

# Challenges and Dilemmas in Open Innovation: Ambidexterity as Management Approach

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**Abstract.** What are the relevant management challenges for open innovation, and how do companies tackle these challenges? This study adds to the research of open innovation management by investigating different management dimensions and their inherent dilemmas. By applying the concept of organizational ambidexterity as an approach to pursue apparently conflicting objectives, we extend previous research in two key aspects: First, in contrast to most studies we do not focus on a single management dimension but consider a wider set of dimensions which we found evidence to be relevant for open innovation. Second, unlike previous studies which consider ambidexterity for managing open innovation, we do not limit our discussion to ambidexterity as a whole but consider different modes of ambidexterity. Our findings support this approach: We find structural ambidexterity for the degree of innovation, organizational configuration, intellectual property management and motivation. We also find temporal and contextual ambidexterity in two additional dimensions.

**Keywords:** Open Innovation, Management Dimensions, Challenges and Dilemmas, Ambidexterity

## 1 Introduction

Without innovation and the constant search for new products, services, and business models, companies are not able to survive in the market in the long run. Dynamic capabilities, i.e. the ability to adapt to change and develop new competences, are required in order to react to changing business environments [1]. The classical approach how companies dealt with the innovation challenge was to set up large research and development (R&D) units, allocate large budgets to R&D, and protect knowledge against competitors via intellectual property protection mechanisms, especially patents. This protectionist innovation strategy was named “*closed innovation*” by Professor Henry Chesbrough, who in 2003 described a new paradigm which he called “*open innovation*” [2]. He found that successful companies also perform R&D in collaboration with external partners, allowing external knowledge to flow into the company and also allowing externals to make use of internal knowledge. Although collaborative R&D was not new [3],[4], the globalization of the world economy, increasing competition, and improved possibilities from IT – especially web technolo-

gies – led to a stronger diffusion of the open innovation concept and accordingly to a growing body of knowledge over the past years [5]. However, despite the significant number of studies about open innovation, we still lack a deeper understanding of the key management challenges and best practices for open innovation [6]. From our point of view, this relates to the fact that managing open innovation is a multi-dimensional challenge and can bear conflicts and dilemmas in many different management dimensions.

This study makes use of the *organizational ambidexterity* concept as theoretical lens for explaining how companies can deal with the dilemmas. Organizational ambidexterity has been predominantly discussed in the context of exploitation and exploration [7]. But to our understanding and in line with other authors [8-11], this is not a logical limitation. Especially with regards to (open) innovation, studies have shown that ambidexterity can be applied to other management dimensions as well: For instance, Rothaermel and Alexandre [8] discuss ambidexterity as an approach to balance between internal vs. external technology sourcing. Argyres and Silverman [9] found hybrid (ambidextrous) structures where innovation processes are executed by centralized and decentralized units. And Henkel [10] identified an ambidextrous approach to intellectual property management, what he calls “selective revealing”. Based on these studies, we postulate that conflicts and dilemmas exist in manifold management dimensions, and ambidexterity can be used to balance between conflicting tasks and thus resolve these dilemmas [11]. We also suggest that there is no singular ambidexterity mode: According to Raisch and Birkinshaw [12] ambidexterity can be applied on organizational and individual level, and it can be implemented by a structural, temporal, or contextual division of conflicting tasks. Building upon these studies we define the following two research questions:

1. For which management dimensions can we find ambidexterity as an approach to dealing with potential dilemmas in open innovation?
2. If we find ambidexterity in one or more dimensions, which ambidexterity mode is being applied in the respective management dimensions?

We will analyze and discuss these questions based on an explorative case study with a major multinational enterprise. This enterprise has established an open innovation environment with different formats of internal and external open innovation processes, supported by dedicated web-based IT platforms.

The remainder of this paper is structured as follows: In section 2 we provide the theoretical background by discussing the concepts of open innovation and organizational ambidexterity in further detail. In section 3 we develop a conceptual framework of different management dimensions for open innovation, based on the extant literature. Supposing that in each management dimension there is no unambiguous and straightforward direction, we aim at identifying potential dilemmas which could be handled using ambidextrous approaches. In section 4 we describe our case study and the research methodology. In section 5 we summarize our case findings, and in section 6 we discuss the findings and develop conclusion for theory and practice.

## 2 Theoretical Background

### 2.1 Open Innovation

The innovation process by general definition begins with the ideation phase, followed by an idea selection phase. The selected ideas then get developed and tested, and new developed products or services will be introduced to the market [13]. This process is largely the same for closed and open innovation, except that in open innovation the boundaries become permeable at certain stages of the process, in one way (inbound) or the other (outbound). We talk about open innovation when the innovation process has an interface – inbound or outbound – at one or more stages to one or more external parties. This also includes interfaces to peripheral inside innovators [14], i.e. employees inside the organization but external to the R&D department. We call this *internal open innovation*, as opposed to *external open innovation* with external parties outside the company.

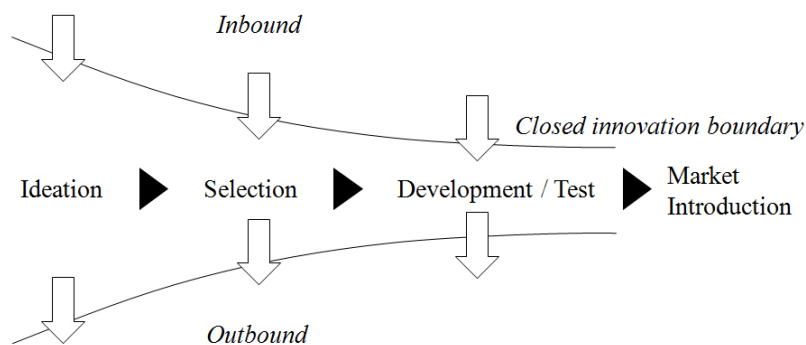


Fig. 1. Innovation Process in Open and Closed Innovation

Managing the innovation process requires dealing with manifold complexities: Different actors have different roles in this process, they may have different and sometimes opposing motives and objectives, and their dispersed knowledge must be coordinated and aligned towards achieving common objectives. If the innovation process has external interfaces, complexities are usually even larger due to the need of coordinating these interfaces and balancing heterogeneous objectives.

In order to follow a common terminology in the following, we refer to the *open innovation process* when we talk about singular innovation efforts with a specific innovation result (see figure 1). Open innovation processes by this definition can be very different, ranging from engaging external individuals in the ideation phase up to long-term research collaborations involving many companies and research institutes. We subsequently refer to an *open innovation environment* when a company has established structures and policies for professionally executing open innovation processes on a continuous basis.

## 2.2 Ambidexterity

Managing innovation does not only include the coordination and supervision of the innovation process, it also requires *making decisions* and *resolving dilemmas* wherever different options are at hand. The classical example is the dilemma between exploitation and exploration [7]. Companies should not simply focus on either exploitation or exploration, but rather balance between the two concepts and thus pursue both innovation strategies simultaneously. March's seminal work has become part of a wider academic discussion about the challenges and dilemmas in organizational design for innovation. There is common agreement that organizations require different structures for *finding new* innovations on the one hand and *being efficient* in their existing business on the other hand [15],[16]. In order to pursue both objectives simultaneously, successful companies have implemented what Duncan [17] called the "*ambidextrous organization*". By "hosting multiple contradictory structures, processes, and cultures within the same firm" [18], companies manage to balance between contradictory objectives and thus create an optimal setting for a sustainable business development. *Balancing* in this context does not mean finding a punctual equilibrium, but rather excelling at both ends of the continuum [19-20]. The application of this concept to organization science has become widespread in the past decades – for a detailed recent overview see [12].

Organizational ambidexterity can be applied in different forms: *Structural ambidexterity* can be achieved by implementing dual structures [17], i.e. separate units focusing on either alignment or adaptation. Dilemmas are then resolved by assigning conflicting objectives to different business units. Structural ambidexterity can also be implemented beyond the boundary of the company, when conflicting tasks are divided between internal units and external parties [8]. Alternatively, ambidexterity can also be realized on a temporal basis when the entire organization temporarily alternates between conflicting objectives in cyclical phases [21], [22]. We denominate this as *temporal ambidexterity* [11]. As a third alternative, dilemmas may not only be resolved on organizational level but also on individual level [11]. In this so-called *contextual ambidexterity* a set of systems, processes, and beliefs "enables and encourages individuals to judge for themselves how to best divide their time between the conflicting demands" [12]. Table 1 summarizes the three predominant modes of ambidexterity.

**Table 1.** Different modes of ambidexterity

<b>Ambidexterity mode</b>	<b>Basic definition</b>
Structural	Conflicting objectives and tasks are divided at organizational level (different sub-units)
Temporal	Conflicting objectives are pursued by the organizational unit temporarily in cyclical phases
Contextual	Individuals are enabled to decide context-based how to divide their time between conflicting tasks

### 3 Conceptual Framework: Open Innovation Management

Due to the aforementioned complexities in managing open innovation, it is crucial to understand where these complexities arise and how they are shaped in their respective dimensions. Therefore, as a starting point for our analysis, we develop a *conceptual framework of different management dimensions* which (1) are relevant for open innovation environments and (2) in which we had evidence to believe that ambidexterity could be applied. The conceptual framework is based on a thorough review of the existing literature: Starting with the renowned open innovation literature [2], [23], [24] and a recent literature review [25], we identified a first set of dimensions relevant for managing open innovation. We further used these dimensions to perform a database search in leading R&D and innovation related journals [25]. Subsequently we extended the body of literature by iteratively screening the list of references from relevant sources and used these findings to refine the framework. We chose this methodology due to the absence of an existing comprehensive management framework for open innovation. As Gassmann et al. noted in 2010, “industry is starting to professionalize the internal processes to manage open innovation” but “nevertheless, it is currently still more trial and error than a professionally managed process” [5]. Because there is no integrated cookbook for managing open innovation [26], our conceptual framework is rather built upon a broader number of articles that focus on particular open innovation management dimensions. In the following we develop the conceptual framework considering each of these management dimensions:

**Degree of Innovation.** Taking the exploitation-exploration dilemma, we have already discussed the need for a company to simultaneously optimize its current business and also develop new capabilities in order to cope with changing markets and demands. We can relate this challenge also to the terms *incremental* and *radical innovation*, which denote the innovation’s proximity to the current technological trajectory and customer/market segment [27]. Incremental innovations rather support business improvements, whereas radical innovations result in new products, services, or even new business models. The question is whether we find a clear tendency towards incremental or radical innovation in an open innovation environment, or if companies can pursue different degrees of innovation within singular open innovation processes.

**Organizational configuration.** Several authors have investigated organizational configurations and especially *centralized* and *decentralized structures* for innovation and R&D [22], [28-29]. Based on previous studies, we could find support for temporal and structural ambidexterity: Siggelkow & Levinthal [23] found that a *temporary* decentralization and later reintegration yielded in the highest exploration performance. Argyres and Silverman [9] found that companies implement *hybrid structures* with both central and decentral elements, thereby combining the advantages of both approaches – high proximity to market demands and high impact of R&D for the entire firm. We will investigate in our case study whether we find support for a temporal or structural ambidexterity combining central (firm level) and decentral (business-unit level) aspects.

**Target setting.** Defining innovation targets and measuring the innovative performance should be seen as a core innovation management responsibility [30]. Such *measures* often include R&D expenditures, number of patents, patent citations, and new product announcements [31]. With regards to open innovation environments, much less *systematic target setting* can be found [5]. A prominent example is the company Procter & Gamble which follows an explicit open innovation strategy and aim at acquiring 50% of their innovations from external collaboration and external sources [32]. However, so far no similar approaches have been found, maybe because most companies are still at an early stage of adopting open innovation concepts [33].

**Decision making policies.** Decision making in open innovation is clearly different from closed innovation. Actors outside the R&D unit must be motivated to participate, often realized via a democratization of the innovation process [23]. But in contrast to predominantly democratic innovation systems like open source software development, the majority of open innovation environments are organized as a community of creation, “governed by a central firm that acts as the sponsor and defines the ground rules for participation” [34]. This environment requires a set of rules which define the degree to which the external actors join the decision making process, and whether decision making policies are more *hierarchical* or *flat* [35].

**Intellectual property.** Intellectual property (IP) is a proprietary asset which secures commercial success of innovations [36]. The private-investment model supports traditional practices where IP is *protected* and innovators receive private returns from their investments. In contrast, in the collective-action model the innovators *reveal* their knowledge and contribute to the creation of public goods [37]. In open source software development a combination of both models exists: Companies that use embedded Linux in their technical devices have been found to share some modules and extensions with the external community while keeping other pieces of that code internally [10]. We will investigate whether simultaneous IP protecting and revealing can also be found in open innovation environments other than open-source settings.

**Motivation and incentives.** Even in closed innovation environment where all R&D employees receive their salaries, social psychologists found that there is more than money that motivates employees and influences their innovative behavior. Intrinsic motivation – e.g. interest, curiosity, enjoyment, or a personal sense of challenge – will foster employee creativity [38]. And also leadership mechanisms in terms of intellectual stimulation, offered autonomy, resource availability, feedback, recognition, and career opportunities will influence motivation and innovation performance [39]. In an open innovation environment, it is specifically important to consider motivation for each group of actors. External innovators may have different motives for participating in an open innovation process [40], and therefore the mix between *monetary incentives* and factors supporting *other personal gains* should be deliberately chosen for the particular open innovation configuration [41].

The following table summarizes the conceptual framework. It constitutes an initial set of management dimensions for which we found support in the literature. In the

course of our case study, we intended to review and revise this framework for best possible results. The balancing dilemmas are further used for analyzing our research questions whether we find ambidexterity, and which ambidexterity mode is applied.

**Table 2.** Conceptual framework

<b>Management dimension</b>	<b>Balancing dilemma in open innovation context</b>
Degree of innovation	Pursue incremental or radical innovations
Organizational configuration	Central (firm-level) or decentral (sub-unit level)
Target setting	Hard KPI targets or soft qualitative targets
Decision making policies	Hierarchical (top-down) or flat (democratic)
Intellectual property	Protect IP or reveal to outside market
Motivation and incentives	Monetary or personal gains

## 4 Research Methodology

### 4.1 Case Setting

We have designed this research as an embedded case study with a major DAX 30 and EURO STOXX 50 company (in the following called „*InnoMaster*“). Founded more than 100 years ago, InnoMaster has become one of the largest integrated technology enterprises worldwide, operating in more than 150 countries. With more than 25,000 R&D employees across the globe, InnoMaster spends significant efforts in constantly developing new innovative products and services. InnoMaster also has a long history of *collaborative* R&D: Suppliers and customers are involved in innovation projects, collaborations with universities and innovation labs have been established, and intellectual property which is not seen as strategic asset is being commercialized via spin-out projects. A couple of years ago InnoMaster established a central open innovation unit (OI unit), based on a systematic white spot analysis of potential open innovation areas. This analysis identified three major gaps in the existent portfolio of open innovation processes: (1) idea generation via internal and external innovation contests, (2) collaboration with communities of external scientists for problem solving, and (3) knowledge management via company-wide expert networks. To fill these gaps, the OI unit has developed specific methods and tools for these open innovation processes.

We have designed and conducted this case study following the process defined by Eisenhardt [42] and taking into account further guidelines from Yin [43]. We used the theoretical approach of a „soft positivism“ [44], assuming that the management dimensions and the dilemmas for open innovation management are existing phenomena which we can discover and validate. The conceptual framework served as starting point for our case interviews. We were expecting to extend this initial framework by additional management dimensions in an interpretive manner. A single case study design was chosen in order to contribute to knowledge and theory building on the managing open innovation and to provide fundamental insights for future investiga-