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ORIGINAL RESEARCH

Obstacles affecting the management innovation process through different actors during the covid-19 crisis: a longitudinal study of Industry 4.0

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Abstract
Industry 4.0 represents the most advanced stage of organization of industrial companies, allowing them to respond to an uncertain and changing environment, particularly as accentuated by the recent crisis resulting from COVID-19. Management innovation (MI) contributes to this process of permanent adaptation. The MI implementation phase is a critical step in MI generation that can generate many potential obstacles. This study focuses on these obstacles while considering the different activities (or subprocesses) embedded in this phase and the different actors involved in this complex process. We conducted a longitudinal case study in real time to investigate the implementation of MI internally generated by a multinational industrial company. Our results show that the obstacles encountered during the MI implementation phase may differ depending on the different activities and actors of this phase, thus leading us to question current implementation frameworks. This paper contributes by refining the theoretical model of MI generation and providing a better understanding of the obstacles that occur during the MI implementation phase. From a managerial perspective, this paper highlights key management principles to overcome the obstacles identified.

Keywords Industry 4.0 · Management innovation implementation · Management innovation obstacles · Role of various internal actors · Longitudinal Study · Nvivo

1 Introduction

Industry 4.0 characterizes the most advanced stage of industrial organization and can be defined as follows: "Industry 4.0 represents the current trend of automation technologies in the manufacturing industry, and it includes mainly enabling technologies such as the cyber-physical system (CSP)" (Lin et al., 2019; Xu et al., 2018). The Industry 4.0 concept is based on a new form of complex industrial organization centered on the redesign and direct control of all elements of the value chain (Jabbour et al., 2018a, 2018b). This organization is

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made possible by the implementation of innovative technologies such as big data, artificial intelligence, the Internet of Things, robotics and virtual data storage (Belhadi et al., 2021; Dubey et al., 2019; Grover et al., 2020; Hermann et al., 2016; Pereira & Romero, 2017; Wamba et al., 2017).

To support these technological advances, companies are changing their management methods by innovating (Ettlie, 1988; Sturdy, 2004). Indeed, to achieve their performance goals and develop a competitive advantage, companies are continuously trying to enhance their management and organization to deal with a hypercompetitive context and a changing and uncertain environment (Dubey et al., 2019; Ilinitch et al., 1996; Lucianetti et al., 2018). The literature has identified this phenomenon as management innovation (MI) (Birkinshaw et al., 2008), also known as organizational innovation (Damanpour, 2014). Some authors have even identified a sequencing model called the "lead-lag" model to explain the relationship between technological innovation and MI. According to this model, technological innovation appears first, leading to the evolution of a company's managerial and organizational model (Damanpour & Evan, 1984).

Many researchers claim that MI (Alexander & Childe, 2013; Damanpour, 2014) is one way for a company to reach its performance objectives (Birkinshaw et al., 2008; Bititci et al., 2016; Hamel, 2006). Through MI, a company can even obtain a long-lasting competitive advantage over its competitors (Hamel, 2006; Mol & Birkinshaw, 2009). This assertion is supported by numerous studies (Battisti & Stoneman, 2010; Evangelista & Vezzani, 2010) showing that MI implementation significantly improves the performance of companies (Keupp et al., 2012; Mol & Birkinshaw, 2009). The recent example of the COVID-19 pandemic provides a tragic but particularly significant illustration of this need for companies to adapt their organization and management quickly and continuously (Corsini et al., 2020; Dubey et al., 2020, 2021a, 2021b; Gupta et al., 2021; Queiroz et al., 2020).

The literature on MI implementation shows that strong tensions can arise due to unavoidable obstacles related to change (Ansari et al., 2014; Lozeau et al., 2002). These obstacles remain to be identified and confirmed. Thus, in some cases, a particular MI can be rejected by an organization (Knights & McCabe, 2002). Other authors have highlighted that some MI efforts can be only partially implemented due to such resistance in organizations (Sahu et al., 2021; Zbaracki, 1998), producing a high MI failure rate and significantly increasing the costs of MI implementation.

The MI implementation phase is impacted mainly by human factors (Damanpour & Schneider, 2006; Hamel, 2006) and human behavior; however, few studies have sought to identify the specific obstacles related to different categories of actors (Ansari et al., 2010, 2014; Madrid-Guijarro et al., 2009; Wagner et al., 2011). Presumably, resistance stemming from human factors will change depending on the different categories of actors who compose the company. However, to the best of our knowledge, such an analysis has not yet been conducted. Thus, to address the different obstacles, a perspective that considers the diversity of actors within a company appears to be appropriate. To that end, we mobilize the theoretical model of Birkinshaw et al. (2008).

Birkinshaw et al. (2008) proposed a theoretical model of MI segmented into four phases (motivation, invention, implementation, and theorization and labeling) and two different categories of actors. Unfortunately, despite the contribution of their MI model and its implementation subprocess, Birkinshaw et al. (2008) suggested that obstacles such as resistance within the intraorganizational context occur during the process. However, their model does not clearly identify these obstacles in relation to the different categories of actors. To address this theoretical gap, we contribute by identifying and analyzing the specific obstacles that arise in each phase and subprocess of this model in terms of the functions of the different

categories of actors to help companies overcome these obstacles and enable them to more efficiently implement MI. This paper contributes by refining the theoretical model of MI generation and providing a better understanding of the obstacles that occur during the MI implementation phase.

Ultimately, this research, in line with the theoretical model of Birkinshaw et al. (2008), seeks to answer the following question:

> What are the specific obstacles related to the different actors involved in the implementation phase and its subprocesses?

To address this question, we focus on MI implementation in an international company operating in the industrial sector. Our results show that different obstacles have different effects depending on the actors and subprocesses embedded in the MI implementation process. The analysis is performed through the lens of obstacles and allows us to question and refine the theoretical framework proposed by Birkinshaw et al. (2008). For instance, this analysis shows the importance of nuancing the distinction between internal and external change agents to more closely analyze the implementation process of internally generated MI (Wright et al., 2012). Consequently, this paper contributes to theory by providing an understanding of the MI implementation process, and it augments the existing literature on this topic (Birkinshaw et al., 2008; Brockman & Morgan, 1999; Damanpour & Schneider, 2006; Freitas, 2008; Massini et al., 2002; Vaccaro et al., 2012; Wright et al., 2012). From a managerial perspective, identifying the barriers to MI implementation allows us to highlight the following two key managerial principles: the search for a better equilibrium between rigidity and flexibility and between leadership and "communityship" (Mintzberg, 2008).

2 Literature review

A review of the literature on the recent COVID-19 pandemic demonstrates that companies facing an unexpected and unpredictable event must have the ability to change their mode of organization and management suddenly and rapidly (Corsini et al., 2020; Dubey et al., 2020, 2021a, 2021b; Gupta et al., 2021; Queiroz et al., 2020).

Moreover, the literature assumes that MI is the pre-established way to evolve an organization and management (Birkinshaw et al., 2008; Bititci et al., 2016; Hamel, 2006). MI is first generated and then implemented by either the organization that generated it or another organization (Damanpour, 2014; Wright et al., 2012). In this study, we focus on the implementation of MI generated by the organization that implements it.

2.1 MI Implementation: definition and model

In the model of the MI generation process developed by Birkinshaw et al. (2008), there are four interlinked phases: motivation, invention, implementation, and labeling; see Fig. 1.

These authors define the specific phase of implementation as *"All the activity on the 'technical' side of the innovation after the initial experiment, up to the point where the new management innovation is first fully operational"* (p. 836). In this definition, the technical side of MI refers to Zbaracki's (1998) work, which distinguishes between technical elements and rhetorical elements. Technical elements incorporate well-defined practices and realities associated with MI, while rhetorical elements refer to discourses related to MI. Furthermore, Damanpour and Schneider (2006) postulate that implementation is not automatic [it may

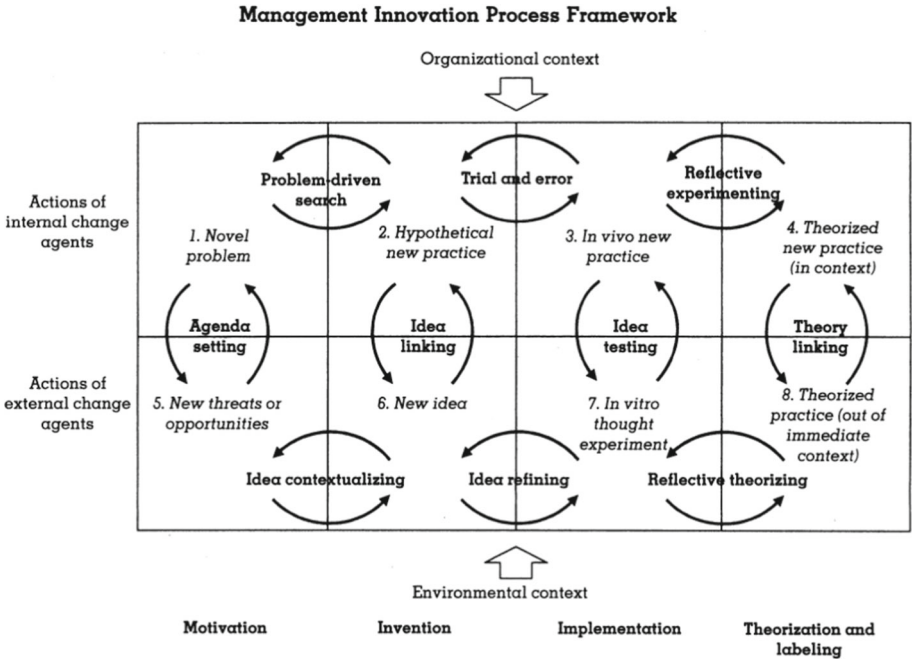

Fig. 1 The model of Birkinshaw et al. (2008). *Source:* Birkinshaw et al. (2008)

encounter difficulties in terms of acceptance of the MI by the organization and its members; Robert et al. (2019)] and that it requires preparation by the organization and even modification of the MI from its original conceptualization (Freitas, 2008; Kumaraswamy et al., 2018). Ansari et al. (2010, 2014) propose a similar postulation.

In their "recursive interlinked model" of MI generation, Birkinshaw et al. (2008) propose that implementation is intrinsically interlinked with its adjacent MI phases: invention and theorization and labeling. The invention phase represents the initial act of experimentation resulting in a new hypothetical management practice. Implementation logically follows this invention phase as soon as early versions of the invention are ready for implementation. The process of theorization and labeling is a social subprocess during which individuals inside and outside the organization make sense of and validate the MI to build its legitimacy. In their framework, Birkinshaw et al. (2008) posit that during the implementation phase, the MI is perceived as an "in vivo new practice" by actors inside the organization and as an "in vitro thought experiment" by actors outside the organization. These authors also propose that the implementation phase groups five core and interlinked activities or cognitive activities (David, 2018). The first activity, i.e., trial and error, is interlinked with the invention phase and clearly involves internal actors. This activity includes monitoring, adjusting, and improving the original MI concept. During this activity, internal change agents use the proposed adaptations or new practices and evaluate their progress against the original idea and the reactions of other employees (i.e., the organizational context). Birkinshaw et al. (2008) identify this activity as an important part of effective MI because it represents the ad hoc starting point of the implementation process. However, experimenting with the new practices before achieving a proven MI can take a long time. Some aspects of the new practices may prove to be unworkable, and the reaction of employees may be opposed to the MI invented during the

previous phase. The second activity, i.e., idea refining, is also interlinked with the invention phase but involves external actors, even though Birkinshaw et al. (2008, p. 837) state that these actors *"rarely play an active role in actually implementing new ideas* in vivo". While their role in MI generation is indirect (Mol & Birkinshaw, 2014; Wright et al., 2012), internal actors play a central role because their reaction to the MI can have an important influence on its implementation. However, they may make internal change agents aware of problems with the MI and its advantage (Freitas, 2008; Wright et al., 2012). The idea refining phase is directly analogous to the subprocess of trial and error performed by internal change agents, but it occurs in the conceptual domain. External change agents consider the implications of the new ideas in terms of how they can work in practice and/or in other units or organizations. The third activity, i.e., idea testing, involves back-and-forth exchanges between internal actors, who experiment with the new practices, and external actors, who mainly aim to build theories within the practice context of the organization implementing the MI (Massini et al., 2002). However, this external theorization does not occur automatically, and theorization can occur internally through the fourth activity, i.e., reflective experimenting, during which internal actors evaluate progress against their broader body of experience and the consequences of MI implementation to understand how to address the tensions created by these changes. Finally, the fifth activity, i.e., reflective theorizing, is the counterpart of reflective experimenting, but it occurs on the external actor side. External actors draw from their prior knowledge and experience to sharpen a theorizing idea of the newly generated MI (Damanpour et al., 2018; Wright et al., 2012). Other authors in the process innovation literature have also underlined the importance of external actors (De Silva et al., 2018).

The framework of Birkinshaw et al. (2008) framework is particularly valuable because it identifies the events and cognitive activities of the internal and external change agents involved in this process and the important role of context in shaping MI. Nonetheless, while their model mentions some potential difficulties occurring during the process, it does not fully address the obstacles to or their consequences for MI and its implementation.

2.2 Main obstacles to MI implementation

The barriers or obstacles (both terms are used in an undifferentiated way in the literature) are understood as problems preventing innovation or hindering the innovation process (Mohnen et al., 2008; Raj et al., 2020; Sahu et al., 2021; Tourigny & Le, 2004; Zhou, 2016). In a pioneering study conducted for the Commission of the European Community, Piatier (1984) distinguishes internal barriers from external barriers, a categorization that continues to serve as a reference. Internal barriers are related to resources (financial, time, technical and human) and firm structure (Hadjimanolis, 1999). Among them, the effects of financial obstacles have been the most studied, and a range of nonfinancial barriers are crucial in the context of innovation policy and management (D'Este et al., 2012). External barriers are related to offers (obtaining technological information, raw materials, and financing), demand (the needs of consumers, their perception of risk, and the limits of domestic and foreign markets) and the external environment of the organization. A third category is related to the perception of attributes of the innovation, namely, its relative advantages (cost and risk), that can slow the process of MI implementation (Damanpour & Aravind, 2012). Other authors introduce a distinction between *revealed barriers*, which reflect the degree of difficulty of the innovation process due to learning experience, and *deterring barriers*, which represent obstacles that prevent firms from conducting innovation, such as financial obstacles (D'Este et al., 2012). Most studies investigating the barriers to innovation focus on technological innovations. Despite

some recent contributions, knowledge regarding the factors that hinder MI implementation and their impacts remains limited (Huo et al., 2019; Mol & Birkinshaw, 2012; Sahu et al., 2021), and studies investigating MI are very scarce. We provide a synthesis of the empirical results related to MI barriers in Table 1.

The results of empirical research highlight that most obstacles to MI are internal and related to human resource difficulties, such as skill deficits, employees' resistance to change regardless of their status (employees, managers, and trade unions), lack of time, lack of management support, lack of clarity regarding roles and responsibilities or high staff turnover (Amara et al., 2016; Dubouloz, 2013; Khallouk & Robert, 2018; Madrid-Guijarro et al., 2009; Sinclair, 2006; Wagner et al., 2011). These obstacles are consistent with the attributes of MI. Indeed, according to Damanpour (2014), MI is operationally complex because it is difficult to implement and use.

The MI implementation phase is impacted mainly by human factors (Hamel, 2006) and human behavior. Presumably, resistance stemming from human factors will change depending on the different categories of actors. The model of Birkinshaw et al. (2008) considers two main categories of actors without distinguishing the roles and activities of the actors in each category depending on their status or functions. To address this theoretical gap, we contribute by identifying and analyzing the specific obstacles that arise both for the different categories of actors and in each phase and subprocess of this model, which should help companies overcome these obstacles and enable them to more efficiently implement MI. This paper contributes by refining the theoretical model of MI generation and providing a better understanding of the obstacles that occur during the MI implementation phase.

This research, in line with the theoretical model of Birkinshaw et al. (2008), seeks to answer the following question:

> What are the specific obstacles related to the different actors involved in the implementation phases and subprocesses?

3 Data and method

3.1 Research design

The research design took a qualitative and longitudinal approach for numerous reasons (Ketokivi & Choi, 2014; Pettigrew, 1990). First, as mentioned in the theoretical discussion, MI implementation requires time (Mol & Birkinshaw, 2012), and a snapshot of this phenomenon or system at a particular point in time may differ substantially from another snapshot of this same phenomenon or system at a different time (Carlsson et al., 2002; Robert et al., 2019). Thus, a longitudinal case study clearly seems to be relevant. Second, compared to a survey, a qualitative approach can provide more detail and better access to multiple perspectives regarding obstacles (Childe, 2011; Junior & Filho, 2016). In this research and consistent with the research strategy described by Musca (2006) and Kelliher and McAdam (2018), we adopted a longitudinal case study involving several subunits involved in large organizational change (Chang & Harrington, 2002). Through the qualitative approach, we could truly capture the perspectives of multiple actors in each subunit regardless of their status and function (Shibin et al., 2018). Third, the case study methodology is well suited for meeting our goal of better understanding a phenomenon, i.e., the implementation of internally generated MI, for which limited data or theory exists (Childe, 2011; Yin, 2009). Finally, while

Table 1 Obstacles to MI: a synthesis

Internal obstacles		
Financial resources	Lack of financial resources	Dubouloz (2013) Khallouk and Robert (2018)
Human resources	Deficit in skills and the lack of available expertise	Madrid-Guijarro et al. (2009) Dubouloz (2013) Amara et al. (2016) Khallouk and Robert (2018) Robert et al. (2019)
	Managers' attitudes toward risk and change—resistance	Sinclair (2006) Madrid-Guijarro et al. (2009) Wagner et al. (2011) Dubouloz (2013) Robert et al. (2019)
	Employees' attitudes toward risk and change—resistance	Sinclair (2006) Madrid-Guijarro et al. (2009) Wagner et al. (2011) Dubouloz (2013) Robert et al. (2019)
	Resistance from trade unions	Sinclair (2006) Robert et al. (2019)
	Lack of time	Wagner et al. (2011) Dubouloz (2013)
	Lack of management support	Wagner et al. (2011) Dubouloz (2013) Robert et al. (2019)
	Lack of clarity regarding roles and responsibilities	Wagner et al. (2011)
	High staff turnover	Khallouk and Robert (2018)
Information	Lack of information regarding the market and technologies	Amara et al. (2016)
Strategy	Strategic alignment	Wagner et al. (2011)
	Lack of systemic scope	Khallouk and Robert (2018)
Structure	Overcentralization	Dubouloz (2013)
External obstacles		
Offer	Funding difficulties	Madrid-Guijarro et al. (2009)
	Difficulties raising partnerships	Dubouloz (2013)
	Standardized nature of consultant-led managerial innovation	Wright et al. (2012)
Barriers linked to MI attributes		
Relative advantage	Cost	Madrid-Guijarro et al. (2009) Robert et al. (2019)
Compatibility	Lack of compatibility with the internal culture	Massini et al. (2002) Wagner et al. (2011) Dubouloz (2013)
Complexity	Risk	Dubouloz (2013) Robert et al. (2019)
	Lack of clarity	Khallouk and Robert (2018)

the research starts with a theoretical base and model, a critical goal is to address the issue of how the implementation of internally generated MI occurs and can be disrupted by different obstacles and how a company can succeed in overcoming these obstacles. Under this qualitative approach, the suggestions proposed by Miles and Huberman (1994) and Cuervo-Cazurra et al. (2017) were incorporated into our data collection and analysis.

3.2 Selection and presentation of the case study

The Schneider Electric Company is a private French company formed by the fusion of three industrial companies that have worked for a long period of time in the energy sector; each company is known for its respective trade. At the turn of the twentieth century, the company decided to fuse all of its trades into one trademark name to reinforce its reputation and visibility. We conducted interviews between October 2010 and December 2014, and we updated the information collected in September 2021. The company employs more than 140,000 employees at approximately 150 locations in more than 100 countries.

The Schneider Electric Company is resolutely committed to Industry 4.0 transformation through the integration of embedded computing in its automated production lines, owing to the Internet of Things and artificial intelligence. The supply chain has been completely redesigned with the introduction and processing of big data. Indeed, at Schneider Electric, intelligent production systems (smart production) are increasingly capable of driving physical processes and suggesting efficient decisions through real-time communication and the processing of big data through technologies that interact with operators. Managers' consideration of this relationship with innovative technologies has become a major managerial challenge to ensuring the commitment of all employees, including and above all, the first hierarchical levels.

Several business unit (BU) managers decided to form a project team with some internal experts in industrial performance and the assistance of a consulting firm to evolve the company's management system to accompany these major technological developments. After a few years, this project resulted in the launch of a new and unique MI called "Short Interval Management" (SIM), which was entirely internally generated and described in detail in internal documents. Notably, the consultants committed to the project and then became employees of the group. In 2010, Schneider Electric decided to implement this MI in all its BUs beginning with the pilot business (unit "E"; see Table 2). To achieve SIM implementation, a task force consisting of experts visited various BUs to boost and support them in adopting this new management approach. The task force provided training on the principles, process, and practices included in SIM and disseminated internal communication tools. Subsequently, the task force audited the regularity of the implementation process. SIM implementation was not without difficulties, but this MI was quickly identified and supported as the best means for reaching the target productivity objectives set by top management (average gains of 7%). Building upon this internal success, in 2010, Schneider Electric further developed a specific consulting unit to commercialize this MI to external industrial companies.

Thus, the specific context of Schneider Electric and its BUs is theoretically interesting and relevant for an investigation of the MI implementation process and the obstacles identified by the different actors involved in this process. The top management of the company agreed to allow us to observe through immersion the implementation of the MI in five BUs. This immersion phase allowed us to cross-check and verify the accuracy of the collected data (Eisenhardt & Graebner, 2007). The richness of the collected data allowed us to identify and analyze the different obstacles generated by the implementation of this MI.

Table 2 Characteristics of the respondents and their functions

	Number of employees	SIM implementation year	Number of interviews	Status of respondents
Top Executive	4	2005	4 + 3	4 corporate top managers (**E1, *E2*, E29,** and E30)
Pilot BU "E"	500	2005	10	2 top managers (E20 and E21); 4 middle managers (E22, E25, E24, and E27); 4 operators (E23, E26, E28, and E19)
BU "D"	300	2009	4	1 top manager (E16); 1 middle manager (E15); 2 operators (E17 and E18)
BU "C"	350	2008	3	1 top manager (E12); 1 middle manager (E13); 1 operator (E14)
BU "B"	150	2006	5	1 top manager (E7); 3 middle managers (E8, E9, and E11); 1 operator (10)
BU "A"	100	2005	4	4 top managers (E3, E4, E5, and E6)

The numbers in bold indicate the members of the project team; the numbers in bold and italics indicate external consultants who became employees of Schneider Electric

3.3 Description of the MI: short interval management (SIM)

SIM includes multiple specific and innovative managerial practices and processes that change the day-to-day tasks to detect and solve malfunctions that affect the production process. SIM is based on recurrent sequences of animation ("SIM loops"). These sequences or loops involve different hierarchical levels to identify malfunctions and produce corrective action plans. The goal of these corrective action plans is to improve overall performance. SIM starts with loop one and finishes with loop five (see Fig. 1). All identified dysfunctions or improvement proposals in loop one must be solved throughout the entire process. At all levels, each manager must search for a solution to an identified problem. If no solution is identified, the dysfunction is elevated to a higher hierarchical level of management. SIM is based on both responsibility and autonomy practices. SIM generates a chain of unbreakable responsibility across all hierarchical levels. Top and middle management are inextricably linked to the operators who identify problems as they emerge in the organization. Figure 2 provides an overview of the SIM process and managerial practices.

3.4 Data collection and interview protocol

The research design explicitly captures the viewpoints of the multiple stakeholders identified as key actors in the SIM implementation system (Carlsson et al., 2002), and it controls for

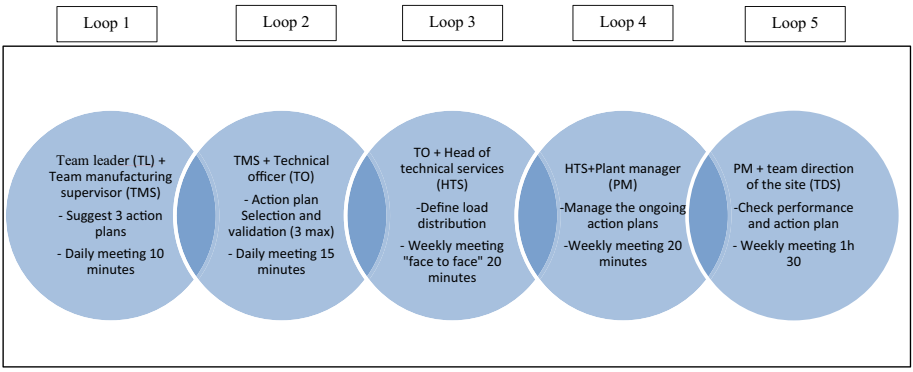

Fig. 2 Description of SIM

the potential biases arising from a single data type and a single researcher (Eisenhardt, 1989; Yin, 2009). Four primary sources of data were collected in each BU. First, we conducted a minimum of 4 interviews at each facility. Altogether, we conducted 30 semistructured interviews between 2010 and 2014 in five different BUs with actors involved in the SIM implementation process from multiple hierarchical levels (see Table 2), and we updated the information collected in September 2021. Following the COVID-19 pandemic, we conducted 3 additional interviews with key players involved in the MI implementation process. The objective of these interviews was to determine the extent to which the working conditions imposed by the pandemic had impacted the implementation of the SIM and whether specific obstacles should be considered in addition to those already identified.

Each interview lasted at least one hour, and some lasted all day. All interviews occurred at the workplace to shed light on the respondents' direct environment. The respondents provided verbal permission for the recording of the interviews. We used a semistructured interview protocol. The interview guide included seven main themes: the context and actor experience, the story of the implementation process as experienced by the actor interviewed, and the five activities occurring during the implementation phase and noted above (trial and error, idea refining, idea testing, reflective experimenting, and reflective theorizing). Regarding each activity, we asked the actors to discuss the obstacles that they perceived.

We transcribed each interview and asked the respondents to validate the verbatim transcripts. During the interviews, we asked them to speak freely about the obstacles that they encountered during the SIM implementation process before asking them questions about the different types of obstacles obtained from the literature and those occurring during the different activities performed during the implementation phase.

Three other primary sources of data included operational performance data, internal documents about SIM and immersion-based observations (all facilities were toured). Following Miles et al. (2003) and Yin (2009), we note that the combination of these data guarantees a multidimensional view, a wide range of research materials and, ultimately, an improvement in the validity of our results.

3.5 Coding

To exploit the data, we imported all interview transcripts into a computerized system (NVivo). Each interview was encoded sentence-by-sentence into categories (5 activities encompassed

within the implementation phase), themes (various categories of actors) and subthemes (internal and external obstacles and those linked to MI attributes) derived from the literature. Each act of coding involved at least two researchers. Then, their work was checked by a third researcher, and coding was considered complete once all three researchers reached consensus. When possible, we relied on data triangulation to check the validity of our study. We triangulated the data obtained from the interviews, observations, documents, and secondary sources (newspaper articles and websites), and our reporting includes only data substantiated by multiple information sources. We also used a graphic approach to represent the coded interview data through a visual map to display the obstacles during each activity performed during the implementation phase considering the various facilities and actors. This method helped us improve the organization of our data and double-check the raw interview material.

In this work, specific respondents are referred to by a number to ensure their anonymity.

4 Results: main obstacles to MI implementation during its five cognitive activities

We classify the results of our study based on the five cognitive activities and the various actor categories. The obstacles differ considerably depending on the activities included in the implementation phase of internally generated MI. Table 3 provides an overview of the results related to the barriers to MI implementation. For each obstacle, we identified 5 levels of intensity ranging from very high to low based on the number of occurrences described by the interviewees.

The major obstacles perceived by the interviewees during the implementation of SIM are internal and particularly linked to the overcentralization of the process and human resources. The obstacles linked to the attributes of SIM, such as the lack of compatibility with the original SIM concept, are the second most often cited obstacles. The interviewed actors had no perceived external obstacles.

Below, we provide a detailed discussion of the perceived obstacles based on the five identified activities included during the implementation phase.

4.1 Trial and error activity

In the framework of Birkinshaw et al. (2008), trial and error is one of the two primary activities performed by internal change agents in their attempt to implement internally generated MI. These agents test the proposed new practices and participate to monitor and adjust the original concept. In our case, these agents tested the MI invented by the project team, but they considered each part of the concept while adjusting the original concept because the project team did not accept questions regarding the original concept.

During this activity, the obstacles that had the highest number of occurrences regardless of the status of the respondents were a deficit of skills and the lack of available expertise. During this activity, the lack of skills and expertise could be a source of stress for employees.

> "Regarding the lack of competence, SIM may be perceived as a source of stress by some actors". (E6)

These obstacles also hampered any proposals of adaptations. Due to the lack of skills and expertise, employees did not feel legitimate in making proposals for adaptations. Employees

Table 3 Obstacles encountered while performing activities during MI implementation

Obstacles		Level of importance (in terms of the number of occurrences)				
		Trial and error	Idea refining	Idea testing	Reflective experimenting	Reflective theorizing
Internal	Skill deficit	+ + + +		+ +	+ + + +	
	Lack of management support	+ + +		+		
	Overcentralization	+	+ + + + +	+ + +	+	+ +
	Employees' attitudes toward risk and change	+				
	Managers' attitudes toward risk and change	+ +			+	
	Lack of clarity regarding roles and responsibilities	+			+	
	Lack of communication				+ +	
	Lack of financial resources				+ +	
	Lack of systemic scope				+ +	
	Lack of open-mindedness or ability to refine a concept					+ +
	Difficulties identifying adaptations					+ +
MI attributes	Lack of compatibility	+		+	+ + +	
	Lack of clarity	+				

Very important + + + + ; important + + + ; moderately important + + ; slightly important +

needed time to assimilate the SIM system, and they first tended to apply SIM in a very theoretical way.

> "I will not teach you anything by telling you that guys are on their bike, their head on the handlebars. We explain SIM to them, and then, they pedal and pedal. Without expertise, they do not question anything, and if, at some point, nobody said, 'Oh, look up and see where you are going', nothing happens". (E22)

This difficulty in making adaptation proposals was also amplified by another obstacle, i.e., the overcentralization of the SIM implementation process, which was also reported by both internal and external change agents to have many occurrences. SIM was implemented through a top-down process. The team in charge of SIM implementation was also the team that invented SIM. Therefore, this team tended to impose its SIM concept and process as originally conceived without any possibility of adaptations by internal change agents. The project team was a she-wolf that did not want anyone to touch her baby.

> "I think this concept of SIM was described so theoretically that it was difficult for employees and all teams to discuss it". (E3) "In terms of deployment, SIM was implemented by a 'task force' made up of people from different trades and led by specialists". (E2) "No, there is no brake if we agree to respect the SIM fundamentals and codified techniques without questioning them". (E27) "It was very, if not too, military. That was the first obstacle. That we fit into something very square and very framed that does not leave room for initiation or reflection. That is the first risk on which we broke our teeth". (E21)

The top managers and the members of the project team largely reported the following obstacle during the trial and error activity: the lack of management support and management's attitude toward risk and change. The role of middle managers was central to the SIM concept because they had to ensure that SIM was animated. Without this animation, SIM could not work.

> "The hardest part of SIM is the first and second level of management. They have to manage the first loops, which is fundamental". (E5)

Furthermore, middle managers had to monitor SIM implementation to encourage their team. However, for such monitoring, these managers had to take ownership of the SIM process. As previously stated, the very top-down approach was not efficient for the teams and managers to immediately take ownership of the new practices and management approach of SIM. Unfortunately, managers could have also played a role in identifying necessary adaptations in the field.

> "The obstacles are generally hierarchical and managerial. If they don't get involved and do not take ownership of the process, it does not work". (E12)

Then, according to the respondents, if middle managers did not adhere to SIM, it was difficult for SIM to perform.

> "The first obstacles are the managers. What I mean is that managers not convinced by SIM will have trouble taking advantage of SIM. On the other hand, a good manager transcends SIM". (E3)

This final quotation illustrates that change agent E3, who was a member of the project team, believed that a good manager necessarily adheres to SIM and that the success of SIM depends on the ability of a manager to promote and animate it. While the top manager and the project team pointed to the lack of management support as the main obstacle during the implementation phase, they also recognized that middle managers were not sufficiently trained during the first steps of implementation. Therefore, these managers had to assimilate SIM without formal training, and they had to become translators, supporters and animators of this new approach without really having the means for doing so.

> "As soon as we helped them [managers and middle managers] set up SIM, they lifted the brake, and these same people told me a few months later facing the results obtained

that they wondered how they were able to function effectively without SIM before". (E7)

Finally, commonly shared among all respondents, one attribute of SIM was described as an obstacle during the trial and error activity. This obstacle was the lack of compatibility of SIM with the previous culture of Schneider Electric; however, not all Schneider Electric entities had the same culture. Furthermore, SIM encouraged initiatives and autonomy while it was being implemented, and removing any initiative was not consistent with the vision of the project team.

"One of the brakes is that there was a big difference in culture among those who engaged in products of a large series, those who engaged in small series, and those who made equipment…but there was one solution for all: SIM". (E20) "The essential brakes are related to the change in culture in the managerial mode that is intrinsic to the SIM approach". (E2)

4.2 Idea refining

According to the framework of Birkinshaw et al. (2008), during idea refining, based on their deep knowledge, external change agents perform an "ideational trial and error" activity to work through the implication of the invented MI in terms of how it might work in practice.

The major internal obstacle appearing during this activity was internal and linked to the rigid behavior of the team project members (assimilated to external change agents by the BUs) who were in charge and guaranteed MI implementation. This obstacle was considered an overcentralization obstacle. Indeed, these external agents advocated for a rigorous procedure based on a predefined scheme during SIM implantation, and this scheme was established by the project team. In the studied case, the team members refused to reconsider their view of SIM throughout its implementation in practice.

These external actors accepted very few adaptations in light of the theoretical scheme that had originally been defined. The participants of the project team underlined that this activity was carried out centrally since they were the only "masters on board". "The implementation of SIM is accompanied by technical management… At the beginning, it is essential to codify and refer to CES techniques" (E2). "I think this concept of SIM was described in a theoretical way, and then, it was pushed to the maximum by enriching our practice" (E3).

The operational pilot of SIM implementation (E2) was recently explained to be very centralized in the top-down mode based on the project team, which was considered the most successful way to implement SIM in all entities of the group. The project group felt that it had "the right formula", which should be imposed as a whole without reverting to the concepts theoretically defined by the project team. "I remain convinced that the proper way to implement SIM is to enforce the principles that we have defined" (E5).

However, one project team member reported a risk associated with the overcentralization mode during the idea refining phase. Indeed, he mentioned that SIM could be perceived as Taylorism, i.e., a project team that conceptualizes and imposes its vision on collaborators and unit managers who must apply it without customization. "SIM may appear as Taylorism; employees think that they are under the control of SIM. So, it's a psychological obstacle" (E4).

Indeed, the perception of the internal actors shows that they considered the overcentralization mode to be a major obstacle during the idea refining phase. Although the members of the project team (external change agents) considered this overcentralization mode to be an

indispensable element for the success of SIM implementation, the internal actors' perceptions markedly differed.

Thus, some representatives of the top factory management felt that the deployment procedure recommended was too rigid and did not hesitate to implement SIM with some adaptation to the local context of their plant:

> "There is a theoretical part in the SIM implementation that I do not strictly apply in this factory, particularly doing SIM loop 4 before SIM loop 5. We do it in parallel; we do not need SIM loop 4 to make SIM loop 5. All we need is only the reporting of SIM loop 2. We do not need SIM loop 3. We do that in parallel. This is not quite what is written in theory, but it works very well" (E 20).

Regarding the first hierarchical level, overcentralization appeared to be an obstacle because it imposed a mode of implementation that restricts the autonomy of the internal actors.

> "The downside is that the mode of implementation of SIM is too restrictive. Meetings are held every day at the same hour. I have to be present, and I must have all my formations before nine o'clock" (E 28).

4.3 Idea testing

During this activity, theoretically, both internal and external change agents are involved and interact. The internal agents experiment with the new practices, while the external agents initially refine the concepts established to build a conceptualization within the practice context. During this activity, the major obstacle that was perceived by both the internal and external agents was once again related to overcentralization. In fact, we observed conflicting interests and objectives. On the one hand, the internal actors regularly sought to highlight their practical difficulties in adapting SIM to their local context. On the other hand, the external agents sought to maintain uniformity in the SIM implementation mode to disseminate a managerial culture common to all factories through a top-down process.

> "SIM is something very square and very framed, and it does not leave an opportunity for personal initiative or reflection. This is really the first brake that blocked us". (E21)
> "Fifteen years ago, when you went from one factory to another, each factory did things differently and said it does not work the same, and he explained why. Today, with SIM, the processes are aligned in the front office". (E4)

The second obstacle identified is a deficit in skills and the lack of available expertise. This obstacle is related to the lack of managerial skills necessary to animate the different problem-solving loops.

> "You have to be able to animate a group, which is not always easy" (E18). "If a manager does not have a good vision of the load of his teams, he can also deregulate the system very quickly, and he can overload his teams or let actions that are not productive in terms of performance pile up". (E16)

Second, this obstacle was also manifested as a lack of competence in relation to the analytical capacity of the operational agents to identify the most important problems, which could lead to priority action plans. The lack of expertise in prioritizing the inherent steps of SIM could lead to an overload of services supporting and a blockage of the entire implementation process.

"Other brakes appear because some internal actors are incompetent. This is the downside when you do not have the right data. I have an example from last week. In two different production shops, we retraced unimportant problems but not the major problems. To solve the right problems, you have to have good technicians and good manufacturing team managers. They must have the right ability to analyze the information. Today, I find that they lack relevance". (E24)

This lack of skills and expertise appears to be due to the lack of training because training on the mastery of certain techniques associated with SIM had not been anticipated or considered a priority for SIM implementation. Only descriptive documents prepared by the project team regarding the SIM implementation mode were presented to top and middle management.

> "Some internal agents lack skills, and there is not yet a training cycle on the animation of specific SIM within the group; it is a brake". (E12) "I would also like to have more training to animate these SIM loops; Sometimes, it's very hard to deal with other employees". (E17)

Finally, the third obstacle identified is the lack of commitment from top and middle management in the factory. Some members of the project team complained about the lack of commitment and internal support from managers within factories during SIM implementation.

> "Once the roadmap is given and the trainings are done, it is the commitment of the managers in different factories that makes the difference, and this commitment plays a role either as a brake or as an engine". (E7)

4.4 Reflective experimenting

In this activity, theoretically, internal actors assess the effects of the actions undertaken during MI implementation and retroactively identify and analyze the difficulties encountered to provide appropriate solutions. These agents have a better perception of the obstacles and barriers associated with SIM implementation due to a feedback effect of experience. This feedback makes it possible to precisely identify a greater number of barriers.

Regarding the occurrences of the main obstacle, a deficit in skills and the lack of available expertise, we analyzed this obstacle based on the perception of each category of actors.

Top management presented the lack of expertise and competence as an obstacle in middle management and some operational members, such as team leaders. Strangely, these individuals focused on this type of obstacle without attempting to understand the root cause of this problem, which we could identify based on the vision of other internal actors. It seems that this obstacle is the core explanation of the SIM difficulties experienced by top managers and external change agents. These individuals ignored the need for adaptation due to this lack of expertise.

> "The malfunctions come mainly from the competence of the middle management who is the REF. If in terms of animation the REF does not include all the support functions, we're going to miss something". (E29) "The last brake is the ability to manage each one, and the team's animation skill is different from one individual to another. Some managers are clear and square in their animation, while others are entangled in the process". (E12)

Regarding middle management, the main obstacle, i.e., the deficit in skills and the lack of available expertise, was expressed in terms of personal inadequacy in the animation capacity of the SIM loops.

> "If I have 40 actions that happen to me, it's hard to manage. You have to be able to be very well organized…". (E13)
> "At some point, guys, they're on their bike with their head in the handlebars, and then, they pedal, pedal, pedal. If at some point nobody tells them, 'Oh, raise your head and look where you're going', they can curb the implementation". (E22)

Regarding the first-line operators, this obstacle pertained to the lack of competence for the animation of loop 1. These individuals were at the front line of the expectations of other operators, who complained about the lack of responsiveness of SIM.

> "The only obstacle is that we may not be able to respond to the problem raised on the assembly line at that time or a problem that has been addressed for a long time". (E28)

Other obstacles, such as the lack of financial resources, which was mentioned exclusively by middle management and operators, appeared during this activity. This obstacle was more related to the operational nature of SIM and involved the difficulty of placing some SIM loops into practice, mainly those related to action plans (loop 4). Without enough financial resources, some actions were too difficult or impossible to implement. The cycle of SIM loops could end and fail.

> "Another obstacle to deal with is the lack resources and action plans from production shops, which could generate demobilization at the base of the process" (E13).

Another obstacle appearing during this activity is the lack of communication. This obstacle was mentioned equally by all actors and was manifested in the difficulty of providing feedback throughout successive loops. SIM is considered an effective system for obtaining information. Without good communication, SIM becomes a failure or a so-called empty shell. Furthermore, without real communication and mutual efforts to understand the difficulties of all internal members, no SIM adaptation is possible. During this activity, internal actors could assess the effects of the actions undertaken during SIM implementation. These agents retroactively identified the difficulties encountered without real communication and listening. Without a strong desire to consider the problems encountered in the field and to understand them in depth, appropriate answers and adaptations are impossible. The feedback effect of the experience fails.

> "Feedback is also essential for the system, or it is a real difficulty for the system". (E13)
> "It is also necessary to have information to give to individuals. If we have no information, people's interest tends to decrease. There should not be any information leaks that interfere with communication. People are waiting to receive information as well. It is difficult to maintain motivation if you do not have information to communicate". (E18)

Similarly, the lack of management support was identified as an obstacle. This obstacle was mentioned by middle managers and operational actors and involved a commitment deficit in some support service technicians in SIM loops 2 and 3 and even throughout the SIM implementation process.

> "You can have a SIM loop 2 with a technician, a quality specialist and a maintenance manager. But if a member of the logistics service is missing and there is a question on this point, it blocks the process because the person is not there to answer. So, it's also

important to have the full team at the meeting about loop 2. The fact that not all needed participants are present is, therefore, a brake". (E23)

This obstacle was also observed through a lack of solidarity among middle managers.

"Another phenomenon appears to limit SIM in my opinion. Often, the actions return to the same person due to a lack of solidarity, and therefore, this person is overloaded due to a lack of time". (E22)

4.5 Reflective theorizing

Reflective theorizing is one of the two cognitive activities performed by external change agents during the implementation phase. In this activity, these agents sharpen a theorizing idea related to a newly generated MI by using their prior knowledge and recent deep knowledge of a particular contextualization. This activity must enable them to achieve a theorized MI.

In this activity, the only obstacle identified is the lack of open-mindedness or ability to refine a concept that has been the subject of in-depth and in vitro reflection. In the studied case, the project team (assimilated to external change agents because they acted as external consultants for the different entities at which SIM was implemented) had difficulties identifying and accepting the adaptations from the field and rethinking their SIM concept to theorize about it ex post. In fact, these individuals theorized about SIM ex ante, that is, before testing their concept in a real-life situation. Thus, some adaptations were implemented surreptitiously and had not been theorized.

"I think that there was this preconceived conceptualization. This theoretical part is not applied strictly in my factory. Especially the fact of doing SIM 4 before SIM 5. We do it in parallel. We do not need SIM 4 to do SIM 5. We only need feedback from SIM 2. We do not need SIM 3. It is not what is written in the theory, but it works very well. We adapted the method, but it has not been the subject of any theorization". (E20)

The sanitary conditions of distancing imposed by the COVID-19 pandemic created specific obstacles to operations more than the obstacles in SIM implementation. Our interlocutors told us that the SIM MI had sufficiently permeated the company's managerial practices that it was not to be called into question by specific material obstacles.

More specifically, during the first phase of the pandemic (April–May 2020), when operators could not be physically present in the company, this absence had the effect of stopping the loop 1 process of the MI. Middle management and support services continued their activity, which was possible owing to an accelerated digitalization of several processes. On the other hand, as we have seen previously, the volume of action plans resulting from loop 1 of the SIM has made it possible to continue the activity of loops 2, 3, 4 and 5.

During the subsequent phases of confinement (September 2020–April 2021), physical work resumed, as did the SIM management loops in compliance with sanitary procedures. All the tools and animation sequences were digitized to reduce physical contact.

Thus, loops 1 and 2 of the SIM were performed through digitized meetings. The CSA tools were also digitized, and the tables tracing the monitoring of action plans and performance indicators were replaced by the latest-generation digital screens.

Finally, we confirm that if the COVID-19 pandemic slowed down certain phases of MI operation for a short period of time, it did not call into question the implementation of the MI. It was sufficiently established within the company to adapt to specific management

conditions. It is likely, however, that if material difficulties of operation had to be considered in the initial phase of the SIM MI implementation, the results could have been different.

5 Discussion

To date, the implementation of internally generated MI has been underresearched. While historians of management produce material describing how things occur through monographs, MI researchers propose different conceptual frameworks that generally illustrate examples of well-known or historical MIs (David, 2018). The most accepted and well-known model is that developed by Birkinshaw et al. (2008), who describe MI implementation through a typology of actors (internal and external) and their cognitive activities. However, this model has not been empirically tested or validated, and current knowledge regarding the process of the implementation of a generated MI is insufficient. This research explores this blind spot by highlighting the main obstacles to MI implementation activities. We discuss the implications of our study from three main perspectives: the too-formal distinction between internal and external change agents understood as two different homogeneous populations, the rational perspective chosen by these authors, and the barriers to the cognitive activities associated with these two populations. In this way, we help to refine the theoretical model of Birkinshaw et al. (2008).

5.1 Theoretical contributions

5.1.1 Questioning the homogeneous conceptualization of change agents

Our results indicate that the distinction between the internal and external change agents in charge of SIM implementation is much more complex than it initially seems. Indeed, in our case, two consultants invested in the project team behind the generation of SIM quickly integrated with the Schneider Electric staff. In addition, the six members of the project team (including the consultants who became Schneider Electric employees) were perceived by the BUs in which SIM was implemented as external change agents. Hence, based on our results, these six members of the project team are considered external change agents. Our results also indicate that when considering internal change agents, a homogeneous population seems simplistic. Our results show that it is important to move beyond this paradigm to better identify the obstacles to MI implementation.

This distinction must be considered more carefully in future research since it seems somewhat artificial in practice. Some consultants may become internal change agents over time or may be treated as such because they engage with the company for a long period of time or are involved with some internal change agents in the team generating the MI. As evidenced by Howells (2006), Wright et al. (2012) and De Silva et al. (2018), the nature of the relationship between internal change agents and intermediaries (here, consultants) evolves over the innovation process. We show that this relationship can become ambiguous in the sense that external intermediaries may be regarded as internal change agents. Furthermore, in the case of an enterprise organized around different BUs, the team in charge of implementation seems to be external to the BUs, even if all members are internal change agents. Therefore, in reality, internal agents could be perceived as external agents, which is particularly true when a firm decides to place a specific project team in charge of MI implementation in different BUs. Indeed, some actors may play hybrid internal/external roles. For instance, internal agents

may be involved in idea refining and reflective theorizing activities, which, in principle, are reserved for external agents in the literature (Birkinshaw et al., 2008).

5.1.2 Questioning the rational perspective of the implementation process

The rational perspective of the implementation phase of MI generation chosen by Birkinshaw et al. (2008) considers five cognitive activities (or subprocesses) performed by internal and external change agents that behave and reason as rational actors as though they share a common objective. Our results show that some obstacles oppose this rational perspective. For example, while the MI may have been generated by an internal/external team that was also in charge of its implementation, some human behaviors and limited cognitive capacities tended to challenge this rational perspective. First, the team members may refuse to question some aspects and practices included in their original conceptual idea even if some difficulties were clearly identified through the trial and error and idea testing activities, and some adaptations were made almost in a surreptitious way. These individuals tended to overemphasize some obstacles, such as the skill deficit or the lack of expertise of operational actors or middle managers, rather than attempting to identify some necessary adaptations highlighted through the idea refining and reflective theorizing activities to better fit the cultural, technical and political characteristics of the BUs (Ansari et al., 2010, 2014; Freitas, 2008; Massini et al., 2002). The difficulties in identifying necessary adaptations were mostly due to the resistance of the team that invented the MI concept and that did not question and/or adapt it, remaining deaf and blind to signs of trouble.

Therefore, our results contribute to the debate on the various theoretical perspectives regarding the adoption of innovative management practices (Sturdy, 2004).

5.1.3 Obstacles to the cognitive activities of external and internal change agents

Research investigating obstacles to innovation is scarce (D'Este et al., 2012; Galia & Legros, 2004; Wolfe, 1994), and the few available studies investigating MI have mostly focused on its adoption as a dichotomous decision (Damanpour et al., 2018). Previous studies investigating MI barriers have rarely considered all activities included during the MI implementation process by considering the perception of actors with different statuses.

Regarding all actors, the following two major obstacles are highlighted: a deficit in skills and the lack of available expertise and overcentralization. These results are consistent with those of previous MI-related research (Amara et al., 2016; Madrid-Guijarro et al., 2009), but they are nuanced by the new light offered by a processual and qualitative perspective. First, notably, these obstacles do not appear in all cognitive activities. A deficit in skills and the lack of available expertise do not appear during the idea refining and reflective theorizing activities, which are performed by the members of the project team who developed the fixed idea of how the MI should be customized and theorized. Second, our results show that the absence of this obstacle in these specific activities could be a sign of difficulties in testing the original idea invented by the project team, which is highlighted by another major obstacle, named overcentralization in the literature. This obstacle mainly appears in both the idea refining and idea testing activities during the implementation phase. The obstacle mentioned in these two activities reflects the difficulty perceived by internal change agents stemming from the fact that the MI cannot be implemented without adapting or modifying it. Interestingly, these analyses of obstacles challenge the rational view of implementation. For instance, the overcentralization obstacle shows that, on the one hand, the cognitive activity of idea testing,

which is considered to be shared between internal and external change agents, may in fact be more complex. The back-and-forth exchanges between internal and external change agents may be limited or represent an empty promise because of the posture of departure by some members who refuse ideas that were not invented by them and impose their view through a top-down perspective. This phenomenon echoes the Not Invented Here syndrome highlighted as a major obstacle in technological innovation (Katz & Allen, 1982).

In contrast, the lack of management support is considered a major obstacle by only two types of actors, i.e., production unit managers and members of the project team. For these actors, this obstacle appears only during the trial and error activity. This result might be explained by the fact that the top managers of the project team believe that the production unit manager is not sufficiently able to implement the MI and that production unit managers do not feel sufficient support from the project team members. This result complements the earlier work performed by Wagner et al. (2011), who identified this obstacle but did not explain its polysemic character. Finally, the lack of communication, lack of financial resources and lack of systemic scope are obstacles that are considered moderately important by the majority of change agents (except for production operators), who cited the presence of these obstacles mainly during the reflecting experimenting activity. This result complements those of earlier works (Amara et al., 2016) identifying this obstacle but not explaining its presence mainly in the specific reflecting experimenting activity.

5.2 Implications for practice

Based on these major MI implementation obstacles, we formulate two key management principles. The first and foremost principle is to search for an equilibrium between flexibility and rigidity. While a top-down process may be useful for implementing MI (Daft, 1978), it could be a large risk to impose the original MI concept, as it was invented by people in a theoretical way without considering or even encouraging some modifications or adaptations. Rejection and implementation sit on a continuum of MI with respect to the original concept: modification, customization, adaptation, and selective rejection of practices (Ansari et al., 2010; Freitas, 2008; Mamman, 2009; Massini et al., 2002; Rogers, 1995). All these steps can be sources of interesting improvements to the original MI concept. Implementing MI involves adaptation more than imposing the MI in its original theoretical idea. Flexibility in the MI implementation process may reduce mistakes and encourage the customization of the MI. It is erroneous to think of the MI in monolithic terms during its invention and to not question it. MI designers (David, 2018) should accept that the MI implemented will never be the same as that initially designed (Ansari et al., 2010, 2014; Freitas, 2008; Massini et al., 2002).

The second management principle for MI implementation is to search for equilibrium between leadership and "communityship" (Mintzberg, 2008). While the leadership of the members of the team behind the MI is determined to promote and launch the MI, it is no less important to share this leadership with people in the field or with practitioners who can introduce their view to fit the MI more appropriately to local situations or changing circumstances, depending on the different BUs and team diversity (Huo et al., 2019). These people are best positioned to identify and understand the adaptations realized in the field and the reasons for them. Without shared leadership among external, internal (from all statuses) and external/internal change agents, the appropriate adjustments and adaptations could be difficult to identify, accept and, if necessary, generalize. This shared leadership allows internal actors to become ambassadors of MI implementation because they are invested in its global design.

6 Conclusions

This research contributes by identifying the different obstacles proposed by the literature based on the different categories of actors (internal/external and in terms of status, i.e., corporate leaders, BU heads, middle managers and operators) and the different activities included in the MI implementation model of Birkinshaw et al. (2008) (trial and error, idea refining, idea testing, reflective experimenting, and reflective theorizing). Additionally, this paper contributes by refining the theoretical model of MI generation and providing a better understanding of the obstacles that occur during the MI implementation phase.

7 Limitations and future research

While this research provides some critical insights into the MI implementation process and its obstacles, it also suffers from limitations that should be addressed in future research. While it is interesting and rare to follow in real time a contemporary case of implementation of an internally generated MI (Birkinshaw et al., 2008), we were unable to eliminate all problems associated with retrospective sense-making bias from the interviewed actors, and it was sometimes difficult to clearly delineate the different cognitive activities included during the implementation phase. The borders were sometimes blurred. Furthermore, to better understand the MI implementation obstacles and their implications for necessary adaptations, it could be interesting to follow this process over a longer period. Moreover, the MI studied, i.e., SIM, was internally generated at Schneider Electric, but we believe that it is based on principles obtained from another MI. It could be interesting to better establish the foundations of this MI, what David (2018) names the conceptual filiations, which can also explain some of the obstacles during its implementation. Finally, although the case studied revealed ambiguities in the nature of the relationships that consultants as intermediaries have or maintain with the innovating firm, this study does not provide a proper temporal perspective on this phenomenon. Beyond the previous recommendation of Howells (2006) about the functions and activities of intermediaries, we think that further research clearly still needs to be conducted to develop a better understanding of the tensions and paradoxes in the external/internal place occupied by some intermediaries throughout the MI implementation process.

Despite these limitations, our study contributes to the theoretical model of MI implementation by questioning the relevance of the rigid distinction between internal and external actors and the overly rational vision that does not sufficiently consider the divergence of the various categories of actors based on the different subphases of the implementation process.

Authors' contributions MR, PG, and SD designed the study and interview, analyzed the data, and wrote the manuscript.

Declarations

Conflict of interest The authors have no conflict of interest to declare.

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