

Routes of Employee-Driven Innovation: How HRM Supports Emergence

Abstract. Research has shown that HRM can contribute to innovation, both at the organizational-level by stimulating innovation performance and at the individual-level by stimulating innovative behavior. Scholars have accumulated knowledge about innovative behavior of employees in business contexts, where innovation was nurtured. Yet, to seal the phenomenon “innovation by employees” we need to shift research towards a business context where innovation by employees is not overtly expected. The aim of this paper is to explore so-called employee-driven innovations (EDI) in a formalized business context, and their HRM support mechanisms. To reach the goal, we followed an explorative research design, and conducted a single multilevel case-study at a highly formalized company – a medical laboratory in The Netherlands. Data analysis was based on 40 interviews, documents, and observations. We found that a highly formalized business context also cherishes innovation by employees, but it has its specific, what we called, *employee-driven innovation routes* through which innovation by employees occur in the organization. The data analysis allowed to distill emergence-enabling factors that are important for the progression of EDI. Furthermore, the findings suggest that EDIs emergence content and process to be studied using a multilevel perspective, if one aims to map its routes and the support mechanisms. Based on the these findings, we suggest how to model EDI routes and we reflect upon the HRM – innovation literature.

Keywords: Employee Driven Innovation, Human Resource Management, Bottom-up emergence, IWB, Healthcare

INTRODUCTION

Motivated by the evidence that innovation contributes to organizational success (Anderson, Potočník, & Zhou, 2014), researchers have increasingly studied the contribution of HRM to innovation outcomes (Bos-Nehles, Renkema, & Janssen, 2017; Seeck & Diehl, 2016). HRM practices such as training, autonomy, teamwork, and rewards are considered to be instrumental in stimulating innovation, through increasing organizational learning (Shipton, Fay, West, Patterson, & Birdi, 2005), creating an innovative climate (Shipton, West, Dawson, Birdi, & Patterson, 2006), and enhancing innovative human capital (De Winne & Sels, 2010). Recently, HRM scholars have started to acknowledge the multilevel nature of the HRM – innovation relationship (Shipton, Budhwar, Sparrow, & Brown, 2016). Indeed, researchers have already accumulated evidence that HRM practices positively relate to both innovation performance of organizations (Beugelsdijk, 2008) and the innovative behavior of individual employees (Alfes, Truss, Soane, Rees, & Gatenby, 2013; Dorenbosch, van Engen, & Verhagen, 2005; Veenendaal & Bondarouk, 2015).

Academic studies have assembled conceptual and empirical knowledge about top-down effects of HRM on employee innovative behavior. That allowed scholars to turn their attention to the bottom-up role of individual's innovative behavior. Such a recent scholarly move started to explore and examine emergence of organizational-level innovation performance based on individual's innovative behavior (Renkema, Meijerink, & Bondarouk, 2017; Shipton, Sparrow, Budhwar, & Brown, 2017). Studying emergence of innovation through a bottom-up process is justified by observations that ideas generated by individual employees need to be shared and implemented within organizations for organizational-level innovation performance to occur (Gong, Zhou, & Chang, 2013). In fact, although HRM researchers have studied both the generation and implementation behaviors of employees, this

does not explain yet how innovative ideas at the individual-level develop into innovation at the organizational-level.

We build our arguments on the research findings that the antecedents of different innovation dimensions reside on different levels of analysis (Axtell, Holman, & Wall, 2006; Gong et al., 2013). For example, Axtell et al. (2000) showed that individual-level variables were more strongly related to idea generation, while group and organizational-level variables were more related to implementation of ideas. Another important organizational-level variable that affects innovation is structural formalization (Damanpour, 1991; Hirst, Van Knippenberg, Chen, & Sacramento, 2011; Jansen, Van Den Bosch, & Volberda, 2006), which is referred to as work processes that are pre-described rules, procedures, policy manuals and job descriptions (Mintzberg, 1980). From innovation-management research it is known that formalization can both enhance and inhibit the creation and implementation of innovative ideas (Aiken & Hage, 1971; Jansen et al., 2006; Jung, Wu, & Chow, 2008). We take this notion further and elaborate in this paper on how HRM practices support and/or inhibit the emergence of individual ideas and their rise up-to organizational-level innovation performance.

This study aims to explore the ways in which HRM contributes to the emergence of innovation in a formalized business context. To do so, we introduce the concept of employee-driven innovation (EDI) to the HRM literature. EDI refers to the generation and implementation across organizational levels of new ideas, products, services, and/or processes originating from work floor employees who are not overtly required to be active in these activities. We study EDI in the healthcare sector, where enhancing EDI is complicated by a high degree of formalization. In this context, daily tasks of work floor employees do not include innovative behavior (Montag, Maertz, & Baer, 2012), as they have to deal with a high number of formalized routines to reduce errors (Kohn, Corrigan, & Donaldson, 2000).

However, given the rapidly changing environment, even mechanistic organizations are facing a greater demand to engage in innovative behavior (Ramamoorthy, Flood, Slattery, & Sardesai, 2005).

Our contribution to the literature is threefold. First, we add to the multilevel HRM and innovation research by examining the role of HRM in the bottom-up emergence of innovation. Following the idea that emergence exists of multiple features, we show that the role of HRM is categorized as whether it influences the content or process of emergence. Second, we adopt a process perspective on how innovative ideas are created, shared and implemented, in addition to the vast body of knowledge about variance in employees' innovative behavior. We uncover different routes, their underlying phases and process steps that result into innovation. And we show which HRM practices play a role in each of these phases. Finally, we show how employees contribute to innovation in a strictly formalized context. We described how formalization can both support and restrain the emergence of innovation. By doing so, we develop a comprehensive multilevel model of emergence of innovation among employees who face extra challenges to innovate because of the formalized organizational context.

The paper continues as follows. We first conceptualize EDI in a formalized context and the role of HRM in stimulating and facilitating EDI. Next, we present the results of a single multilevel case study at a highly formalized company – a medical laboratory in The Netherlands, to identify the process of EDI and the ways through which HRM encourages EDI. We finalize with discussion of the theoretical and practical implications.

LITERATURE REVIEW

HRM, Innovative work behavior & EDI

To date, the HRM scholarly tradition has conceptualized and empirically validated the relationship between HRM and innovation, with employees' innovative work behavior (IWB) as an important outcome of HRM practices. Here, IWB refers to the actions of individual employees focused on "[...] the intentional creation, introduction, and application of new ideas within a work role, group, or organization, in order to benefit role performance, the group, or the organization" (Janssen, 2000, p. 288). Reflected in this definition is the idea that IWB consists of several dimensions and behavioral tasks. Scholars have enjoyed the consensus in studying such IWB dimensions as idea generation, idea promotion, and idea realization (Scott & Bruce, 1994).

Studies into the field "HRM – IWB link" has accumulated knowledge about single HRM practices enhancing IWB, drawbacks of IWB, and the contribution of IWB to organizational outcomes. A recent literature review into the HRM – IWB link showed that practices such as training, rewards, job security, autonomy, task composition, job demands, and feedback positively affect innovative work behavior (Bos-Nehles, Renkema, et al., 2017). Another review of the studies into HRM – innovation performance found evidence for a positive relationship between HRM and innovation performance at the organizational level (Seeck & Diehl, 2016). Important for our study is the unique assumption made in the earlier works - the organization's capability to innovate is derived from the individual-level employees' capabilities and motivation, which is influenced by HRM (cf., Jiménez-Jiménez & Sanz-Valle, 2008). We make the step forward and suggest to build upon this assumption and examine the relationship between HRM and innovation from a multilevel perspective (Lin, 2015), as it is well-suited the cross-level nature of both concepts (Seeck & Diehl, 2016).

The multilevel approach will allow to conceptualize the ways in which HRM contributes to the bottom-up process of innovation, turning IWBs into innovation outputs. For example, the link between creativity of employees and firm innovation performance can benefit from the multilevel approach (Gong et al., 2013). Taken in integration, the IWB concept is an individual behavioral construct that does not encompass how innovations are developed and implemented across organizational levels. From a behavioral perspective, it is assumed that more innovative behavior leads to innovative outcomes, such as development or improvement of products, services, and processes (Crossan & Apaydin, 2010). The underlying assumption is that increasing employees' IWB leads to more ideas generated and implemented in the organization. Studies have broadly indicated that innovative behavior is positively related to innovation outcomes for the organization (Fu, Flood, Bosak, Morris, & O'Regan, 2015), and now it is time to address how the individual-level constructs IWB emerges to innovation performance. Employees who behave innovatively do not automatically succeed in implementing their ideas across the organization (De Spiegelaere, 2014). Hence, the question remains how to route innovations as the bottom-up emergence, and how behaviors of individual employees result into innovation output at the organizational level. For this reason, we introduce employee-driven innovation (EDI) to the HRM literature that allows to connect IWB with innovative outcomes at two levels of analysis, individual and organization. EDI is a relatively new concept that focuses on the development of innovation rather than employee behavior.

Employee-driven Innovation and HRM

Following the definitions coined by Høyrup (2010) and Kesting and Ulhøi (2010), we view employee-driven innovation as:

The generation and implementation across organizational levels of new ideas, products, services, and/or processes originating from one or more work floor employees who are not overtly required to be active in these activities.

Our definition of EDI has two important implications for understanding how IWB emerges to innovation at the organizational level. Firstly, EDI involves innovation activities where front-line employees are at the core of the innovation process, and not regular innovation channels such as R&D departments (Høyrup, 2010). The definition highlights that EDIs are innovations that are not necessarily required from the employees. Employees who are not thought to be innovative come up with new ideas that, once implemented, are called EDIs. Therefore, these innovations are conceptualized as to emerge from “regular” employees who do not have formal job tasks dedicated to innovation, such as shop-floor workers, service employees, and middle managers (Kesting & Ulhøi, 2010). These employees are ideally positioned to provide innovative suggestions (Wihlman, Hoppe, Wihlman, & Sandmark, 2014), because they face challenges during their work and understand market demands because of their customer contact (Skaggs & Youndt, 2004). Secondly, Birkinshaw and Duke (2013) suggest that EDI has a potential to change the management approach from top-down to bottom-up because it is initiated and led by operational employees. This idea corresponds with the notion that one of the factors of successful development and implementation of innovations is the active and constructive involvement of all stakeholders across all hierarchical levels of the organization (De Spiegelaere, Van Gyes, & Hoote gem, 2012).

We recognize that the conceptualization of EDI is closely related to IWB. Whereas innovation is the ‘outcome’ of the EDI process, employees’ innovative behavior serves as the input of EDI. Thereby, EDI essentially combines both the individual innovative behavior and the collective innovation outcomes. For this reason, we claim that EDI is a concept that helps to understand how innovation unfolds across levels. Implicitly, EDI discloses employee

behavior from a multilevel perspective: it is focused on the initial ideas generated by employees, and the involvement and participation of employees in the implementation of innovations of the organization. The bottom-up innovation process explains how the dynamics and interactions of the individual innovative behavior reveal over time to produce the collective phenomenon of innovation performance (Kozlowski & Klein, 2000). As such, innovative behavior is a necessary but insufficient condition for innovation outputs.

Innovative outputs are only possible when employees share, interact, and coordinate their ideas across organizational levels. Hence, the emergence of EDI depends on individual's innovative behaviors and the coordination and interaction of those behaviors. By integrating IWB and EDI into a process approach, we stress that all employees can be active in the EDI process to ensure that innovation outcomes materialize across organizational levels. In viewing EDI as a bottom-up process, we can start to uncover how HRM can shape and stimulate the process of emergence of innovation. In the next section, we further elaborate on the emergence of innovation and how HRM support these emergence processes.

Emergence of EDI through enabling processes

EDI can be best described as an emergence process, a process whereby individual characteristics coalesce into a higher-level collective outcome (Kozlowski & Klein, 2000). Characteristics such as affections, innovative behaviors, and cognitions are amplified through interaction and coordination to form a collective phenomenon (Allport, 1954; Katz & Kahn, 1978). Task complexity and emergence enabling states have been identified as elements that influence the emergence enabling process (Ployhart & Moliterno, 2011). We treat innovation as such an emergent phenomenon, because it has its foundation in characteristics of individuals - innovations arise from individual's ideas and interactions. Following Kozlowski and Klein (2000), we state that EDI has emergent properties because it manifests as innovation – a collective phenomenon – when individuals interact and exchange ideas,

knowledge, or attitudes. Principles of multilevel theory show that there have to be underlying contextual and emergent mechanisms that drive the relationship between HRM and innovation (Ostroff & Bowen, 2000). Emergence at a higher level is determined by multiple factors, where system interactions amplify and shape how emergence affects performance (Kozlowski & Chao, 2012; Ployhart & Moliterno, 2011).

Three features of EDI emergence can be identified: content, process, and structure (Fulmer & Ostroff, 2016). The content of EDI emergence is the elemental content of individual operational employees' innovative ideas that are aggregated at a higher organizational level to result in innovation (Ostroff, Kinicki, & Muhammad, 2013). The process of EDI emergence is related to the interaction and coordination between individual employees that is needed to implement ideas and thereby shape higher-level outcomes such as innovation performance (Kozlowski & Klein, 2000; Ployhart & Moliterno, 2011). The EDI structures refer to higher-level contextual factors that shape the process of EDI emergence such as HRM practices and formalization. Hence, in this research, EDI captures both the content and the process of emergence, as it entails both the innovative ideas and the process that leads to implementation of the innovation across organizational levels. Hence, we examine the emergence of innovation, by studying how ideas coming from individuals are implemented within the organization and how HRM contributes to this emergence process.

A formalized work context for EDI

Formalization is a structural dimension that in the first sight is not easily associated with supporting innovative behavior of employees. Given that EDI involves ideas that arise from 'regular' employees who often work in a formalized context, it is adamant to reflect upon the rules and regulation of a workplace – embodied by formalization. Formalization of behavior is one of the design elements of an organizational structure, referring to work processes that are prescribed through rules, procedures, policy manual, and job descriptions (Mintzberg,

1980). Therefore, formalization is defined as the extent to which formal procedures, rules and roles are used to regulate employee behavior, their decision-making, and the transmission of information (Pugh et al., 1963). Formalization is usually seen as limiting the discretionary power of employees, and instead, the power is vested in formal systems and procedures. In relation to a link between formalization and innovation, we know that mechanistic organization systems and the corresponding managerial control, which translates into high formalization and high centralization, inhibits innovativeness (Aiken & Hage, 1971; Pierce & Delbecq, 1977). A low degree of formalization was found to facilitate innovation (Jung et al., 2008). A high degree of formalization suppresses the expression of individual differences and decreases creativity (Hirst et al., 2011). Some even argued that increased formalization potentially sanctions employees for not following the existing procedures, thereby limiting employees' ability to engage in discretionary behavior (Raub, 2008).

In line with the abovementioned literature, we can expect that a formalized work environment is not a favorable context for EDI because of the focus on control instead of autonomy for employees. However, that does not mean EDI is impossible. For example, Veenendaal and Bondarouk (2015) found that production workers in a manufacturing firm could still be involved in innovative behavior. Typically, these blue-collar, manufacturing jobs are highly formalized and found in machine bureaucracies (Mintzberg, 1980). Blue-collar employees from manufacturing organizations can make suggestions for improvements when they have autonomy, feel ownership, and can participate in decision-making (Axtell et al., 2000; Ramamoorthy et al., 2005). Vough, Bindl, and Parker (2017) show that even in highly formalized jobs, individuals can be engaged in proactive work behaviors, given that there is a clear routine that supports such behaviors. Other research has shown that formalization does not negatively affect exploratory innovation, while having a positive effect on exploitative innovation (Jansen et al., 2006), because formalization facilitates the process of improving

and implementing existing routines (Zander & Kogut, 1995). These contradictory findings related to the formalized environment in which innovation arises puts the question how the formalized context affects EDI and which mechanisms explain the success of EDI.

METHODOLOGY

To uncover the emergence of EDI and how HRM influences this process, an exploratory qualitative case-study has been conducted at an organization that can be characterized by its highly formalized context. The company is a Dutch medical laboratory, in this study called “MedLab”. We have chosen the case study method for three reasons. First, EDI in the field of healthcare constitutes a complex social setting where causal dynamics and employee motivations are not immediately clear (Elsbach & Kramer, 2003). Second, the analysis of EDI in this context requires to involve long-term processes, which need to be analyzed and clarified using inductive techniques (Lee, 1999). Third, the study is focused on elaboration of HRM mechanisms, whereby we contrast previous understanding with the observed events to improve and extend existing theory (Lee, Mitchell, & Sablinski, 1999). We did this by developing a research model of the HRM–EDI relationship based on the observed events in our case study, and thereby refined and extended theory (Lee et al., 1999). MedLab is well-positioned to study EDI in a formalized context, because the technological (e.g. new equipment) and market pressures (e.g. consolidation) necessitate innovations to survive in highly competitive markets.

Data collection

The case study was carried out between February 2016 and May 2017. For triangulation purposes we relied on multiple data collection techniques, including document analysis, semi-structured interviews, and observations. Given our multilevel perspective, we interviewed and

observed (1) employees at the work floor (i.e. analysts, phlebotomists, and specialists) who generated and implemented innovative ideas and (2) the EDIs that are a result of these behaviors.

Data sources and procedure. The first research phase included desk research, document analysis, informal conversations, and observations. It allowed us to understand the organizational culture and traditions, to establish a common research language, and to get to know employees that are involved in the EDI processes. After that, we conducted semi-structured interviews; based on documents and observations, potential EDIs have been shortlisted. We operationalized EDIs as innovative initiatives with the involvement of work floor employees. In a close collaboration with the HR manager, we identified and selected employees involved in these innovation initiatives interviews. Consequently, we asked employees and managers about the EDI process and their role in it, and about the factors that stimulate and inhibit innovation. Secondary data that was used are written reports, strategic documents, research reports, and minutes of meetings.

Based on the preliminary observations of the first phase, we conducted interviews with top management, department managers, supervisors and support staff to identify their role in EDI. Lastly, we conducted interviews with employees who were not necessarily innovative. We randomly selected employees across the organizations for this purpose. The third phase of the research consists of reflection and discussion of the results. During this phase, results were discussed, reflected upon, and clarified with key informants to enhance the credibility and validity of our results (Yin, 2009).

Insert Table 1 about here

Semi-structured interviews were conducted with employees who have been involved in EDIs. Interviews with employees on the work floor, their direct supervisors, and department managers were used to identify their role in EDI, their perceptions and behaviors regarding the HRM practices, and factors that affect constrain EDI. The interviews were conducted at all labs and within several units. Prior to all interviews, interviewees were assured about the confidentiality and anonymity. Interviews were audiotaped, fully transcribed, and verified by interviewees. The first author also made field notes to supplement the audiotapes. In total, 40 interviews were conducted at three different locations of the laboratory (see table 1).

Data analysis

The raw data were inserted in a data analysis software program (NVivo) and this data was analyzed using several steps and coding strategies. The qualitative analysis of the data consisted of three phases. First, each of the transcripts were read and re-read, and while reading through the 15-20 page long documents, initial ideas on the main research concepts were written down. Core thematic concepts and critical incidents are identified, for example innovative initiatives. Subsequently, three successive levels of coding were applied to all the raw data: open and axial coding, selective coding, and theoretical coding (Strauss & Corbin, 1998). Using the broad themes, we identified first-order codes using open coding – codes that came directly from the raw data – in order to make sense of the content and processes of the broad themes. For example, we coded different activities of employees after generating a new idea (e.g. communicating and monitoring). During the open coding, we also identified groupings of codes – second-order codes. For example, we coded text about communicating ideas with colleagues and managers as first-order open codes and then grouped them together as ‘idea communication’. The third level of coding was the construction of overall coding categories, integrating the inductively arrived codes with the existing literature. This resulted

in some categories that were already identified as themes by the literature, for example the EDI process, whereas others such as ‘leadership behaviors for EDI’ emerged as a supporting mechanisms for EDI through the coding process.

The second phase of data analysis existed of the identification of specific instances of EDIs. We identified whether these mentioned initiatives can be seen as EDIs, by comparing them to the key elements of the EDI definition. These instances were assessed based on the following criteria; they had to include (1) the generation and/or implementation of a new idea, product/service, or process; (2) to originate from an employee with no regular innovative task; and (3) to be integrated with the organizational context. Next, these EDIs separately analyzed and categorized, resulting in an inductively arrived overview of different types and routes of EDI.

The third phase of data analysis existed of developing a process overview of EDI. Based on the first two phases of analysis, a process approach was used to identify the general steps and phases of the EDI process. A number of second-order codes from the open coding process were used to develop the EDI process model. Whereas the stages of the model were inductively arrived, some stages resemble dimensions of IWB and were therefore also integrated with the existing literature. For example, we coded texts related to the application of initiatives and those about using ideas on the work floor as ‘idea implementation’. Subsequently, the stimulating and constraining factors that were associated with the EDI process and its different stages were identified based on an inductive approach. For example, we linked phases of the EDI process with stimulating factors by analyzing whether informants mentioned what had helped them to further their ideas. We created a data structure consisting of the first, second, and aggregated categories to develop an inductive process model including the different stages of EDI emergence and the concepts that influence the development of EDI.

FINDINGS

The case study highlights that HRM positively contributes to EDI in a formalized environment. Despite the formalized context, employees were engaged in generating and implementing innovative ideas. First, we describe the case study organization and its approach to innovation. Next, we provide an in-depth analysis of EDI at MedLab and outline EDI routes and types. Lastly, we describe support mechanisms and draw upon the findings to develop a phase model of EDI.

Case description and approach to innovation

MedLab is a medical laboratory that performs diagnostics of blood samples and is responsible for reporting results to general practitioners, specialist and other customer organizations. The motto of MedLab is: “Faster, Better, Closer” (annual report, 2015), which emphasizes both quality and efficiency. The mission of the organization sets central the importance of the services quality: “We are a service organization that offers medical diagnostics in its broadest sense. We support medical care around the patient by offering quality diagnostics at the right time and by this we promote the quality and expedience of healthcare” (website, 2017). In total, the organization has 445 employees, divided over three labs and around 80 different locations for blood collection. MedLab is an organization with a high amount of written norms, rules, and procedures. It is an accredited lab according to the ISO-15189 norm, which defines norms about quality and competences in medical laboratories. It has implemented an extensive quality system in order to guarantee the quality of the healthcare provision. The quality system is part of the goal to meet the specific ISO norms, with the goal to assess and control the service quality.

In public documents, MedLab communicated that innovation is an important mission of the organization and part of the current approach. Whereas we did not find a documented long-term strategy, MedLab’s vision clearly called for innovation as an important part of the

business. Regarding the approach to innovation, MedLab aimed to develop specific content-related priorities in which the organization wants to excel and innovate (strategic letter, 2016). Also strategic documents contained the aim to innovate: “MedLab needs to distinguish itself more through quality, innovation, and entrepreneurship”. However, also apparent is that a clear operational plan how to achieve this is absent. Moreover, we did not find mentioning of the importance of stimulating innovative behavior of employees. In fact, a staffing document advised MedLab to put more focus on innovation.

Emergence of EDI - countless initiatives and unique approaches

We have identified over a hundred unique initiatives at MedLab. Most of the innovative ideas concerned innovations in processes, such as changes of procedures or improving communication between departments. The majority of the ideas were discussed among colleagues and supervisors and were implemented relatively easily. Among many factors that constrained EDI, a lack of resources, priority, recognition and organizational knowledge were most consistent. Especially the wider organizational implications that needed to be addressed were limiting EDI, given the procedures and quality assurances. Whereas there was an expectation from the management for employees to develop their ideas, many employees saw limited possibilities to innovate. The bottom-up process by which innovation was fully initiated, developed, and implemented by work floor employees was rather an exception. Most of the developed initiatives involved an important role of managers in the bottom-up innovation processes.

The content and process of EDI emergence – different routes and types of EDI

A clear process emerged showing through which phases EDI developed. Regarding the process, we inductively developed a phase-model outlining 5 phases through which EDIs develop: emergence, development, communication, establishment, and implementation of ideas. In all phases, different employee behaviors played a role. The first phase of EDI is the

emergence phase – new ideas arise from problem and opportunity recognition. In general, being very close to the practicality of the work routines, employees were very good at recognizing challenges at the work floor. In the *development phase* – employees found solutions for the challenges and opportunities they encountered and generated ideas. The *communication phase* existed of discussing the idea with direct colleagues and leaders and getting initial feedback. The *establishment phase* consisted of involving others with the idea, developing the idea further, testing/piloting, and convincing others. The final phase is the *implementation phase* – once an idea was established and decisions were made that the idea is worth implementing, the idea had to be put into practice.

Routes of EDI. Particularly striking about EDI at MedLab was that different types of innovative initiatives were developed and that these ideas were developed through different organizational routes. Based on an in-depth analysis of the initiatives, we distinguished three routes through which these initiatives are developed in the organization: (1) the *organizational route*, (2) the *formalized-system route*, and (3) the *project-initiative route*. We term these as employee-driven innovation (EDI) routes and define them as pathways through which ideas and initiatives of employees are developed in a bottom-up fashion in the organization. Furthermore, the data revealed three main elemental content-types of innovations that are developed: ideas related to (1) primary work content (e.g. new test for vitamins), (2) work processes (e.g. changing routes for blood sampling), or (3) organizational developments (e.g. education program for trainees). Our analysis has shown that the EDI routes were contingent upon an underlying elemental content of EDI. Employees made use of one of the routes depending on the ideas they wanted to pursue. Although our observations showed occasional overlap and mix across routes and the elemental content, to model the EDI process, we followed the analytical distillation of the three routes.

Route 1: Organizational route. The first EDI route is represented by the organizational structure. Employees first shared their ideas with colleagues and direct supervisors and then communicated them with the department heads. Often the manager took over the responsibility and communicated the idea further within the organization. Department managers adopted the leadership role and were engaged in championing the initiatives with other departments, higher management and/or customers. The prevailing process did often not involve employees in the further development of innovations. However, there were some exceptions in which employees were more active in the second and third phase of the EDI process.

The case study shows that supervisors needed to have knowledge about what to do with ideas from the work floor. Regarding the nature of the work and the formalized context, employees were not overly required to be innovative and therefore official protocols for ideas were absent. As a result, the success of pursuing innovative ideas depended on the direct supervisors and their organizational knowledge. Direct supervisors in our case study indicated to know how to deal with EDIs, as is highlighted in the following:

“I doubt whether it is described like that, but that is the way to go. Of course you have to consult with colleagues. Actually, you know it – you know when a clinical chemist needs to make a decision or whether you can discuss it [the idea] with your department head, who in turn can discuss it with the clinical chemist” (Specialist 1).

 Insert Table 1 about here

The organizational route is predominantly used for *primary work content* type of EDIs, ideas directly related to blood collection and analysis. For example, ideas about how to carry out blood analysis and the process steps for blood collection. This type of EDI required specific

knowledge and approval by higher management – employees did not have autonomy to self-initiate innovations in this area:

“Well, they [employees] can make decisions about whether test results are analytically sound, which is verification. However, in the area of innovation, they cannot develop new diagnostics or whatsoever. That does not happen” (Clinical Chemist 1).

Next to that, most of the primary work content is protocolized and cannot be changed without consulting many parties within the organization, requiring employees to share their ideas through the organizational hierarchy route. This is the case for new equipment, new tests, but also for new software. Secondly, EDIs that are concerned with work processes were also pursued through this route. In some cases, innovations in work processes could be implemented very quickly, particularly when the innovation did not affect other units of the organization – no coordination is necessary. Apart from the protocolized work of the primary processes, other ideas were resolved more easily. For example, creating new work stations or improving waiting times for customers. When innovative ideas did not relate directly to the protocols they could be implemented more directly:

“And issues where there is no protocol involved. Those things can be arranged. And then the feedback is good.” (Phlebotomist 3).

Route 2: Formalized system route. All employees were encouraged to share problems and ideas through an online system in which official procedures and protocols were described. All the input was assessed by the responsible department manager. Employees were able to keep track of the suggestion through the online system. Eventually, employees were supposed to get an email about how the organization has dealt with the input. However, many of the respondents indicated their dissatisfaction with the system, because often it took a long time before problems were solved or ideas taken into consideration and there was a lack of feedback to the employees. It was the role of the quality department to assess the appropriate

enactment of the issue at hand. Other work floor employees were made responsible to update small changes in the protocols based on inputs of employees.

The types of EDI developed through this route were predominantly work process ideas, as employees often indicated small errors or ideas for work processes. Also ideas that were unrelated to the department manager's responsibilities were communicated through this route. For example, one employee mentioned that he used the formal system to communicate about the ICT system. Next to that, the formalized system route was sometimes used to communicate ideas or errors in the primary work content. Again the department managers often played a crucial role in the development of EDI, as they formally needed to assess the incident but also analyzed whether further action was needed in other parts of the organization. Therefore, the formalized incident system enhanced the influence of department managers on the EDI process and diminished the direct influence of work floor employees.

“They are supposed to assess those things for all incidents separately, if it is an issue only at their own department or within the whole organization” (Quality worker).

Route 3: Project-initiative route. Many employees claimed that in specifically arranged project teams there was much more room for their input. MedLab organized lean project teams to improve the logistics of their blood-sample collection. A number of employees were asked to take part in the project, whereas non-participants were also encouraged to share ideas for improvement through project meetings and posters on the walls. In this EDI route there was more freedom for employees to develop and implement their ideas, as they were explicitly assigned to think creatively about existing processes and solutions.

In principle, all types of EDI were developed through this route, from work content and process to organizational-level ideas. However, the data show that organizational developments were most suitable to be developed through the project-initiative route. These ideas were not directly related to the primary work and processes of the organization. In

general, ideas in this category were directed towards improving the quality of internal and external coordination and communication, findings new markets, or improving management processes. One typical example is a project that was initiated by two employees from different departments to improve internal communication and coordination between departments, called “Project Communication”. Within this project, several ideas were developed to fine-tune the interdependent work processes. The HR manager championed the project and helped to write a project plan that was used to get approval from the management team. Eventually, the two employees themselves were in charge of the project and recruited other colleagues to join. What is particularly striking in this example is that all management-level employees were explicitly excluded from participation in the project. Another example of the project-initiative route is the project ‘Market Opportunities’, a strategic work team developed by one of the board members in which all employees of MedLab could participate to create and develop ideas to produce new value for the organization:

“From the start I was involved. I think around 20 to 25 ideas were proposed, particularly to generate more money. Because that was the goal, to generate more income by involvement of work floor employees, since they have a clear picture of the processes and opportunities to generate more money. I think 25 ideas were developed, but none of them was accepted” (Analyst 1).

To summarize, we uncovered five different stages of the EDI process and we described the different *types* (content) and *routes* (process) through which EDIs emerged. We found that there are differences between the content and process of EDI by analyzing the distinct types and routes of the emergence process. The case study also revealed that innovations emerged from employees’ ideas through different routes within the organization were contingent on the type and content of employees’ ideas.

Enabling the content and process of EDI

Based on our analysis of the interdependency of the content and processes of EDI, we describe the mechanisms that support and constrain the emergence of EDI in a formalized context. We observed the influence of multiple HRM policies and practices, particularly by increasing employees' opportunities to be involved in innovation (see Appendix 1 for an overview). Our data show that certain HRM practices are more important in some phases of EDI than in others. In-depth analysis resulted in two main categories: practices that mainly affect the *content* of emergence, and practices that mainly affect the *process* of emergence. There are factors that increased the likelihood of new ideas being generated (top-down stimulation), and factors that increased the chances of implementing employees' ideas (bottom-up championing). We categorized the HRM practices where they had the most apparent influence and focused on the practices that were most evident and relevant for EDI emergence.

HRM policies that were related to the content of emergence were *training, rewards, job design, recruitment, participation, information sharing* and *performance management*. When *training* opportunities were offered, this was perceived as a good vehicle to generate new ideas. In particular, training or collaboration with other organizations are valued for the influence on generating new ideas. The results show that *rewards and recognition* played a prominent role to appreciate innovative initiatives. Especially recognition was important for innovative employees to continue to develop ideas, for example through showing the appreciation about employees' efforts, offering compliments, or providing a small non-monetary reward (e.g. vouchers or chocolate bars). The emergence of EDI was further enabled by specific *job design*. One of the practices that stimulated the content of emergence was offering extra tasks to employees. Especially with many protocols in place, the regular work can become tedious for some employees. There was a group of employees who liked to

do more challenging work, and by allowing these employees to do extra tasks (e.g. quality assessments, scheduling, website editor, etc.) or join projects, the organization benefited from their ideas. Furthermore, one of the most important aspects of the situation at MedLab is that the organization had a very low workforce mobility and flexibility, leading to almost no *recruitment* of new employees. It seemed to be important for EDI emergence that the organization also recruits from outside to gain novel insights and increase the likelihood of idea generation. The findings show that *information sharing* was also an important enabler of EDI emergence. EDI could be channeled and shaped by providing information about organizational developments: informing about strategy and future plans was necessary to increase the likelihood that employees develop ideas that were valuable for the organization, which in turn increased the potential of successful implementation across organizational levels. Higher levels of communication and information sharing enabled common understanding regarding expectations and requirements of innovation. It is predominantly the transparency that was key to successful stimulation of EDI emergence. Employees often lacked the management information that forms the basis of strategic decision-making, therefore it was important to involve employees with the innovation process. Lastly, our data reveals that *performance management* can stimulate EDI emergence, by facilitating employees to raise ideas. Almost all department managers used annual appraisals to raise the issue of employee development and employees could bring forward their wishes to be involved in innovation projects or extra tasks.

HRM policies that were related to the process of EDI emergence were *training, job design, selection, involvement* and *feedback*. *Training* helped to stimulate the implementation of new ideas across levels, for example when employees received training about how to involve the work floor in improvement projects. At MedLab, specialists were trained to learn about the LEAN method and consequently developed their own LEAN projects in which

many innovative ideas of employees were generated and implemented. Our data analysis shows that especially the *selection* for innovative projects proved to be an important factor for the process of EDI emergence. The success of projects for innovation largely depended on the employees who are selected to participate. The department managers played a crucial role in the selection as they selected people based on their perception of suitability and capacity. We also found that when employees were *involved and participated* in decision-making or organization-wide project teams, this enabled the EDI process by which ideas are transformed into innovation, because employees could more directly discuss, test, and apply their ideas. Lastly, our data reveals that *feedback* can stimulate EDI emergence process. As managers were responsible for providing feedback, the implementation of these HRM practices is dependent on how they materialized this role. Department managers at MedLab indicated that they aimed to give positive feedback about ideas, but employees often felt that feedback is either lacking or predominantly negative. Providing more extensive and more constructive feedback would have helped to further develop ideas. Especially during the development phases of EDI, feedback was important to fine-tune employees' ideas and enhance the chances of approval by higher management.

Summarizing these findings, HRM practices facilitate the emergence of EDI by supporting both the content and process. To analyze the influence of HRM, it is important to distinguish between practices within HRM policy domains: some practices are more related to increasing the chances that new ideas arise, whereas others are more needed to facilitate the process of implementation. However, to stimulate EDI, HRM practices should focus on both on the content and the process of emergence. Whereas the identified practices were not *always* present at MedLab, still a substantial amount of EDIs could be developed. Most employees indicated that they felt an openness to generating new ideas. However, the implementation of ideas was often more demanding. These burdens could be softened by the

usage of EDI routes and the availability of HRM practices – to enable further development of employees’ ideas. Nevertheless, many initiatives required the involvement and support of managers – they often needed to champion ideas further. This way, in our case study EDI is often a co-production by work floor employees and management.

Insert Figure 1 about here

TOWARDS A MODEL OF ENABLING EDI EMERGENCE

We now continue the discussion of the results by focusing on how individual innovative behaviors are amplified by their interactions (Kozlowski & Klein, 2000), and result in the emergence of EDI. Based on the theoretical account by Ployhart and Moliterno (2011), we propose an emergence-based approach that models how employees’ innovative ideas lead to organization-level innovation, and how HRM can function as emergence enabler. In developing this model, we departed from the analysis of the data, but we were guided by the principles of multilevel theory. Emergence at a higher level is determined by multiple factors and system interactions amplify and shape how emergence affects performance (Ployhart & Moliterno, 2011; Kozlowski & Chao, 2012). In this research, three mechanisms to facilitate EDI emergence were distinguished: structural enablers, leadership enablers, and social enablers. What we also see is that emergence exists of two components: content and process of emergence.

Structural enablers of EDI emergence

Structural enablers are mechanisms related to the organizational structure and practices that increase the likelihood of innovative ideas to emerge, and in turn to develop into EDIs. Our results support previous claims that organizational structure and HRM practices are important for the emergence process (Fulmer and Ostroff, 2015). In line with Guzzo and Noonan

(1994), we have seen that practices can send strong signals to employees about which types of employee innovative ideas are valued and expected in the organization. For example, the general staff meetings as a method for information sharing were important mechanisms to send signals that ideas for improvement of efficiency were highly valued.

The organizational structure also proved to be important for the emergence of EDI, as the formal structure of the organization affects the interaction possibilities of employees (Kozlowski & Chao, 2012). This is particularly true for the formalized context of our case study, as employees have only limited options to interact with colleagues outside their own department. We have seen that practices such as project teams can partly reduce this burden, offering additional channels for interaction. This supports the idea that enhancing communication and coordination is an important emergence-enabling process (e.g. Ployhart and Moliterno, 2011). Our results show that high-involvement policies can help to stimulate interaction and participation of employees. Practices such as teamwork, suggestion schemes and flexible tasks were found to positively affect EDI, supporting the potential positive effects of high-involvement systems (Wood, Van Veldhoven, Croon, & De Menezes, 2012). Through these practices, employees can share knowledge and ideas that were otherwise restricted within departments.

The results also indicate that when employees are overtly committed to an organization this might hamper innovation. Interaction and coordination is an important behavioral mechanism through which higher-level or collective outcomes can be achieved (Kozlowski and Klein, 2000; Ployhart & Moliterno; 2011), however, when interaction is only possible with likeminded colleagues, the chances that valuable new ideas arise is small. In order to have meaningful interactions about innovation, organizations should facilitate workplace learning (Høyrup, 2010). Our analysis emphasizes that HRM practices related to the development of knowledge, skills, and abilities of employees are very important to promote

learning and the acquisition of knowledge, for example through recruitment & selection and training programs. Again there is a double role for HRM. First of all, it is important to contribute to the cognitive emergence enabling state, the ability to acquire, absorb, and transfer knowledge (Cohen & Levinthal, 1990; Zahra & George, 2002). However, to facilitate the emergence of innovation, it is important to focus on how knowledge and skills can be replicated through practices such as knowledge-sharing systems (Wang & Zatzick, 2015).

What is particularly important in the context of high formalization is that organizations offer channels through which ideas can be shared. Not only does this study support the idea that suggestion schemes are important to capture employees' creativity (Frese, Teng, & Wijnen, 1999), we also offer new insights into how organizations can develop multiple channels through which employees can interact and communicate their ideas. In fact, our results show that many of the ideas developed by employees who are not overtly expected to be innovative (Montag et al., 2012; Shipton et al., 2017), make use of these EDI routes to pursue their ideas. HRM practices can be used to create involvement of employees, but there also have to be routes and channels through which employees can develop and implement their ideas. Presence of the former but absence of the latter creates mixed signals for employees; they could perceive that they are expected to innovate, but their ideas are never implemented. Therefore, we propose a dual role of HRM in the emergence of EDI; combining top-down stimulation with bottom-up championing of innovative ideas.

Leadership enablers of EDI emergence

Leadership enablers refer to the behaviors of leaders that increase the chances that ideas arise and, more importantly, that generated ideas can be pursued and implemented. As the results show, leadership is crucial for the emergence of EDI. Leaders act as filters for innovative ideas and communicate ideas further within the organization. When acting as a filter, leaders send messages about what is expected and appreciated in their work context. Not only do

leaders affect the subordinates by filtering and interpreting top-down messages, our study shows that leaders have an important task in shaping subordinates' sensemaking by selecting innovative ideas. Furthermore, leaders serve as role models for innovation, and influence event cycles within their units by delegating innovative tasks to their subordinates. What is particularly striking in the case study organization is the emergence of collectiveness within organizational sub-units, within departments. This can be partly contributed to the leadership behaviors of the department managers and specialists in those units. Ideas were more easily developed and implemented when only the own unit is affected by the idea, whereas implementation is more constrained when multiple departments are involved. Some department leaders and specialist at MedLab were successful at creating a climate for innovation, by always being open to innovation and delegating responsibilities to employees. In addition, department managers affect the amount of opportunities for employees to discuss their ideas with colleagues and supervisors. Many informants expressed that they had a good working relationship with their managers and that there would be a low barrier to communicate or discuss new ideas with them. We found that department managers played an important role in EDI emergence because of their influence in selecting and further developing EDIs, thereby they influenced which ideas were further developed and which ideas were rejected. Furthermore, when ideas were outside the scope of the regular employees, it was up to the department manager to consult with other departments and to convince the management of the value of the initial ideas. This supports the notion that leaders are very important for innovative behaviors of employees, as they can both stimulate and constrain innovative responses of subordinates (Bos-Nehles, Bondarouk, & Nijenhuis, 2017; De Jong & Den Hartog, 2007)

Social enablers of EDI emergence

Social enablers refer to variables that are related to social interactions between employees that stimulate EDI emergence. The social processes between employees within their own units positively affect the collection interactions and coordination (Fulmer & Ostroff, 2015), which is also required to successfully develop EDI. The results of MedLab show that social processes and communication between employees influence the bond to the group, and therefore our findings support the idea that positive interactions between employees within a unit create an emergence-enable state – facilitating the implementation process of EDI. As explained above, the atmosphere within the direct working group is perceived as positive, employees do not feel restrained to share and discuss their ideas, whereas the climate in the whole organization is rather negative. This makes it more likely that emergent properties develop within departments, and that emergent properties within the whole organization are lacking. Employees at MedLab feel a strong bond with their own direct colleagues, but do not feel a strong bond with colleagues of other departments. For the emergence of innovation, this means that ideas are more easily generated and implemented within units, and that emergence of innovation at the organization-level proves to be difficult. This can partly be explained by the absence of strong bonds between employees. Trust and cohesion between employees in different units is lacking – leading to less well-developed patterns of coordination and interaction across departments within the organization.

CONTRIBUTIONS

The goal of this research was to study how HRM can contribute to the bottom-up emergence of EDI in a formalized context. Theoretical insights from multilevel emergence theory combined with learnings from HRM and innovation research informed us about the bottom-up process of EDI and its support mechanisms. The findings suggests that, despite the

seemingly unfavorable for innovation environment, a context of high formalization, work floor employees do develop EDIs when innovation routes are made available for them, and that these EDIs can be stimulated by HRM practices. Hereby the current research extends previous research about HRM and innovation by picturing the bottom-up process of innovation and showing how different HRM practices can be applied during of the process. Specifically the in-depth exploration of HRM practices for EDI emergence provide further insights into how organizations can make sure that ideas are transformed into successful innovation. In doing so, this research extends previous works of Shipton et al. (2017) and Lin and Sanders (2017), who proposed bottom-up models of HRM and innovation. Next to that, this paper puts forward the notion that the majority of initiatives from the work floor are devoted to innovation and organizational change, supporting the fact that employees who are not tasked with innovative activities show a great deal of commitment to improve a wide variety of aspects of the organization. Rather than to focus on a predetermined group of ‘privileged’ R&D employees, organizations can benefit from the innovative potential of the whole workforce when enabling mechanisms are in place.

Theoretical implications

Our study makes contributions to the HRM and innovation literature, which more and more acknowledges that multiple levels within the organization are important to study how HRM affects innovation (e.g. Shipton et al., 2016; Bos-Nehles et al., in press). Our contribution is the inductive model of bottom-up emergence of innovations from the work floor, arising from ideas proposed by employees, whose job tasks do not request to innovate. Specifically, we uncovered how innovative ideas are transformed into innovative outcomes at a higher organizational level. By doing so, we contribute to one of the central problems in the study of innovation – how creative ideas of employees are better implemented and transformed into innovativeness of the firm (Gong et al., 2013; Shipton et al., 2017). The results of our case

study show that specific practices are deemed important in such a setting. For example, the use of practices such as innovation channels and projects teams and leadership of first-line managers are more important. Furthermore, by investigating the bottom-up emergence of innovation, we contribute to multilevel theory building (Kozlowski & Klein, 2000), as we present new insights into the inner workings of the emergence processes and the enabling mechanisms of innovation (Ployhart & Moliterno, 2011). In doing so, we believe this is one of the first papers that offers an in-depth empirical study to uncover this largely unknown territory for HRM and innovation scholars. Our study also supports previous claims of the positive role of emergence-enabling mechanisms for innovation (Li et al., 2017; Wang & Zatzick, 2015).

Lastly, our results showed that as HRM researchers, we need to distinguish between HRM practices that stimulate the *content* of emergence of the one hand, and the *process* of emergence on the other hand, when studying multilevel and emergent phenomena. As part of the 'structure' of emergence, HRM practices can both affect the content and process of emergence and thereby shape the whole emergence process. HRM practice can both enhance the creation of innovative ideas (i.e. content) and stimulate the successful implementation (i.e. process). HRM practices can enhance the likelihood of idea generation, but this does not lead necessarily to more implemented innovations within the organization. As long as emergence-enabling HRM practices are not present, the chances of successful implementation of ideas are low. To stimulate this emergence process of EDI, HRM scholars and practitioners need to refocus attention towards the bottom-up process research that uncovers how individual attributes collectively contribute to higher-level outcomes through coordination and interaction. When emergence-enabling states are weak, HRM initiatives to stimulate innovation are largely in vain or may be even counterproductive. Employees get demotivated when their ideas are eventually not taken seriously.

Practical implications

Managers of formalized organizations aiming to increase the innovativeness of their employees have to deal with the challenges that employees face during the EDI process. Particularly, the existing protocols and norms for innovative behavior should be attended to. Reinforcing existing protocols in formalized organizations will not stimulate employees to be engaged in EDI. Changes need to be made to increase the likelihood of innovative efforts. For example by building an innovative climate, increasing employees' motivation to be innovative, and providing recognition and appreciation after EDIs are accomplished. Next to that, multiple routes for EDI can be created, through which employees' ideas can develop. For example by introducing project teams or suggestion schemes. By doing this, organizations with many formal rules and regulations can still benefit from the innovative potential of their work force. HR managers can play a role in creating employees' abilities, motivation and opportunities to be engaged in EDI, by implementing initiatives that invite employees to be innovative. More specifically, appraisal talks should emphasize the opportunities to do extra tasks next to regular work, workplace exchange of employees should take place regularly, or project groups including employees from different departments can be developed. Lastly, as HR managers could develop organization-wide initiatives such as innovation competitions, strategic work teams, or knowledge platforms to increase involvement and offer those employees who are looking for new challenges channels for their innovative ideas.

Limitations and future research

This study is not without limitations and boundary conditions. First, the results are based on a case study of one organization. Despite the fact that this may limit generalizability, we believe that our findings can generalize to theory (Stake, 1978). It should also be acknowledged that employees working in a medical laboratory might have unique characteristics that cannot be easily translated to other organizations. Laboratories provide health services and innovation

might therefore be more restricted by regulations than other highly formalized organizations, such as manufacturing companies. Second, there are limitations to the use of the process approach in this study. As most of the analyzed initiatives transpired in the past, there may be important events missing in the data (Langley, 1999), for example due to misinterpretation or the retrospective nature of the data. To reduce the chances of hindsight bias due to the forgetting of past events, data triangulation was used. Furthermore, intermediate analyses and results were discussed with key informants for validation. Third, despite the fact we focused exclusively on EDI, we might have covered other related proactive employee behaviors such as innovative behavior or organizational citizenship behavior. In reality these concepts are close to each other and sometimes hard to isolate in this type of research. We acknowledge that our model of EDI resembles to some of the dimensions of the concept of IWB (e.g. De Jong & Den Hartog, 2010). The difference, however, is more than a discursive one. First of all, EDI is focused on the innovation rather than employees' behavior. Moreover, in our phase model, we combine phases of EDI with employee behaviors. Phases such as *idea emergence* and *establishment of idea* add new aspects to innovative behaviors and its sub-dimensions. Furthermore, we made a distinction between types of employees based on their work behaviors. Future research could establish a link between these types of behaviors and personal characteristics of employees to inform organizations how to recruit the more innovative types of employees. Lastly, the examples of employee-driven innovations were rather incremental of nature, thereby not covering technological or radical innovation initiatives driven by employees. It might be difficult to generalize the findings of this study to contexts where more radical employee ideas are needed.

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APPENDIX 1: OVERVIEW OF HR POLICIES AND PRACTICES FOR EDI AT MEDLAB

HR policies	HR practices for EDI	Quotes
<i>Training & development</i>	<ul style="list-style-type: none"> ● <u>Content</u>: Employees generated new ideas when visiting training days and symposia ● <u>Process</u>: LEAN workshops helped specialists to get new ideas 	<p>“Especially the specialists go to symposia and user days of firms, really content-related [training]. I think for innovation those are the biggest sources” (clinical chemist).</p>
<i>Rewards & compensation</i>	<ul style="list-style-type: none"> ● <u>Content</u>: Almost no monetary rewards for initiatives and innovation and a predominant lack of appreciation of innovative employee behavior 	<p>“No rewards, no. It is more the appreciation. The appreciation of the effort and those things. I see those things [projects] as extra tasks, things you want to do, things you are allowed to do. And it is a great learning experience.” (analyst 3).</p>
<i>Job design</i>	<ul style="list-style-type: none"> ● <u>Content</u>: Protocols both restrain and enable innovation, depending on employees’ personal behaviors; extra tasks and job rotation stimulate EDI emergence; Formalization makes employees less critical ● <u>Process</u>: Protocols can facilitate implementation (process routes support) 	<p>“We have to work according to the quality documents. The intention is that I perform every task with the quality documents opened. That is the goal. To make sure that I perform the task in the same manner every day and that all my colleagues also perform their tasks similar to me” (analyst 1). “I perceive that as a bit of challenge at my work, doing these additional things” (analyst 15).</p>
<i>Recruitment & selection</i>	<ul style="list-style-type: none"> ● <u>Content</u>: Only internal recruitment diminishes new insights; lack of internal mobility program sometimes constrains motivation; mobility programs are in place to stimulate outflow of employees ● <u>Process</u>: Selection of suitable candidates for innovative projects is important 	<p>“We hear nothing other than the need to cut personnel costs. And yes, they offer courses and they supervise people who want to leave or think about early retirement, to stimulate them” (analyst 12). “It was the department manager, together with the clinical chemist I think, but also in consultation with us. Like ‘who do you think is up for this? Do you think that person or that person could do that?’” (specialist 4). “It is not an conscious criterion, but it is the case that some employees want to do more than others. Or someone at the routine always comes up with ideas. Look, when you have something to choose than is could be the case that you choose the one who comes up with ideas and is open for new things. Yes, that actually plays a role” (department manager 4).</p>
<i>Participation & involvement</i>	<ul style="list-style-type: none"> ● <u>Content</u>: Employees get the opportunities to do extra tasks next to their normal work; many employees participate in specific projects for innovation ● <u>Process</u>: Employees are often involved in implementation of innovations – particularly when new equipment is introduced; employees are often invited to come up with ideas and share them 	<p>“With the whole implementation and selection of the equipment and everything that is necessary not one employee from the work floor has been asked to participate. That is very sad and is not correct. [...] That is something I think is wrong, because there might be very good ideas on the work floor, which never pop up. And when you bump your head a couple of times, then you don’t even try it anymore. So I don’t think that the way I describe the process in my department is adopted in the whole organization, it is very person-dependent” (specialist 2).</p>
<i>Information sharing & communication</i>	<ul style="list-style-type: none"> ● <u>Content</u>: Employees get informed about organizational developments during general staff meetings and team meetings → structures the types of innovative ideas; during team meetings innovative ideas are always welcomed and on the agenda; ● <u>Process</u>: Information about innovative projects is shared through all different types of communication channels; intranet gives employees the option to upload their innovative ideas or issues. 	<p>“The more information you share with each other, the more people understand these issues. [...] I think it has to do with proper communication, sharing of information with each other. And this can be a constraint when this is done too little, or it can offer a chance, that people can take part in the thinking process” (specialist 3).</p>
<i>Performance management</i>	<ul style="list-style-type: none"> ● <u>Content</u>: A regular feature of the annual appraisal is to talk about personal development and initiatives ● <u>Process</u>: Feedback about EDI is often insufficient, especially from top management; feedback from colleagues, specialists, and department managers helps to further develop and select innovative ideas. 	<p>“During an appraisal talk you always indicate these kinds of things, for example that you want to learn something or that you want to be involved in the trials. Not everybody can do these trials, because they are quite laborious. Well, I was trained for this task, after I indicated that I would like to do this” (phlebotomist 4). “It is my role to manage the expectations. Look, employees can come up with great ideas, but sometimes you can or have to say immediately: ‘guys, that is a great idea, but we are never able to do it that way’. Then that is also instantly clear” (department manager 2).</p>

Figure 1. Phases and activities of Employee-Driven Innovation and support mechanism.

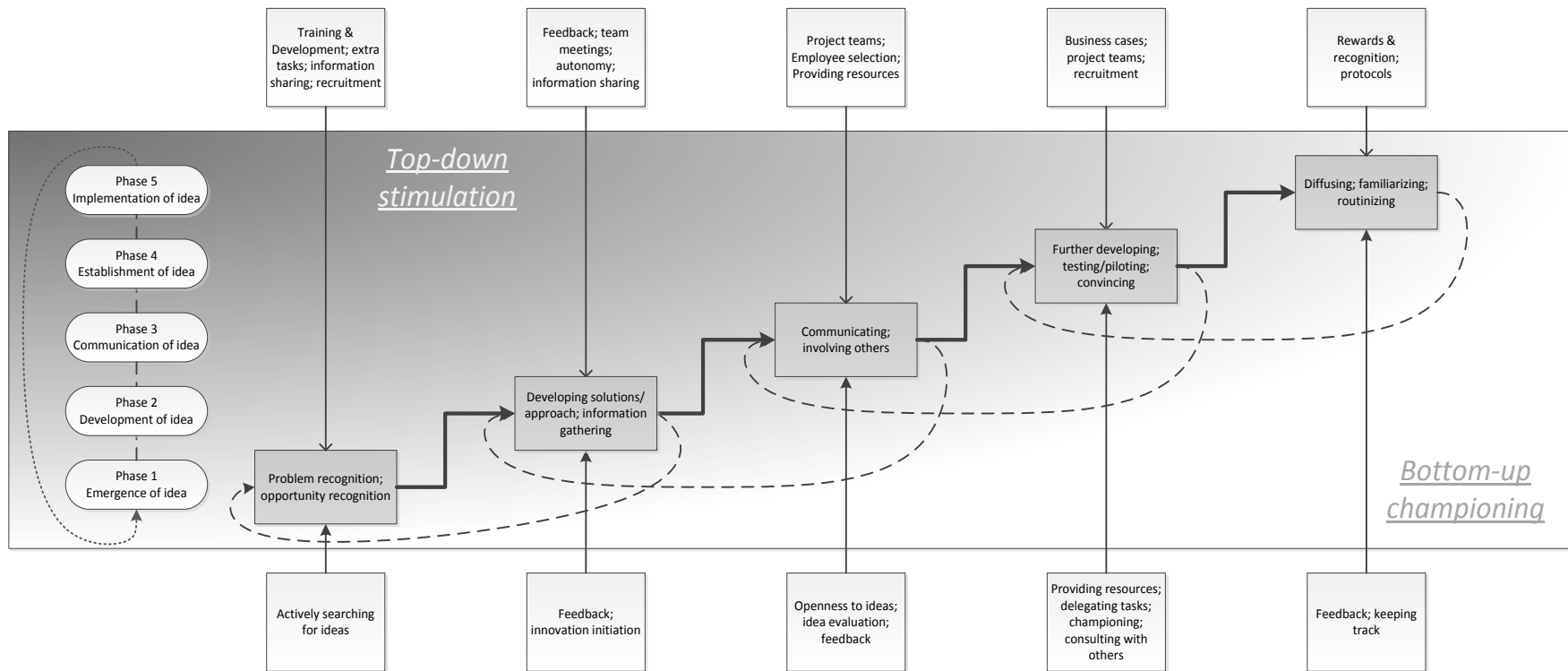


Table 1: Overview of interviews

<i>Informants</i>	<i>#Interviews</i>	<i>Length</i>
Board of directors	1	66 min.
Clinical chemists	2	103 min.
Support staff	7	425 min.
Department managers	6	335 min.
Specialists	4	247 min.
Phlebotomists	4	220 min.
Analysts	16	833 min.
<u>Total</u>	<u>40</u>	<u>37 hours</u>