge from external sources, is enabled by two complementary mechanisms in the contextually ambidextrous organizations in our sample. Employee integration into the scientific community and the business environment facilitates the development of absorptive capacity in both fields. The integrative frame of reference and similar background knowledge make possible the internal flow of externally captured knowledge among project groups and employees.

5 DISCUSSION

Our findings contribute to the literature on ambidexterity in a number of ways. We describe the idiosyncratic characteristics of contextually ambidextrous organizations. Therefore we specify the broad notion of a “context” that allows employees to switch between exploration and exploitation according to their own judgments. Furthermore, we explain the advantage of contextual ambidexterity in comparison to structural ambidexterity and monodexterity by highlighting the role of knowledge transfer between exploratory learning and exploitative learning. Finally, we discuss the function of meta-capabilities (high-order dynamic capabilities) for balancing exploration and exploitation (*Figure 1*).

First, based on our empirical analysis we are able to further elucidate the concept of contextual ambidexterity. In their current synopsis of ambidexterity, Raisch and Birkinshaw (2008) state that research on contextual ambidexterity has so far been limited to a few studies. Gibson and Birkinshaw (2004) refer to the work of Ghoshal and Bartlett (1994) and argue that contexts that are characterized by stretch, discipline, support, and trust facilitate contextual ambidexterity. Our findings provide a rich description of the context and the role of structures for establishing, maintaining and governing an equal balance between exploration and exploitation.

Figure 1: Landscape of contextually Ambidextrous Organizations



Contextual ambidexterity is enabled by the existence of a broad skill base of employees, by a common frame of reference, and by a similar level of background knowledge among employees. Fluid project structures and semistructures, as well as commonly shared cultural values and norms, provide stability for a concurrent performance of exploration and exploitation. Therefore we also emphasize the role of loose-tight structures, supplementing tight organizational culture. This is essential in maintaining maintain contextual ambidexterity. An operationalized business model and target agreements formally define the strategic corridor at project-team and employee level. Using projects enables contextually ambidextrous organizations to perform within the boundaries of the business model concurrently in an exploratory and in an exploitative learning mode. By doing so, tendencies of contextually ambidextrous units to drift apart into several specialized units are mitigated. Dynamic capabilities for reconfiguring the project-based working structure (modularity of independent but related projects; Galunic and Eisenhardt (2001)) as well as capabilities for setting a corridor that facilitates entrepreneurial ac-hoc activities of employees are other sources for keeping contextually ambidextrous organizations vibrant in their response to heterogeneous demands from diverse environments.

A comparison among organizations shows that the contextually ambidextrous business model collapses, if the integrative frame of reference weakens. When this occurs, organizations develop competing frames of reference as well as social structures that initiate the development of structural ambidexterity. Subsequently, formal structures emerge to separate the subunits and to provide rules of cooperation. Increasingly, the TMT is asked to coordinate the subunits, to integrate exploratory and exploitative learning experience and to establish a loose-tight culture (i.e. loosely connected tight subcultures), which is typical of structurally ambidextrous organizations (Tushman and O'Reilly (1996)). However, the transfer of knowledge and information becomes more difficult than in contextually ambidextrous units, as only the TMT serves as an integrative institution. If one subunit starts to dominate the business model, the organization becomes increasingly monodextrous, because it loses its outstanding competitive position in both domains. In the worst case, an absence of exploratory impulses leads to a transformation of core competencies to core rigidities.

In our case studies, we identified some (non-ambidextrous) organizations that suffered from obsolescence of their knowledge and capability base. It seems that the transformation of a contextually ambidextrous organization into a monodextrous or structurally ambidextrous organization is also typical of the development of many start-up firms, which are most frequently contextually ambidextrous when they are established. However, organizational growth leads to formalization, tighter structures and, finally to the development of several structurally divided, monodextrous units with diverse subcultures (Nosella, Petroni, and Verbano (2006)).

Second, literature is silent in regard to the question under which circumstances different kinds of ambidexterity are favorable. Our empirical data indicate that the main advantage of contextual ambidexterity is that it facilitates the knowledge transfer between exploratory and exploitative domains; i.e. between projects that are dedicated to knowledge creation and projects that are committed to knowledge application. In structurally divided units, the TMT needs to translate knowledge from exploiting units to exploring units et vice versa; in contextually ambidextrous organizations, projects serve as knowledge bridges (see also Schmickl and Kieser (2008)). Since an employee is often member of more than one project concurrently, he or she needs to alternate between exploratory and exploitative activities based on his or her own judgments. As the projects are deeply integrated into the business or scientific environment, employees have to display both scientific rigor and business relevance concurrently. Subsequently they need to convey their experience across the boundaries of concrete projects. Therefore, the employees' dual anchorage in science and business serves as a gateway which permits that novel methods in science get applied in business and service projects. Moreover, project proposals as well as project results receive immediate feedback from different environments and thus serve as a means for constantly adjusting the organization's knowledge base, because the usability of knowledge, embedded into project work, is constantly evaluated. Consequently, we can connect our findings with the concept of mode 2 of knowledge production as described by Gibbons et al. (1994) and discussed by Harvey et al. (2002) and Hessels and van Lente (2008) among others. These scholars discuss the issue of an intensive integration between research efforts and application in knowledge production mainly on the level of the system of science. We can conclude

that mechanisms such as knowledge creation in the context of application and quality control based on feedback from different environments are also present within contextually ambidextrous organizations that aim for an intensive integration of exploration and exploitation. In structurally ambidextrous or monodextrous organizations, the TMT is in charge to transfer and translate knowledge from exploratory to exploitative domains et vice versa. However, since the transfer of knowledge is a complex endeavor, even the intrafirm transfer of knowledge between various domains is prone to error, slow and frequently incomplete (Szulanski (1996)). Contextually ambidextrous organizations have the advantage that knowledge generated in different learning domains is diffused quickly by the use of project teams instead of being translated by the TMT. Moreover, since the employees' background knowledge includes an understanding of the different requirements in diverse domains, newly generated knowledge from the scientific community can be applied faster, more comprehensively and with a better fit to the clients' needs in the business environment than in structurally ambidextrous or monodextrous organizations.

Contextually ambidextrous organizations are integrated in the scientific community (knowledge creation) and perform in the business environment (knowledge application) concurrently. Employees and project teams are embedded in diverse environments and are assigned to sense and to seize opportunities and threats because they constantly receive immediate market feedback from the scientific community and from the business environment. The maintenance of networks within the scientific community enables access to cutting-edge knowledge; this enhances a subsequent application in the business environment (Verona and Ravasi (2003)). Therefore project teams concurrently explore new opportunities and generate variation, since the acceptance of external institutions, such as business firms or research funds, gives indications regarding which development path should be selected. Therefore, the use of fluid project structures allows an organizational coevolution within dissimilar environments. Projects also serve as the main mechanism for the continuous coupling and decoupling of contradicting microevolutionary streams (Greve (2007)). From a microevolutionary perspective, competition for internal project funding serves as mechanism to stimulate variation. The TMT provides managed selection (Volberda and Lewin (2003)) and, therefore, paves the way for the organization's future development.

Third, our data also provide a description of the contextually ambidextrous organizations' capability to balance the relationship between exploration and exploitation. Ambidextrous organizations or business units, which usually address several markets with different dynamics concurrently, must develop ways to deal with these antagonistic forces. Besides continuous TMT attention, He and Wong (2004) conceive the development of an unspecified "synthesizing capability" and "ambidextrous organizational design" as necessity to enable ambidexterity. Gibson and Birkinshaw (2004) suggest that ambidextrous organizations possess meta-capabilities for governing both their operative and learning activities (exploring and exploiting).

Just recently, O'Reilly and Tushman (2008) and Teece (2007) have drawn attention to the role of ambidexterity and of contradicting learning modes within the framework of dynamic capabilities. Teece (2007) emphasized the need to orchestrate the firm's develop-

ment between the poles of exploration and exploitation. O'Reilly and Tushman (2008) defined ambidexterity as the core dynamic capability of an organization as it integrates both exploration and exploitation.

Within the dynamic capabilities framework, routines for exploratory and exploitative learning can be perceived as first-order dynamic capabilities that can point in opposing development directions (e.g. first-order dynamic capabilities for innovation (exploration) or for replication (exploitation) as described by Winter (2003)). Within this context, the ability of an organization to enable ambidexterity can be conceptualized as a high-order dynamic capability to balance these contradicting learning modes. High-order dynamic capabilities therefore serve as a means to orchestrate exploration and exploitation in heterogeneous domains (research and service) and to balance emerging contradictions.

We show that high-order dynamic capabilities contain routines for monitoring (Schreyögg and Kliesch-Eberl (2007)) and strategic governance. These routines make use of formal structures and cultural values and social norms in order to orchestrate exploratory and exploitative learning in heterogeneous domains and to balance emerging contradictions. The strategically defined business model and a constant stretch in the strategic aims serve as a basis. Therefore we also find support for the notion of Harvey et al. (2002) concerning a "strategy of related diversification" performed by research groups who follow mode 2 of knowledge production. The constant stretch in the strategic aims prevents a monodextrous specialization both of the organization on a narrow strategic topic and of employees in either exploration or exploitation. An explicitly defined business model governs the firm's evolutionary development path within the different microevolutionary streams.

6 CONCLUSION

Ambidexterity has become a heavily discussed issue in the scientific discourse. However, yet there are still just a few studies that deal with the issue of contextual ambidexterity, i.e. ambidexterity that arises from the cultural values and norms of the organizational context (Raisch and Birkinshaw (2008)). In this paper, we presented empirical case study data from contextually ambidextrous units. We described their idiosyncratic characteristics and we explained their major competitive advantage that lies in the quick dissemination of knowledge across exploratory and exploitative domains. Fluid project structures based on semistructures serve as a means for connecting temporarily decoupled project teams that are embedded into dissimilar environmental development streams. Furthermore, we analyzed the role of balancing and orchestrating capabilities for enabling the firm a concurrent performance of exploration and exploitation.

As to deriving managerial implications, it would appear that contextual ambidexterity is especially desirable for organizations which operate concurrently in environments with varying dynamics. Under such conditions, the continuous development of new knowledge in exploration and the quick exploitative application of this newly created knowledge is critical for gaining and sustaining competitive advantage. By doing so, contextually ambidextrous organizations can stay ahead of competitors, especially in the business field. In

knowledge-intensive firms where employees are broadly and equally skilled and, therefore, have similar background knowledge based on a common frame of reference, the establishment of a project-based working structure can serve as a means for creating a context where employees can alternate between exploration and exploitation.

A strategically defined business model sets the boundaries for the relationship between exploration and exploitation. Project team structures make group and individual performance within the group visible and enhance the impact of group pressure to meet performance objectives. A mutual understanding of the needs in research and business characterizes the employee's frame of reference. As projects are sensitive to feedback from their respective environment a quick adjustment of the knowledge base is possible. As a result, contextually ambidextrous organizations are able to manage the knowledge transmission between heterogeneous fields without necessarily using the TMT as an intermediary. Constant monitoring of the organization's development and a re-adjustment of the relationship between exploration and exploitation and leveraging structures for tightening or loosening activities serve the purpose to resolve conflicts and ensure cohesion between different projects. For fully profiting from a contextually ambidextrous design, these units need to be embedded into a research-driven environment and into knowledge application as the mutual understanding of both requirements and the use of feedback mechanisms from those distinct environments are necessary.

Certainly, there are limits of our results from case study research in research-intensive firms. Subsequent studies could explore the performance of contextually ambidextrous strategies in other industries and in other settings. Furthermore, contextual ambidexterity can also be connected to different development stages of an organization between the poles of loose structures during the start-up phase and the increasing role of tight structures in the subsequent phases. Research could investigate the use and appropriateness of different ambidextrous designs in diverse development stages of organizations. As our study is one of very few empirical studies on contextual ambidexterity, more qualitative as well as quantitative research on this issue is necessary. Nevertheless, this paper contributes to an advancement of our understanding of contextual ambidexterity and to the creation of a suitable framework for further analyses.

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