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How Does Innovation Differ across Business Functions? Employee-level Analysis of a Multinational Company

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Abstract

This paper investigates how innovation differs across a company's business functions. We argue that employees working in different functions of a corporation (e.g. marketing, R&D, top management) differ in terms of the types of innovation they are engaged in, the strategies they adopt to organize their innovative activities, and the factors that spur or hamper their innovation performance. Little is known about this issue, however, which we investigate by making use of a rich novel dataset at the employee-level for the multinational company Telenor. We combine a large survey among nearly 16,000 Telenor employees with an extensive qualitative data collection through interviews in different business units and functions. The empirical results point out the relevance of climate and culture, quality-oriented tasks and external interactions as the key factors supporting employees' innovation activities. The effects of these factors on innovation are substantially different across business functions of the company.

Key words:

Innovation; microfoundations; meso level; business functions; multinational company

1. Introduction

Ever since Schumpeter (1934), innovation has been seen as crucial for firms' competitive advantage. Innovation has typically been studied as a rather heterogeneous phenomenon, ranging from incremental to radical changes in products and services, production, use of resources, and organization of work. As such, innovation is relevant for all parts of a company, but the processes of innovation will arguably differ between these parts. This paper contributes to a micro-level understanding of the heterogeneity of innovation processes within firms.

Extant research on the factors that affect innovation in business companies is rich. An important conceptual framework is dynamic capability theory, which points out that firms, in order to create and sustain competitive advantages, must possess and develop a set of capabilities that are difficult to imitate and hence unique (Prahalad and Hamel, 1990; Teece and Pisano, 1994; Teece, 2007). Empirical research using this perspective has studied a variety of factors that explain innovative performance of firms, such as the type of resource endowment and its internal allocation, the firm's organizational structure, its internal learning system and knowledge management tools, and a well-established organizational culture that supports and encourages innovative activities (Crossan and Apaydin, 2010).

A recent strand of research, however, argues that the focus on routines and capabilities provides a rather aggregate view of the firm, which does not shed sufficient light on the microfoundations and origins of such dynamic capabilities (Felin and Foss, 2005; Gavetti, 2005). One of the endeavors of this new microfoundations research agenda is to study intra-firm innovation processes and to investigate how organizational capabilities are developed and sustained through the co-evolution of employee-level activities and aggregate structure and strategy (Grigoriou and Rothaermel, 2014; Jansen and Chappin, 2015). In a recent appraisal of this new microfoundations movement, Felin et al. (2015) suggest that an important avenue for future research is the investigation of the set of contextual meso-level factors that shape individual employees' capabilities, incentives and strategies:

> "Beyond the constituent individuals that make up the organization, there are also central questions about the "utilization" of individuals. In other words, the structural arrangements under which individuals operate within organizations can have a significant bearing on the full realization of individual capacities *as well as* collective outcomes and performance. Thus, the importance of organizational design, structure, and HR practices and policies." (Felin et al., 2015: 616).

The present paper argues that an important and largely neglected meso-level of analysis that has crucial influence on individuals' innovative activities is the *business function*. Multinational companies (MNCs) and large business groups are complex hierarchical organizations in which advanced knowledge production does not only involve interactions between headquarter and affiliates, but also across different functions of the same business unit. It is reasonable to argue that individual employees' motivation and ability to develop innovations will differ depending on the strategies and resources of the business function in which they work, and to which they devote the bulk of their working tasks. Business functions (often defined as departments due to functional specialization) constitute therefore an important meso-level in the analysis of innovation in organizations, representing an intermediate unit of analysis between the micro (employee) and the macro (company, business unit, group). The specific contribution of this paper to the microfoundations literature is hence to investigate how meso-level characteristics of a company's business functions affect individual employees' innovative activities.

Innovation at the meso level of a company's business functions has not yet received sufficient attention. Two previous strands of research are relevant for our study. First, prior research has investigated Department-stage models, which investigate how innovation is generated through different stages carried out by various business functions within a large functionally-organized company, and provided empirical evidence on the importance of cross-functional collaboration between, in particular, the functions of R&D, marketing, and production (Song et al., 1997; Hansen and Birkinsaw, 2007; Cuijpers et al., 2011). Second, a large literature in organizational psychology has studied the team-level predictors of innovation (West and Anderson, 1996), providing insights on how individuals organize their innovative activities when working in teams (which, as we will argue below, share some common characteristics with functionally defined departments or sub-units). However, how factors that predict and explain innovation activities vary across business functions of the same company has not been addressed directly, and is of great scientific interest. For a large multi-unit company that wants to develop and promote an innovative culture, it is of paramount importance to understand the specific factors that explain and sustain innovation in its various functional areas. The present paper therefore raises the following research question: *how do employees' innovation activities differ across business functions within a multinational company?*

This novel topic is investigated using data from the Telenor Group, a multinational telecommunications company headquartered in Norway. Telenor is the seventh largest mobile operator in the world with more than 200 million subscribers and affiliates in 13

markets in Europe and Asia. In 2014, Telenor undertook a large-scale survey data collection – the *Telenor Organization Culture Survey* – which resulted in a new dataset that comprises information on nearly 16,000 employees in 14 different business units (BUs). The present paper uses this rich employee-level dataset and combines it with an extensive qualitative data analysis based on 75 interviews, which we carried out in different business units and functions of the company during 2015.

The paper puts forward a multilevel theoretical framework in which employees' innovative activities are shaped by micro-level (individual) characteristics, meso-level functional features and macro-level characteristics of Telenor's business units. Differently from previous multilevel empirical research, however, our model's main interest is not to estimate which level of analysis is more relevant, or how different levels interact with each other. Our main objective is to focus on the links between the meso- and the micro-level, and investigate in particular the role of three key meso-level dimensions that shape employees' innovation activities: climate and culture, task orientation and external interactions (across functions as well as with external market actors). Our econometric results and the insights from the extensive interview material point out that the effects of those three meso-level factors on employees' innovation are substantially different across various functional areas of the company.

On the whole, the paper's contribution to the recent strand of microfoundations research is that, by using a rich employee-level dataset and mixed methods of analysis, we show the relevance of meso-level factors, and in particular business functions' characteristics, to shape individual employees' innovative activities. By doing so, the article follows Felin et al. (2015: 618)'s recent suggestion to extend microfoundations research by drawing insights from organizational psychology and organizational behavior theories on how individual creativity and innovation are shaped by meso-level characteristics of the team or organizational unit in which employees work.

The paper is organized as follows: section 2 summarizes the relevant literature; section 3 presents the theoretical framework and hypotheses; section 4 describes the data, design and methods; section 5 presents and discusses the empirical results; and section 6 concludes and summarizes the main contributions of the article.

2. Literature

A growing body of research has investigated the factors that shape innovation and knowledge sharing in large firms (Hansen, 1999; Buelens et al., 2006). Extant literature points out that multinational companies (MNCs) and domestic business groups often have substantial advantages *vis-a-vis* standalone firms, since they can exploit the pool of advanced human capital, financial resources and technological knowledge that is available through collaboration with the other units in the larger company (Kogut and Zander, 1993; Narula, 2002; Carney et al., 2011; Mahmood et al., 2011; Castellacci, 2015). However, knowledge flows across organizational boundaries are typically hampered by a host of factors such as cultural differences, language, and institutional distance (Kogut and Zander, 1993; Asmussen et al., 2013; Reilly and Scott, 2014). Advanced knowledge production and sharing within a multi-unit firm also necessitates a good structural fit between headquarter and affiliates, as well as the development of shared organizational values (Nohria and Ghoshal, 1994).

MNCs are complex hierarchical organizations, most often organized in regionally based business units containing sub-departments representing a functional specialization, i.e. specific departments such as for marketing, production, sales, and research and development (R&D). There is a long tradition in innovation management and organization studies highlighting this variety and the ways in which firms and sub-units need to adapt to unique environments, requiring a difficult balance between differentiation/functional specialization and integration across units (Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Lazonick, 2005). Newer perspectives discuss the dynamics of the processes of sensing and making sense of the market and institutional environment, seizing opportunities and making internal reconfigurations, and emphasize how each sub-unit uses distinctive skills, procedures and structures (e.g. Teece 2007).

The organizational capabilities approach has extensively investigated the factors shaping innovation activities within companies. Rooted in evolutionary economics (Nelson and Winter, 1982), dynamic capability theory points out that, in order to create and sustain competitive advantages, firms must possess and develop a set of capabilities that are difficult to imitate, possible to change and consistently lead to entrepreneurial behavior (Prahalad and Hamel, 1990; Teece and Pisano, 1994; Teece, 2007). The term "dynamic" emphasizes the importance of coping with a fast-changing environment, while the term "capabilities" points out the relevance of strategic management in "*appropriately adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional*

competences toward changing environment" (Teece and Pisano, 1994:1). According to this view, dynamic capabilities refer in particular to two specific dimensions: managerial and organizational processes (e.g. integration, learning, reconfiguration and transformation capabilities), and the company's competitive position, shaped by its difficult-to-trade knowledge assets and related complementary assets such as technology endowments, intellectual property, financial assets, and external relations with users and suppliers (Teece 1985; Teece and Pisano, 1994). A dynamic capabilities perspective is particularly appropriate in situations of global competition, and rapid and systemic technological change. These are typical features of the telecom industry which this paper seeks to analyze.

Inspired by the organizational capabilities approach and related theories, empirical research has identified several relevant factors that contribute to explaining the innovation performance of companies. Five recurrent themes in particular have been identified (Crossan and Apaydin, 2010): the existence of an explicit and clearly communicated innovation strategy in the company, the type of resource endowment and its internal allocation (e.g. absolute and relative R&D intensity, slack resources); the firm's organizational structure (administrative intensity; formalization, specialization and centralization; Damanpour, 1991); the internal system for organizational learning and knowledge management tools (e.g. links with universities, user-producer interactions), and an established organizational culture that supports and encourages innovative activities.

A recent strand of research, however, argues that the organizational capabilities approach's focus on routines and capabilities provides a rather aggregate view of the firm, which does not shed sufficient light on the micro foundations and origins of such dynamic capabilities (Felin and Foss, 2005; Gavetti, 2005; Felin et al., 2015). One of the challenges of this new micro foundations research agenda is to study intra-firm innovation processes and to investigate how organizational capabilities are developed and sustained through the co-evolution of employee-level activities and aggregate (firm-level) structure and strategy (Teece, 2007; Grigoriou and Rothaermel, 2014; Jansen and Chappin, 2015).

Motivated by recent microfoundations research, we advance the specific argument that the meso-level matters for employees' innovative activities. By *meso-level*, we mean the intermediate level between the micro (employee) and the macro (company, business unit), and specifically the department or sub-unit representing a business function to which an employee is formally affiliated and/or devotes the bulk of daily working tasks. We will refer to this as a business functions (BF), and we will discuss in detail different functions relevant for the telecom industry in the methodology section. A few studies previously investigated

how innovation is generated through different stages carried out by various BFs within a large company (so-called department-stage models; Saren, 1984; and the innovation value chain, Hansen and Birkinsaw, 2007). Other works provided empirical evidence on the importance of cross-functional collaboration between, in particular, the functions of R&D, marketing, and production (Song et al., 1997; Cuijpers et al., 2011).

A popular meso-level approach highlights team-level predictors of innovation (West and Anderson, 1996). According to Cohen & Bailey (1997: 241-242):

> "A team is a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems. (…) Their membership is typically stable, usually full-time, and well-defined".

The focus on teams is warranted, since within organizations, innovation activities are first and foremost planned, organized and carried out by functionally-defined working teams (Hüsleger et al., 2009). For instance,

> "a management team may initiate changes in organizational procedures; a marketing team may modify approaches to advertising product lines; and an assembly team may institute new and improved methods of product manufacture" (Anderson and West, 1998: 239).

Team-level studies of innovation have typically made use of a so-called input-process-output model of team performance (Hackman, 1987; Ilgen et al., 2005). This model distinguishes between two types of team-level predictors of innovation: those referring to the input side and those related to the process side. Input-side variables point out the composition and structural characteristics of teams as one main dimension fostering innovation. Typical input-side variables that have been found to be positively related to functional teams' innovation are in particular team size, longevity and diversity of employees (e.g. job-relevant and background diversity). On the other hand, process variables relate to how teams' resources and capabilities are organized, supported and developed. Three groups of factors have been identified as important to foster innovation performance: the team's organizational culture, the type of task orientation, and the external interactions that team's employees engage in across functions and business units, as well as with external market actors such as users and

suppliers (Hüsleger et al., 2009). Our theoretical framework will point out the relevance of these factors within a general model of innovation in multi-unit companies.

3. Theoretical framework and hypotheses

Drawing insights from these related strands of literature, we put forward a hierarchical model of organizational innovation. Multilevel theorizing and empirics has attracted a great deal of attention in recent years, seeking to investigate the relative importance of different levels of analysis for firm's performance, and how these interact with each other (Hitt et al., 2007; Agunis et al., 2011; Mathieu and Chen, 2011; Mollick, 2012). Figure 1 depicts our theoretical framework. The model is *hierarchical* as it points out that innovation in a multi-unit company depends on factors that refer to three related levels of analysis: (1) the individual level, since individual employees' characteristics represent a prime engine of innovative activities; (2) the meso-level of business functions (BF), which is the main focus of this paper; (3) the aggregate business unit (BU) level, since affiliates of a multinational group are characterized by different resources and strategies and face distinct market conditions and national regulations and working cultures. Firms' dynamic capabilities and their role for innovation performance, we argue, must necessarily be understood within a broad hierarchical framework.

< Figure 1 here >

Specifically, our empirical study will make use of indicators at all three levels of analysis, but, differently from previous multilevel research in this field, our objective is not to investigate which of the three levels is more important, or how different levels interact with each other. Our hierarchical model seeks to focus on the intermediate level of business functions: we are interested in uncovering the meso-level factors that shape employees' innovation and point out how these factors differ across BFs of the same multi-unit firm.

In our framework, a business function may be defined as a group of employees that perform a similar task within the company, that carry out similar work and activities, and that have analogous relationships to other firm's agents and the external environment. Our definition does not require that employees of the same BF must be formally affiliated to the same organizational unit, but it emphasizes the full-time and stable commitment of the BF's

employees to a certain type of working tasks. This is in line with Cohen & Bailey (1997)'s definition of working groups, and it explains why the team-level literature noted in the previous section represents a relevant conceptual framework for our model.

Among the factors highlighted by the input-process-output model of team performance (Hackman, 1987; Ilgen et al., 2005), the three "process" dimensions are the key factors pointed out in the diagram in Figure 1. The first is the *culture and climate* that characterizes a functional area. An organizational culture that fosters innovation is defined in particular by the existence of a clear vision and set of shared values, which contribute to shape employees' "*clarity of and commitment to objectives*" (West and Anderson, 1996: 682); by an active participation of team members in decision-making (so-called "*participative safety*"); by a high degree of internal cohesion, i.e. strong commitment to team work and membership (Hüsleger et al., 2009); and by an active support for innovation and tolerance of failures, i.e. the "*expectation, approval and practical support of attempts to introduce new and improved ways of doing things in the work environment*" (West, 1990: 315). Hence, in line with extant literature, we point out the following general proposition.

Hypothesis 1a: *An organizational culture that supports innovation and internal cohesion is positively related to the BF's innovativeness.*

However, it is reasonable to expect that the relative importance of the organizational culture and its effects on a company's innovation performance will vary across different BFs of a multi-unit corporation. We specifically argue that one important factor moderating this relationship is the type of tasks and underlying knowledge base that characterize working activities, and in particular the extent to which working tasks must adapt to a continuously changing knowledge base, or are rather routinized and repetitive. It is reasonable to expect that in BFs in which working tasks are subject to a continuously changing knowledge base (such as for instance R&D, strategy and top management) employees have to devote systematically more resources and attention to innovative activities, and hence a supportive leadership and organizational culture is relatively more important than in BFs where working tasks are typically routinized and repetitive.

Hypothesis 1b: *The positive relationship between organizational culture and innovation is stronger in BFs where working tasks are subject to a continuously changing knowledge base.*

The second dimension in our theoretical framework is *task orientation*, which defines the objectives of working tasks carried out by employees in a given BF and how these tasks are typically organized. The key factor pointed out in previous research is quality orientation (also defined as "*climate for excellence*"), i.e. the importance of detail and analytical focus in everyday activities, and "*a shared concern with excellence of quality of task performance in relation to shared vision or outcomes*" (West, 1990: 313). According to previous empirical studies, we should expect that:

Hypothesis 2a: *Task orientation towards quality and analytical detail is positively related to the BF's innovativeness*.

Other characteristics of working tasks studied in the literature are risk-taking and entrepreneurial orientation, result orientation, as well as operational efficiency orientation, i.e. the extent to which external market pressures make it important to reduce costs or shorten times of delivery (Hüsleger et al., 2009). The factors noted here are distinct, yet it is reasonable to argue that they are closely related to each other. For instance, if the external market environment poses severe pressures to the performance of working teams, these will arguably have to shift their focus from quality orientation and creative innovations towards operational efficiency and incremental innovations (West, 2002). The specific point we develop here is that the relationship between task orientation and innovation varies across BFs depending on the relative importance assigned to quality vs. costs and time-related factors, i.e. depending on the extent to which working tasks in a given BF are intended to produce a high quality output or service (like in an R&D Department), or are rather aimed at reducing times and costs of final deliveries (e.g. in operations and support service functions).

Hypothesis 2b: *The positive relationship between task's quality orientation and innovation is stronger in BFs where quality of delivery matters more than costs and time factors.*

The third dimension relates to the external interactions that employees in different functions have with other agents and organizations. Considering first interactions that arise within the same multinational corporation or the same domestic business group, two types are relevant and contribute to shape innovation performance. One is cross-functional collaborations, namely interactions that employees have with other working groups or functions within the same BU (Song et al., 1997; Cuijpers et al., 2011). The other is interactions with other BUs

and affiliates of the same group (Kogut and Zander, 1993; Asmussen et al., 2013; Reilly and Scott, 2014). Although Dasi et al. (2015) point out that different factors govern knowledge sharing within *versus* across BUs, for the purpose of our analysis it makes sense to combine these together in a single proposition.

Hypothesis 3a: *The ability to interact with other functions of the same company (within and/or across BUs) is positively related to the BF's innovativeness*.

We should expect, though, this relationship to be affected by an important moderating factor that may lead to substantial differences across BFs: the degree of organizational centrality (or, conversely, the degree of organizational peripherality) that characterizes each BF.[1] By this we mean whether a function is essential to the dynamic capabilities/competitive advantage of the firm, or whether it is more an indirect support function. If a business function constitutes an important provider of knowledge, artefacts and services to other units of the firm (such as in a marketing and sales Department; see Song et al., 1997; Reilly and Scott, 2014), it would then be reasonable to expect its cross-functional ability and absorptive capacity to play a more relevant role than it is the case in a BF that has a more peripheral position.

Hypothesis 3b: *The positive relationship between cross-functional interaction ability and innovation is stronger in BFs that have a high degree of centrality within the company.*

Finally, a type of external interaction that affects innovation performance and is typically highlighted in the innovation literature refers to the capability to link up to external agents in the market, and in particular users and suppliers. The ability to recognize, imitate and exploit the pool of advanced knowledge that is available in the economic environment is one of the crucial dynamic capabilities that provide companies with competitive advantage (Teece 2007). External sources of opportunities may be exploited when firms are able to engage in cooperation with other agents in the innovation system, such as their suppliers, users and competitors (Laursen and Meliciani, 2002). Supplier- and user-producer interactions, in particular, represent a crucial factor explaining innovation dynamics and corporate performance (Pavitt, 1984). These external interactions increase the pool of technical

[1] This is analogous to the concept of "network centrality", see Tsai (2001).

knowledge available to innovating firms, while at the same time supporting mutual trust, knowledge sharing and hence lower transaction costs (Reichstein and Salter, 2006).

Hypothesis 4a: *The ability to interact with, and learn from, external market actors (suppliers and users) is positively related to the BF's innovativeness*.

Yet, one could argue that this relationship may have different relevance and strength in various BFs of a multi-unit corporation, since BFs by their nature have a distinct relative position and proximity, or distance, from external market actors. Specifically, for BFs characterized by close market proximity (e.g. marketing and sourcing), the interaction ability and absorptive capacity is arguably more important than for BFs that are more distant from the market, since for the latter typical working tasks are not interdependent on those of external agents such as suppliers and users (e.g. like in a R&D or technology department).

Hypothesis 4b: *The positive relationship between external interaction ability and innovation is stronger in BFs that have a high degree of market proximity*.

In summary, our theoretical model points out four crucial factors explaining BFs' innovativeness (Hypotheses 1a, 2a, 3a and 4a), and argues that each of these relationships is affected by a set of moderating factors that lead to expect substantial differences in the working of the model across BFs. In other words, propositions H1a, H2a, H3a and H4a establish general relationships at the BF level, whereas H1b, H2b, H3b and H4b point out how meso-level factors affect micro-level patterns (employees' innovation). It is therefore the latter set of hypotheses that represents this paper's specific contribution to the microfoundations literature.

Figure 2 presents a simple overview of the moderating factors that we have pointed out in this section, and how they relate to Hypotheses 1b, 2b, 3b and 4b. The upper panel of Figure 2 shows that the combination of the two moderating factors "changes in knowledge base" and "quality orientation" generates, ideally, a typology of four distinct BFs. The lower panel of figure 2 shows that the combination of the other two moderating factors – "degree of organizational centrality" and "market proximity" – also leads to four distinct types of BFs. Taken together, these four factors generate a typology of sixteen different BFs, i.e. each BF type would be a different combination of the four factors noted here.

< Figure 2 here >

4. Data and empirical methods

4.1 Data and design

Telenor is a large multi-unit and multinational telecom operator company; it is the seventh largest mobile operator in the world with 200 million mobile subscriptions. The headquarters are in Norway, and the company has affiliates in 13 markets in the Nordic Region, Central and Eastern Europe, and Asia. Each of the affiliates in local markets is defined as a business unit. Telenor has evolved as a multi-domestic MNC characterized by local autonomy to engage in local adaptation. During the last decade a number of centralized functions, such as marketing, technology and R&D, were established or strengthened to facilitated knowledge sharing and innovation across the group without losing the decentralized nature of the company. As such, the Telenor Group has by and large a hierarchical and functionally-organized structure. Telenor has in recent years developed a strategy to foster a better integration of its business units (BUs). As the company's investments abroad expand – particularly towards Eastern Europe and Asia – it is seen as crucial to ensure that different business units exchange knowledge and information and sustain learning and innovation dynamics.

The company recently took a strategic decision to carry out a large-scale study of its organizational culture, in order to map knowledge flows across the BUs as well as across different BFs, and understand better the factors that spur innovation dynamics. In 2014 Telenor undertook the large-scale *Telenor Organization Culture Survey* – which resulted in a new dataset providing information on almost 16,000 employees across 14 BUs worldwide, and their perceptions of the company's leadership and working culture, knowledge sharing practices and innovation process.[2]

In a pilot phase of the survey data collection, a team consisting of researchers from the University of Oslo and Telenor's internal R&D department visited BUs in Pakistan, Denmark and Norway and conducted 40 semi-structured interviews to better understand contextual differences in the corporation, and to develop survey instruments. In spring 2014, the team

[2] Access to respondents and data was negotiated through the company's central HR unit. The Telenor team of researchers had to negotiate access and get the permission from top management to carry out a large-scale internal data collection.

conducted a large scale electronic survey across the corporation. A pilot design of the survey instrument was pretested among 74 employees in Bangladesh and Norway and across two different functions, HR and R&D. This diverse pilot sample was selected in order to to account for the cultural diversity in the organization. Thereafter, the team carried out a full-scale pilot among 1136 employees in Telenor Pakistan. Based on the feedback from the pilot respondents, the questionnaire and the items were adjusted to make them as straightforward and easily understandable as possible to all employees. A final version was reviewed in a meeting with 14 senior managers in R&D and HR.

In March 2014, the questionnaire was sent to all 24571 full-time employees of Telenor (except for Bulgaria and Myanmar business units), effectively making it a census. An external e-survey vendor was used to handle the distribution of e-mails, the collection and storage of returned questionnaires. The survey package included a front page letter from Telenor Research introducing the study and explaining how confidentiality of the respondents was protected. After three weeks, 15793 respondents had returned the questionnaire, which amounts to 64% of the corporation. The survey achieved a response rate of above 50% in most BUs with a peak of 77% in Malaysia and a low point of 36% in the central unit Broadcast.

An important methodological challenge was to develop a broad functional categorization scheme that would allow us to compare functional departments across Telenor's 13 BUs. Since many local BUs were historically established on the basis of acquisitions and were subsequently allowed to keep their original functional department structures, the company as a whole encompassed several hundred small functional departments. Although many of these departments were identical in terms of tasks and roles within the company, their high number made it difficult to make comparisons of functions across BUs.

To tackle this challenge, we used the company's multifaceted functional structure as a starting point for developing a uniform and broad-based categorization scheme. We first interviewed five senior managers in the R&D department, the central HR department and the legal department focusing on how we could map many functional departments into a few larger ones. As a result of these interviews, we created eight distinct business functions (BFs), which were verified by the HR directors in all BUs of Telenor. We ended up with the following functional categorization: (1) marketing and sales; (2) sourcing & purchasing; (3) support functions (HR, finance, legal); (4) technology and telecom (networks); (5) operations; (6) R&D; (7) strategy, (8) top management. This categorization was subsequently used in the pilot survey, which we conducted in Telenor Pakistan and Telenor HQ. In the pilot, the

respondents were asked to map themselves into the categories that best matched their current work tasks. As we received only few (and no significant) comments from the pilot respondents, we decided to use this categorization in the full-scale survey. Hence, in our dataset, each employee is assigned to a specific business function. This information makes it possible to carry out a systematic comparison of innovative activities and their differences across BFs of the Telenor Group.

On the whole, this new survey dataset represents a unique, employee-level empirical source to investigate innovation activities within a multinational corporation, and its relations to a variety of individual, organizational and country-specific factors. The results in this paper are based, first and foremost, on a quantitative econometric analysis of this rich dataset.

However, in order to complement the information available through the survey questions and get a more thorough understanding of the underlying patterns, we have also collected an extensive amount of qualitative data through interviews. Specifically, between July and November 2015, we carried out 75 interviews of 60-90 minutes each with key informants across all the BUs. We interviewed top and middle-level managers representing different BFs of the company, who work with new technologies and solutions, are involved in innovation processes and are able to convey important insights about the company's innovation strategy, work culture and knowledge sharing practices in respective BUs. We kept interviewing until saturation, that is, until each additional interview added little new knowledge (Miles & Huberman, 1994). The interviews were semi-structured, based on an interview guide developed by the research team. We asked employees to define innovation and provide examples, describe the company's strategy for innovation, identify leadership role, assess the work culture, organizational structure and collaboration practices, and discuss the key drivers and obstacles for innovation in respective functions.

We carefully selected the key informants in order to make our sample representative of the overall size of BFs and business units in Telenor. Hence, in our data material there is a close correspondence between the company's overall population of employees, on the one hand, and the quantitative survey data and number of interviews, on the other. Tables 1a and 1b summarize our quantitative and qualitative datasets.

< Tables 1a and 1b here >

4.2 Variables and empirical model

Our empirical analysis will first present the results of a quantitative analysis of the survey, and then use the insights from the interviews to shed further lights on the observed correlation patterns. The dependent variable is INNO, which is a measure of "innovativeness". The respondents in the survey were asked to rate the innovativeness of the work in their department on a 1-7 scale (from low perceived innovativeness to high perceived innovativeness). This variable represents a self-rated assessment given by each employee of the innovative activities they carry out within their respective BFs. Hence, the variable (like most other variables used in this study) is measured at the employee-level, and provides information about employees' perceived innovativeness. The explanatory variables include a set of main explanatory factors – those pointed out in our theoretical model in section 3 – and a set of control variables. The main explanatory variables refer to the meso-level conceptual dimensions of our theoretical framework: (1) culture and climate, (2) task orientation, and (3) external interactions. We provide here a list of all the explanatory variables used in the regression analysis, and Appendix 1 reports the survey items that have been used for the construction of each of these variables, along with the Cronbach's Alpha showing the validity of each construct.[3] Table 2 presents descriptive statistics for these indicators.

CULTURE: Culture and climate.

- PARTICIPATION: active participation of team members in decision-making ("participative safety").

- INNO_SUPPORT: active support for innovation and tolerance of failures.

- COHESION: Degree of internal cohesion, i.e. strong commitment to team work and membership («group psychosocial traits»).

TASK: Task orientation.

- TASK_QUALITY: quality orientation ("*climate for excellence*"), i.e. the importance of detail and analytical focus in everyday working activities.

[3] For a discussion of analogous constructs and variables validity in the literature on team-level predictors of innovation, see the team climate inventory (TCI) in Anderson and West (1998).

- TASK_RISK: Degree of risk-taking and entrepreneurial orientation in working tasks.

- TASK_EFFICIENCY: the extent to which external market pressures make it important to reduce costs or shorten times of delivery.

- TASK_RESULT: Degree of result orientation in working tasks.

- TASK_PACE: Degree of pace-keeping orientation, i.e. the ability to quickly respond and reap opportunities.

INTER: External interactions.

- INTER_CROSS_BF: cross-functional collaborations, i.e. interactions with other working groups or functional Departments within the same BU.

- INTER_CROSS_BU: interactions with other BUs and affiliates of the same group.

- INTER_USERS: interactions with external market agents (users and suppliers).

CONTROLS: Control variables.

We consider the following employee-level characteristics among the set of control factors:

- DIVERSITY: degree of tolerance to other employees' diversity in terms of nationality and gender.

- INTEGRITY: Integrity and ethical values: perceived importance of ethical norms and integrity.

- EDUCATION: Education level of each employee.

- LONGEVITY: Employee's longevity (experience): number of years the employee has worked in that BF.

- GENDER: Gender of the employee.

- ATTITUDE: Employee's attitude and personality: This control variable seeks to take into account and alleviate the fact, common to several survey designs, that some of the respondents have systematically higher (or lower) response values on most of the survey questions than other respondents, due e.g. to individual characteristics (attitude and personality) and/or cultural values. The Telenor survey contains a battery of questions where employees have been asked to what extent they are satisfied with their own Department with respect to a set of characteristics (e.g. culture and climate; task orientation; external interactions). Hence, for each of the explanatory variables noted above, we have been able to calculate a "gap" variable (measuring the perceived gap between the "desired" and "effective" characteristic of the Department), and then compute an average of all of these "gap" indicators. The resulting variable is our proxy measure for individual respondents' attitude, which we use as a control variable in the regressions.

Finally, we insert a set of dummies controlling for other characteristics of business functions (BF) and business units (BU) not accounted for in the model.

- BF: dummy variables indicating the functional area of the employee (each employee is assigned to one of eight BFs of the company).

- BU: dummy variables indicating the business unit of the employee (each employee works in one of the 14 BUs of Telenor).[4]

< Table 2 here >

The econometric model specification is outlined as follows:

[4] In addition to the set of BU dummies, we have also tried to include in the model a variable measuring each BUs size, as measured by its number of employees (in log). The results including this additional variable are very closely in line with the baseline results presented in section 5.

$$INNO_{ijz} = \alpha + \beta\, CULTURE_{ijz} + \gamma\, TASK_{ijz} + \delta\, INTER_{ijz} + \eta\, CONTROLS_{ijz} + \theta\, CULTURE_{jz} + \lambda\, TASK_{jz} + \varphi\, INTER_{jz} + \omega\, BF_{jz} + \psi\, BU_{z} + \varepsilon_{ijz} \quad (1)$$

This is a three-level hierarchical model, where the subscript *i* denotes the employee (micro level), *j* indicates the BF in which each employee works (meso level), and *z* denotes the BU to which each employee is belongs (macro level). We estimate this empirical model by means of two complementary econometric methods. First, we estimate an ordered probit model. The shortcoming of this first approach is that it does not take into account the hierarchical nature of the data. Second, we estimate the model as a three-level hierarchical linear model, where the three levels of analysis are the employee-, BF- and BU-level (see Anderson et al., 2004: 163). Specifically, we estimate this multi-level model as a mixed fixed effects and random-slope model, i.e. where fixed effects take into account unobserved characteristics at each level of analysis (employee, BF and BU), whereas the random effects at the BF-level allow the effect of each explanatory variable on innovation to vary across functions. The estimated random slopes (i.e. the parameters θ, λ and φ in equation 1) represent therefore a direct test of our Hypotheses 1b, 2b, 3b and 4b about the effects of meso-level factors on employees' innovation.

5. Empirical results and discussion

By first looking at our dependent variable (innovativeness), the interviews point to three general patterns that hold for Telenor employees in all business functions. First, the interviews indicate that employees have a broad understanding and definition of what innovation is, and different types of innovation are emphasized by workers in different functions (e.g. process, product, service, organizational changes). Second, the word 'innovation' is in most BFs coupled with an increasing focus on users ("*Innovation is about doing something better for the customer*"; employee in Telenor Norway). Third, most think that innovation in the company by and large refers to incremental changes rather than radical innovation. On the whole, these insights point out that what our empirical analysis shows is a set of factors that explain user-oriented and incremental innovation, and that the specific type of innovation varies among the different BFs.

Tables 3 and 4 present the results of the econometric estimation of Equation 1. Table 3 reports the baseline results of the model estimated through both an ordered probit and a hierarchical linear model specification. The results in table 3 refer to the whole sample and are intended to be tests of the hypotheses 1a, 2a, 3a and 4a, i.e. an analysis of the correlation between our main explanatory variables and the dependent innovativeness variable throughout the whole sample (regardless of differences across BFs). Table 4 reports the estimated random effects for each BF, testing the extent to which the effect of the explanatory variables on innovation varies across functions (hence the estimated slopes reported in Table 4 represent a test of our Hypotheses 1b, 2b, 3b and 4b).

< Tables 3 and 4 >

Results on Hypotheses 1a and 1b

All three variables that we have used to measure the relevance of climate and culture for innovation – participation in decision-making, innovation support, and cohesion and internal collaboration – turn out to be positively related to employees' perceived innovativeness, in line with previous literature and the theoretical expectations formulated by Hypothesis 1a. Among the three variables, Table 3 shows that it is the indicator of BF's cohesion that has the largest estimated coefficient.

Table 4 indicates, however, that these relationships vary substantially across BFs. Business functions that have stronger estimated coefficients (random slopes) than others are strategy, R&D, technology & networks, and sourcing, whereas the support function consistently scores below the sample average. Our Hypothesis 1b points out that this may be interpreted as the result of different underlying knowledge base across functions, where a positive relationship between organizational culture and innovation is stronger in BFs in which working tasks are subject to a continuously changing knowledge base.

The interviews we carried out provide useful insights for a deeper understanding of the econometric results. All the functions where we find stronger estimated coefficients are arguably characterized by a continuously changing knowledge base. In R&D, a direct interaction with customers, external partners as well as a strong connection to the company's headquarters (HQ) makes the function dependent on continuous learning and updating. In the functional area of technology and networks, changes in the knowledge base occur quickly in order to keep up with advances in the telecommunication industry. As customers move rapidly between network providers, this function has to be on the technical forefront in order

to keep up with the pace of the market. In strategy, there is a combination of internal and external pressures that drives continuous learning. In sourcing the fact that collaboration with new external partners and vendors are part of the working environment and company's HQ-driven strategy makes this function subject to a continuously changing knowledge base as well. Overall, both our quantitative and qualitative material support the argument that organizational culture is important for business functions' innovativeness, and particularly so for R&D, technology and networks, strategy and sourcing functions, where working tasks must adapt to a rapidly changing knowledge base. By contrast, interviewees in operations that work on more routinized tasks did not consider climate and support for innovation as crucial factors for their innovation performance.

Results on Hypotheses 2a and 2b

Hypothesis 2 focuses on task orientation, i.e. the type of working tasks that are more relevant for innovation in different BFs of the company. Specifically, the main variable pointed out by Hypothesis 2a is quality orientation, which turns out to be positively and significantly related to the dependent variable as expected (see Table 3). The variables that we have used to take into account the effect of other types of task orientation – operational efficiency, risk and entrepreneurial attitude, result-orientation and the ability to keep pace – are also positively related to the innovativeness of BFs.

From the interviews, it is clear that operational efficiency and cost reduction strategies work as a double-edged sword when it comes to innovation. On the one hand, they hinder creativity and generation of new ideas, constrain resources and hamper long term planning. On the other hand, pressures to reduce costs and delivery times also favor incremental innovation. As one interviewee pointed out, "*Sometimes we have to be more lean and efficient, and then we come up with innovative ways of doing this. But then all this time that we focus on being operationally efficient we can't think about the larger problems at hand*". However, most interviewees agree that the focus on operational efficiency negatively affects BFs' innovativeness in the longer term.

The second part of Hypothesis 2 (H2b) develops this point further and argues that the positive relationship between "climate for excellence" and employees' innovation is stronger in functions with a high degree of quality-oriented working tasks (i.e. where quality of delivery matters more than costs and time factors). Table 4 indicates that this relationship is stronger in top management, R&D, marketing & sales, and sourcing. It is reasonable to argue that these four business functions are working environments where employees have to place more

attention on the quality and precision of their daily tasks and deliverables, and where quality orientation is a crucial requirement for innovation performance. For instance, in R&D many of the interviewees expressed the importance of having some time and funding to experiment, and to work on completely new products and services, instead of simply being quick to execute. Further, many in R&D are subject to performance indicators such as academic publishing, or number of downloads for new mobile applications. For top management, revenue targets are not the exclusive criteria for selecting new ideas: "*We don't want to make it too strict and rigid with Net Present Value calculations, we want some cool ideas generated too!*"

The interviews with employees in marketing, sourcing, technology & network indicate that, while quality orientation is an important requirement for innovation, focus on time and cost factors is always present as well. In sourcing, for instance, innovation is most often connected to "*cost reduction*" and "*functionality*". An interesting point raised in interviews with employees in technology and networks is related to the negative effect of operational efficiency on task orientation. Due to market pressure towards greater operational efficiency and result-orientation, the technology employees feel forced to deliver services and solutions that are not necessarily of what they see as optimal quality, but that are delivered on time. It is argued that when this happens repeatedly, the company creates a great deal of temporary solutions that result in a complex "*spaghetti architecture"* in the IT systems, and that eventually turn out to have a negative impact on service quality, as well as operationally efficiency. Overall, however, both the quantitative and qualitative material indicates that there is a positive relationship between quality-oriented working tasks and innovation, and that this is stronger in BFs such as top management, R&D, marketing & sales, and sourcing. The interviews also highlight the difficulty of balancing quality, cost and time factors.

Results on Hypotheses 3a and 3b

Hypothesis 3 points out that each BF's ability to actively make use of cross-functional collaborations, within the same BU and across BUs, is important to foster employees' innovation activities. Table 3 indicates that both of the variables INTER_CROSS_BF and INTER_CROSS_BU are positively related to the innovation dependent variable, and that the former has a higher estimated magnitude than the latter variable.

This difference in intensity between internal collaboration in a BU and collaboration across BUs is reported in our interviews as well, which point out different factors for why collaboration occurs. For any innovative project, internal collaboration across functions is not

only considered positive, but necessary. Marketing and sales are dependent on technology and networks, which in turn are dependent on operations. This makes internal collaboration within the BU much more prevalent than across the BUs. For collaboration across the BUs, the main drivers are either large scale projects driven by the company's HQ, or informal relations between employees.

Another insight gained through our qualitative analysis is a tension between collaboration and incentives. Although cross-functional collaboration was often mentioned as desirable, this seems to be hampered by performance measures and incentive systems adopted by different functions. Since employees' performance is typically measured within their business function, any collaboration is deprioritized to make sure internal goals are met first: "*When you are measured on cost for your department, you do not care about other departments*". For collaboration across functional departments to work better, it is argued that there should be specific projects with aligned goals, shared ownership and performance measurement.

The second part of this hypothesis (H3b) focuses on differences across functions. Table 4 shows that, for some of the BFs, the estimated slopes for these relationships are substantially higher than for other BFs. In particular, the top management and sourcing functions turn out to have stronger estimated coefficients on both types of cross-functional collaborations (within and across BUs), while marketing and sales have a higher slope on the within-BU cross-functional collaboration. It is reasonable to argue that the positive relationship between internal collaboration ability and employees' innovation is stronger in functions that have closer proximity to other firm's functions, i.e. a higher degree of organizational centrality.

The argument that top management and sourcing functions have a higher degree of organizational centrality is supported by our interviews. The top management is central in decision-making for collaboration: "*There are typical problems of communication between marketing, technology and finance people in cross-functional teams, but we (top managers) take final decisions*". Top managers in the BUs also have more contact with the company's headquarters, travel more across BUs and have stronger formal and informal ties with other managers in the BUs. Top executive managers also often have short- and long-term expatriate assignments in different BUs: "*Without personal relations, cross-BU collaboration would be possible but it would take a lot more time* [...]. *Knowing people in other BUs helps a lot.*" Furthermore, as sourcing is a global unit in Telenor, the employees from different BUs meet often and have "*a lot of dialogue in order to optimize operations*".

However, the most prevalent focus of internal collaboration that emerges from the interviews is between marketing & sales and technology functions. Many new ideas originate from the

marketing and sales employees (such as customer centricity, customer care and internet services teams) that require collaboration with software engineers, network architects, technical product managers and the like in order to execute these ideas. Our interviewees note that when this inter-functional collaboration works well, it affects innovation positively. But while marketing and sales personnel are measured on how well a new product or service does on the market, experts in technology and networks are typically measured on the extent to which the service works as specified by the requirements. A software engineer expressed that "*sometimes the marketing guys are too focused on meeting the targets"*. Employees in marketing, however, argue that employees in technology work too slowly. This creates tensions between these functions, which may explain why our econometric results show a comparatively low coefficient on the within-BU cross-functional collaboration (see Table 4). For collaboration across marketing and sales, and technology functions to work, it is argued that there should be specific projects with aligned goals, shared ownership and performance measurement. Overall, we find that the positive relationship between internal collaboration ability and innovation is stronger in functions with a high degree of organizational centrality.

Results on Hypotheses 4a and 4b

Hypothesis 4 focuses on the importance of interactions with the external users for the innovativeness of BFs. This variable turns out to be positively and significantly related to the dependent variable, in line with hypothesis 4a. Notably, its estimated coefficient is larger than the corresponding variables measuring cross-functional collaborations within the company discussed above, confirming a recurrent theme in the interviews about the relevance of customers in shaping the company's innovation strategy and activities.

Table 4 indicates, however, that the estimated relationship between the user interaction variable and employees' innovation is not the same across all BFs, but it is stronger among top managers and in the sourcing function. According to our hypothesis 4b, differences across BFs in the relevance of the user role for innovation should be interpreted in the light of the degree of exposure and proximity to the market that different functions within a company have. Hence, intensive user-producer interactions for top management and sourcing functions should be related, according to our theory, to their high degree of exposure and close proximity to the market. That makes the company's employees' tasks highly interdependent with those of external market agents.

Our interviews are useful to explain and discuss further these econometric results. For top managers, the market is argued to strongly influence the strategy they create and

communicate to other departments, and all interviewees at the top management level argue that the market has a strong influence on their function's activities. Our informants describe how the company's strategy at this level is set to predict what customers would want in two to five years, and how it influences top management decisions to "*cater our networks to new customer trends*". From our interviews it is clear that Telenor's top management has a thorough understanding of the fit between the company's overall strategy, and the needs of the local markets, and that it seeks to combine these. It is argued that a top executive manager "*has his/her own vision, a little bit like a crystal ball – but must also understand the local market needs*". Overall, the company's top managers we interviewed seem to have a good understanding of the local market, and are overall positive to the influences of external collaboration on innovation.

In sourcing, the nature of the function requires continuous collaboration with external partners, vendors, logistics service providers and customers. These are typically noted in the interviews as important sources for new ideas in this business function. Much of the innovation here is said to be "*need and problem-based*", and it is largely *ad hoc*. This dynamic and rapidly changing business function therefore entails a high proximity to the external market environment.

Another business function that typically has close proximity to the market, and where the users are therefore expected to play an important role, is marketing and sales. The econometric estimations do not find this BF to have a stronger than average coefficient, which is not in line with our expectations. However, the interviews point out clearly how important the customer-innovation relationship is in this BF. Marketing and sales employees argue that customers are the most important source of new ideas and define innovation as a process of "*coming up with ideas which benefit the customer in the future"*. Our informants also highlight the strong impact the competitive market has on innovation where "*tough competitors provoke [them] to be more innovative"*. As one marketing and sales employee describes, *"we all know that if we are not better than them [competitors], we won't reach our KPIs, and then we won't be here for long and we won't keep our jobs*". Our findings indicate that the positive relationship between external interaction ability and innovation is stronger in BFs that have a higher degree of market proximity, and we find this to be the case particularly in the top management, sourcing and marketing functions.

6. Conclusions

This paper has made use of a rich novel dataset at the employee-level for the multinational telecommunications company Telenor to investigate how employee-level innovative activities differ across business functions. The underlying idea is that employees in different functional areas of a corporation have different understanding of what innovation is, employ distinct strategies to organize their innovative activities, and respond to different factors that spur or hamper their innovation performance. For a large multi-unit company that wants to develop and promote an innovative culture, it is of paramount importance to understand the specific factors that explain and sustain innovation in its various functions.

One of the key findings from our analysis is that, across all business units and functions of Telenor, most interviewees point out that innovation is largely incremental. Due to high market pressures that drive towards organizational efficiency and cost reduction activities, there is limited time and resources to pursue more creative activities and undertake brand new search paths that may lead the company to develop radical innovations in the future.

In the analysis of the factors that may explain the company's innovation performance, and how these factors differ across BFs, we have found empirical support for the variables that have previously been identified and studied in the literature on team-level predictors of innovation. However, the specific result of this paper is to show that these factors do indeed vary substantially among different BFs, and hence that the meso-level of business functions represents an important context that shapes employee-level innovation.

First, a culture and climate that support innovation and that include employees in decision-making processes are important factors for all business functions. However, we find that the positive relationship between organizational culture and employees' innovation is stronger in functions such as strategy, R&D, technology & networks, and sourcing. We interpret this result as indicating that these are functions in which working tasks are subject to a continuously changing knowledge base, and where an innovation support and climate are relatively more important than in other parts of the company.

Second, several types of task orientation are relevant. The main factor we have highlighted in this study is quality-orientation, namely the extent to which analytical details, precision and quality are important characteristics defining working tasks and objectives of the employees. The functions where this relationship is stronger are R&D, top management, marketing & sales, and sourcing, which represent working environments where employees typically have to place much attention to the quality and precision of their daily tasks and deliverables, and

so quality orientation represents a crucial requirement for innovation performance, relatively more important than operational efficiency and cost reduction strategies.

Third, our results point out the importance of cross-functional interactions and collaborations, both within and across BUs of the Telenor group, and their role for innovative activities. In particular, the top management, marketing and sourcing functions are those where cross-functional collaborations (within and across BUs) are more strongly related to innovation. According to our theoretical framework, this may be interpreted in the light of these functions' high degree of organizational centrality. Interestingly, though, the interviews indicate that cross-functional collaboration, although generally perceived as important for innovation, seems to be affected and often hampered by the distinct set of performance measures and incentive system adopted by different sub-units. In order to strengthen collaboration across functional departments, specific innovation projects should be organized so to have aligned goals, shared ownership and measurement across BFs.

Finally, our econometric results and qualitative data confirm the importance of external users and other market actors. Specifically, we find that the relationship between the user interaction variable and innovation is stronger in the top management, sourcing and marketing functions. According to our theoretical argument, differences across BFs in the relevance of the user role for innovation should be interpreted in the light of the higher degree of exposure and proximity to the market that these functional departments have within the Telenor group, which makes their employees' tasks highly interdependent with those of external market agents.

These results have implications for management practice. A general implication arises from the fact that innovation can be related to functional units with a strong sense of teamwork and membership and that collaborate intensively with other units with a different specialization. Processes that enhance a sense of belonging within a larger framework of cross-functional projects are therefore likely to influence innovativeness positively. Our results also highlight that practices that enhance innovation differ between functional areas. Contact with users is particularly beneficial for top management and sourcing, while the sense of teamwork and membership is particularly important in units requiring high levels of formal competence, such as R&D. Marketing and sales benefit from a close relationship to technology. Practical implications seem straightforward, but our interviewees gave many examples of dilemmas and difficult balancing tasks that often lead to weak innovativeness (as perceived by the employees). Practices that may be relevant and effective to increase efficiency and economic performance, such as individual performance monitoring and financial statements divided by

functional areas, in practice may lead to reduced sense of membership and cross-functional collaboration. Dilemmas between incremental improvements and disruptive ideas are well-known; our study highlights how such dilemmas play out differently across functional areas, and at the boundary between them.

Overall, the results presented in this paper can be seen as an extension of the recent strand of microfoundations research in strategy and organization theory. Our specific contribution is to show the relevance of meso-level factors for individual employees' innovative activities. In particular, by focusing on the meso-level of business functions and drawing theoretical insights from team-level studies of innovation, our work follows Felin et al. (2015)'s recent suggestion of

> "using microfoundations as a means to connect and collaborate with micro scholars in the field of organizational behavior and organizational psychology. Indeed, microfoundations offers a means to unite different areas of scholarship that exist at different levels, study different outcomes, and consequently make little reference to each other […] For example, some elements of research on small groups and teams may prove fruitful for understanding firm-level competitive advantage. […] The microfoundations movement might thus contribute to the growing collaboration between micro and macro scholars because it helps frame important questions of broad importance across multiple scholarly disciplines" (Felin et al., 2015: 618).

Future research in the microfoundations movement may draw further insights from organizational psychology and organizational behavior theories on how individual creativity and innovation are rooted and framed within a specific organizational context, and hence shaped by a complex set of meso-level characteristics of the business function or sub-units in which each employee works.

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Tables and figures

Figure 1: A multilevel model of innovation in a multi-unit company's business functions.

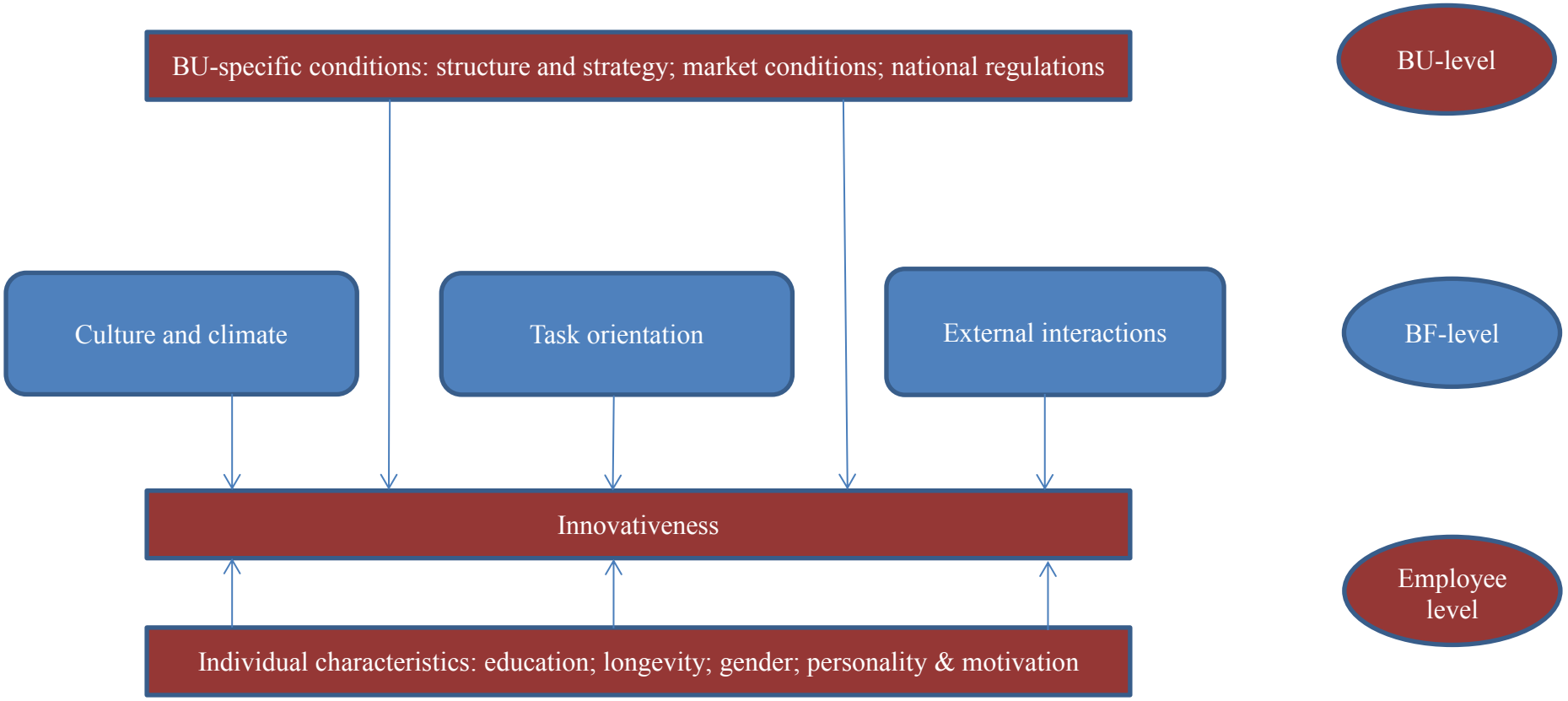

Figure 2: Summary and overview of (latent) moderating factors and theoretical expectations.

2.1 Typology related to hypotheses 1b and 2b

Quality orientation	**Changes in knowledge base**	
	Routinized and quality-focused tasks (e.g. marketing)	*Fast-changing and quality-oriented tasks* (e.g. top manag.; R&D)
	Routinized and cost-oriented tasks (e.g. operations; support)	*Fast-changing and cost-oriented tasks* (e.g. strategy)

2.2 Typology related to hypotheses 3b and 4b

Market proximity	**Degree of organizational centrality**	
	Internal peripherality and market proximity (e.g. sourcing)	*Internal centrality and market proximity* (e.g. top manag.; marketing)
	Internal peripherality and market distance (e.g. R&D; tech & telecom)	*Internal centrality and market distance* (e.g. strategy; operat.; support)

Table 1a: Survey and interview respondents, by BUs

Business unit	Survey responses	Response rate	Interviews
Digi / Malaysia	1735	79 %	13
Dtac / Thailand	3398	74 %	9
Serbia	959	72 %	10
Norway	2755	66 %	4
Uninor / India	868	65 %	6
Montenegro	196	61 %	1
Hungary	593	59 %	3
Pakistan	1081	56 %	8
Grameenphone / Bangladesh	1653	55 %	3
Sweden	868	54 %	9
Telenor ASA / central unit	281	51 %	0
Denmark	932	48 %	0
Digital / central unit	179	43 %	0
Broadcast / central unit	294	37 %	1
Sum	**15793**	**63 %**	**67***

*****Of the 75 interviews used for this article, eight of the interviews were with employees in BUs not represented in the survey (Five in Telenor Bulgaria, one in Telenor Common Operations and two in Telenor Myanmar).

Table 1b: Survey and interview respondents, by BFs

Business functions	Survey responses	Share of total survey responses	Interviews	Share of total number of interviews
Marketing & sales	5744	37 %	26	34%
Technology and networks	3420	22 %	12	16%
Sourcing	290	2 %	2	2.6%
Operations	3521	23 %	6	8%
R & D	282	2 %	4	5.4%
Strategy	210	1 %	5	6.6%
Support functions	1857	12 %	16	21%
Top management	102	1 %	4	5.4%
Sum	**15426**	**100%**	**75**	**100%**

Table 2: Descriptive statistics for the main explanatory variables

Variable	Mean	Standard deviation	Min	Max	Number of observations
PARTICIPATION	5.046782	1.304179	1	7	15426
INNO_SUPPORT	5.102457	1.275268	1	7	15426
COHESION	5.396522	1.220623	1	7	15426
TASK_QUALITY	5.33954	1.172414	1	7	15426
TASK_RISK	4.860344	1.204336	1	7	15426
TASK_EFFICIENCY	5.179389	1.292652	1	7	15426
TASK_RESULT	5.649148	1.035141	1	7	15426
TASK_PACE	5.206534	1.286735	1	7	15426
INTER_CROSS_BF	4.389315	1.52148	1	7	15426
INTER_CROSS_BU	3.242633	1.914332	1	7	15426
INTER_USER	5.350912	1.176321	1	7	15426

Table 3: Regression results: Baseline coefficients

Variable	Ordered probit model	Hierarchical (mixed) linear model
PARTICIPATION	0.07280*** (0.01447)	0.06252*** (0.01449)
INNO_SUPPORT	0.09961*** (0.01196)	0.08879*** (0.009385)
COHESION	0.17514*** (0.01731)	0.1429*** (0.013729)
TASK_QUALITY	0.1748*** (0.01574)	0.1260*** (0.01248)
TASK_RISK	0.4089*** (0.01253)	0.3347*** (0.009625)
TASK_EFFICIENCY	0,03929*** (0,009257)	0.02283** (0.007219)
TASK_RESULT	0.1054*** (0.01612)	0.07948*** (0.01274)
TASK_PACE	0.1961*** (0.01217)	0.1537*** (0.009563)
INTER_CROSS_BF	0.06377*** (0.008157)	0.04099*** (0.006296)
INTER_CROSS_BU	0.01584** (0.006162)	0.01043* (0.004663)
INTER_USER	0.07423*** (0.01291)	0.06693*** (0.01016)
INTEGRITY	-0.01041 (0.01715)	-0.00339 (0.01362)
DIVERSITY	-0.01119 (0.007839)	-0.01081 (0.006118)
LONGEVITY	0.01200* (0.007229)	0.0107* (0.00563)
EDUCATION	-0.05093*** (0.01119)	-0.03458*** (0.00872)
GENDER	-0.03318** (0.01629)	-0.02159* (0.01263)
ATTITUDE	-0.06711*** (0.01453)	-0.09346*** (0.01124)
R-squared	0.3098	-
Number of obs.	15117	15117

LR test vs. linear model: chi2(4) = 253.28 Prob > chi2 = 0.0000

Table 4: Hierarchical linear model: Estimated random effects coefficients

	Mark/sale	Technology	Sourcing	Operations	R&D	Strategy	Support	Top manag.
PARTICIPATION	-0.0867	-0.0016	0.1384	-0.0120	0.0037	0.0042	-0.0203	-0.0086
INNO_SUPPORT	-0.0059	0.0014	0.0045	0.0019	-0.0001	0.0012	-0.0057	-0.0005
COHESION	-0.0098	-0.0108	0.0072	-0.0020	0.0018	-0.0108	-0.0165	0.0015
TASK_QUALITY	0.0067	-0.0054	0.0078	-0.0041	0.0048	-0.0048	-0.0391	0.0009
TASK_RISK	-0.0261	-0.0193	0.0101	-0.0246	0.0156	-0.0029	-0.0091	0.0056
TASK_EFFICIENCY	0.0090	-0.0047	0.0022	-0.0029	-0.0051	-0.0015	-0.0056	0.0024
TASK_RESULT	-0.0052	-0.0006	-0.0057	-0.0066	0.0041	0.0011	-0.0084	-0.0038
TASK_PACE	-0.0128	-0.0015	-0.0003	-0.0028	-0.0012	0.0006	0.0005	0.0017
INTER_CROSS_BF	0.0011	-0.0178	0.0075	-0.0086	-0.0057	-0.0047	-0.0011	0.0019
INTER_CROSS_BU	-0.0019	-0.0096	0.0044	0.0016	-0.0048	-0.0069	-0.0020	0.0059
INTER_USER	-0.0063	-0.0090	0.0168	-0.0160	-0.0101	-0.0097	-0.0050	0.0044

Random effect slopes for the different explanatory scale variables across business functions. Higher values indicate greater deviation from the mean across all functions.

Table A1 (Appendix): Items in each variable and Cronbach's alfa

Dimension	Variables and survey items
Culture and climate	
	PARTICIPATION (Cronbach's alpha = 0.83)
	curcult8 Sharing information freely
	curcult16 Individual goals are transparent
	curcult12 Empowering employees
	Leadcult1 Empowerment of employees; appreciation of independent initiative
	INNO_SUPPORT (Cronbach's alpha = 0.63)
	curcult36 Learning from mistakes
	divcre1 Employees are allowed to try to solve the same problem in different ways
	COHESION (Cronbach's alpha =0.90)
	curcult2 Working in collaboration with others
	curcult32 Cooperative
	curcult39 Being supportive
	curcult10 Being team oriented
Task orientation	
	TASK_QUALITY (Cronbach's alpha =0.87)
	curcult5 Paying attention to detail
	curcult13 Being precise
	curcult21 Emphasizing quality
	curcult29 Being analytical
	TASK_RISK (Cronbach's alpha = 0.74)
	curcult1 Risk taking
	curcult26 Being willing to experiment
	curcult41 Taking initiative
	TASK_EFFICIENCY(Cronbach's alpha = 0.86)
	opef1 Conducting the work at the lowest cost possible
	opef2 Bring down costs to a lower level than our competitors
	opef3 Reducing the overall level of costs in my BU
	opef4 Try to do the work in a more cost-efficient manner
	TASK_RESULT(Cronbach's alpha = 0.86)
	curcult6 Being results-oriented
	curcult14 Having high expectations for performance
	curcult30 Achievement-oriented
	curcult37 Action oriented
	TASK_PACE(Cronbach's alpha = 0.80)
	curcult35 Fast moving
	curcult38 Being quick to take advantage of opportunities

External interactions	INTER_CROSS_BF (Cronbach's alpha = 0.94) How often do you share knowledge within your BU about: knbat11 Customer groups and markets knbat12 New service development knbat13 New ways to serve the customers knbat14 Telecom infrastructure knbat15 Best practices about marketing, technology or sourcing knbat16 Developing corporate strategy knbat17 Solutions and best practices from third-party companies INTER_CROSS_BU (Cronbach's alpha = 0.98) How often do you share with other BUs: knbat21 Knowledge about customer groups and markets knbat22 Knowledge about new service development knbat23 Knowledge about new ways to serve the customers knbat24 Knowledge about technology and telecom infrastructure knbat25 Best practices knbat26 Strategy knowledge knbat27 Solutions and best practices from third-party companies INTER_USERS (Cronbach's alpha = 0.88) curcult7 Being customer-oriented curcult15 Listening to customers curcult23 Being market-driven curcult3 Empowering customers custcent3 Maximizing customer satisfaction is a priority custcent5 Customer satisfaction is included in performance evaluation