How open innovation practices drive innovation performance: Moderated-mediation in the interplay between overcoming syndromes and capabilities

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How open innovation practices drive innovation performance: Moderated-mediation in the interplay between overcoming syndromes and capabilities

Abstract

Purpose –This paper investigates whether and under what conditions open innovation (OI) drives innovation performance (IP) in the financial sector. To this end, the paper first analyzes in depth the indirect effect of overcoming two attitudinal mediators: Not-Invented-Here Syndrome (NIHS) and Not-Sold-Here Syndrome (NSHS). It then uses dynamic capabilities theory to hypothesize that the indirect effects are moderated by absorptive and desorptive capabilities, respectively.

Design/methodology/approach – The authors perform empirical study of major Spanish financial entities. Data are collected from 288 questionnaires from employees at branches of 13 bank entities. Regression analysis tests the mediating role of overcoming syndromes and the moderated-mediating role of dynamic capabilities in the OI – IP relationship.

Findings – Results confirm the indirect effect of overcoming NIHS on the relationship between outside-in OI and IP, and the indirect effect of overcoming NSHS on the relationship between inside-out OI and IP. Further, absorptive capacity moderates the indirect effect between outside-in OI practices and IP by overcoming NIHS, and desorptive capacity moderates the indirect effect between inside-out OI practices and IP by overcoming NSHS.

Originality/value – This paper advances knowledge by explaining discrepancies in the sign of the OI – IP relationship. Introducing comprehensive absorptive and desorptive capacity models to explain OI, it advocates an integrative framework to understand OI activities and their outcomes. Managers should develop these capacities using human

talent training and cultural values development to mitigate NIHS and NSHS, and optimize firms' OI efforts and the improved IP benefits derived from them.

Keywords Open Innovation, Innovation performance, Not-Invented-Here syndrome, Not-Sold-Here syndrome, absorptive capacity, desorptive capacity, financial sector

Paper type Research paper.

1. Introduction

"The management team of our partner company saw us as being incompetent and, in hindsight, did not recognize that it was due to their own employees' unwillingness to outsource. The employees who felt the assignment belonged to their R&D department wouldn't let go of it. In a clever way, they managed to ensure that a number of things did not work out – and that can easily be done."

–Engineering consultancy CEO (Burcharth *et al.*, 2014, p.149)

The CEO's statement above crystallizes the problem firms must overcome, regardless of sector (including financial), to benefit from open innovation (OI): employee resistance and negative attitude to implementation of OI practices (Burcharth *et al.*, 2014). Chesbrough (2003) defines OI as "use of both inflows and outflows of knowledge to improve internal innovation and expand the markets for external exploitation of innovation." OI has recently awakened scholars' interest (Huizingh, 2011; Cheng and Huizingh, 2014; Randhawa *et al.*, 2016).

We focus on the financial sector due to its importance for economic growth and employment (Schueffel and Vadana, 2015). Recently, dramatic changes have affected the sector: regulatory regimes, global demand for banking services, changing customer preferences, and intense change in information and communication technology (Mention *et al.,* 2014). To respond to these new challenges, banks must participate in disruptive change by increasing innovation (Kiziloglu, 2015).

Financial services literature still provides little insight into OI's significance in developing new services and products (Martovoy *et al*., 2012). Gerstlberger *et al*. (2010)

highlight academia's neglect of OI's potential for overcoming crisis. Financial-sector OI allows banks to respond to the changes detailed above as more flexible, open, competitive organizations with collaborative organizational culture (Salampasis *et al.,* 2015).

OI requires deeper, detailed analysis in the financial services sector, specifically banking. Without better understanding of the organizational change needed for this transition and the capabilities that support this effort, bank firms and other industries are unlikely to capture value from OI (Gianiodis *et al*., 2014). We urgently need in-depth understanding of the conditions under which OI fails (West *et al*., 2014; West and Bogers, 2017). Scholars have identified barriers that prevent firms from capturing value from OI practices: negative attitudes to acquiring or exploiting external knowledge (syndromes) (Clagett, 1967, cited in Hannen *et al.,* 2019; Katz and Allen, 1982, cited in Burcharth *et al.*, 2014; Lichtenthaler *et al.*, 2010) associated with closed innovation (Zobel and Hagedoorn, 2020). Syndromes emerge when employees develop protectionist attitudes toward acquisition of external knowledge or exploitation of internally-generated knowledge outside the organization. Although prior OI literature discusses NIHS and NSHS, it lacks empirical research on the effect of overcoming these syndromes, especially on possible countermeasures (Hannen *et al*., 2019).

Our study seeks to fill this gap. First, we attempt to determine whether overcoming NIHS and NSHS (negative attitudes associated with closed innovation) mediates the OI practices – IP relationship. We aim to verify Zobel and Hagedoorn's reasoning (2020, p. 407) to confirm whether firms capture value from OI by "modifying attitudes to knowledge, such that employees are no longer biased toward internal paths to knowledge

creation and commercialization, but consider external paths as equally viable alternatives."

Second, we explore the effectiveness of measures to counter NIHS and NSHS. We derive these measures from dynamic capabilities theory, which argues that extracting and transferring valid knowledge requires firms to develop knowledge-oriented capabilities (absorptive and desorptive capabilities) that transcend internal and external distinctions to understand, recombine, and transfer knowledge from outside in and vice versa (Stephen and Ferris, 2018). Organizational capabilities' can shape attitudes (Arias-Pérez *et al.*, 2017) and neutralize NIHS and NSHS (Amann, 2019).

We thus propose as research goals to: (1) expand the growing literature on the OI – IP relationship in the financial context; 2) deepen understanding of overcoming NIHS and NSHS as mediating variables to make OI work, advancing understanding of the conditions under which OI fails in financial firms; and (3) provide effective strategies to mitigate these syndromes' effects on the OI – IP relationship. We model dynamic absorptive and desorptive capabilities as moderating variables that enhance the effect of overcoming syndromes on the OI – IP relationship.

This empirical study could help financial sector managers adopt effective behaviors to influence employees' positive workplace actions and emotions. To do so, it is organized as follows. First, we review the literature on the model variables—OI and IP, the syndromes, dynamic capabilities—and present the hypotheses composing the proposed model. Next, we present the methodology, results, and analysis of the results. Finally, we discuss the results, their implications, the study's limitations, and future lines of research.

2. Conceptual background and hypotheses

2.1. OI and IP

The three main OI activities in use are outside-in activities, inside-out activities, and coupled activities (Gassmann and Enkel, 2004). While outside-in (or inbound) activities seek knowledge from external partners (customers, suppliers, competitors, etc.), inside-out (or outbound) activities seek to exploit the firm's internal ideas outside the firm, through licensing, sale of knowledge, etc. (Lichtenthaler and Ernst, 2009). Coupled activities are inbound *and* outbound, seeking to interpret collaboration between actors in the OI process (Gassmann and Enkel, 2004). The openness – IP relationship depends on both the specific practice of OI considered here and the context—firm, industry, geographical (Zobel and Hagedoorn, 2020)—of the organization committed to innovation.

Although the relationship between these dimensions and IP is key to analyzing innovation, studies reach disparate conclusions. Spithoven *et al.* (2011) and Suh and Kim (2012) show no effect of these dimensions on IP or substitutability between internal and external openness (Knudsen and Mortensen, 2011). Other studies show that performing more external R&D activities reduces firms' IP (Garriga *et al.*, 2013). Still others find negative effects from the cost of seeking external knowledge sources (Laursen and Salter, 2006) and organizational attitudes toward OI (Lichtenthaler and Lichtenthaler, 2010).

Multiple studies identify factors hindering OI. For Gao *et al.* (2020), OI's advantages bring disadvantages. Some organizations fail when implementing OI, requiring further

study of related limitations and barriers. Milan *et al*. (2020) propose three types of contingencies impeding OI: *organizational* (e.g., absorptive capacity and complementary assets; firm size (D'Este *et al.,* 2014), location, ownership (Chen *et al.,* 2020); insufficient resources (Kim and Ahn, 2019)), *technical* (characteristics of technologies and R&D intensity (Marullo *et al.,* 2020)), and *relational* (e.g., partner alignment (Zacharias *et al.,* 2020), partners' cultural/cognitive differences, contractual problems (Marullo *et al.,* 2020)). Among organizational contingencies, Lüdecke *et al.* (2020) demonstrate that formalization hinders inside-out OI. Their argument extends Kim and Ahn's (2019) argument that structural setting constitutes an internal OI barrier. D'Este *et al.* (2014) propose financial constraints, knowledge shortages (insufficient qualified personnel, insufficient information on technology, inadequate appropriation mechanisms), and market uncertainties as barriers to OI. Mergel (2018) identifies legal barriers, uncertainty about process and outcomes, technological barriers to designing crowdsourcing processes, and, most importantly, cultural factors preventing or delaying OI adoption decisions (type of agency, political context, acceptance of external innovations, insufficient top-management support, buy-in). For Badir *et al*. (2020), organizations' failure to understand employee-level limits of openness prevents them from benefitting from OI. In a recent special issue on internal barriers to OI, De Faria *et al*. (2020) observe that employee resistance to OI practices is an important internal barrier, but not the only one. Our literature review reinforces this observation.

Among studies analyzing factors contributing to successful OI, Lazzarotti *et al.* (2017) provide empirical evidence of organizational-managerial mechanisms' role in promoting OI performance. Bagherzadeh *et al.* (2020) demonstrate that internal practices such as knowledge sharing mediate the OI – OI performance relationship. Other mediators

verified in research are systematic knowledge management and entrepreneurial orientation (Kim and Ahn, 2019). For D'Este *et al*. (2014), human capital is key to mitigating OI barriers. Kim and Ahn (2019) highlight the importance of minimizing internal resistance to OI (to NIHS and NSHS) through an OI-friendly climate. We follow this reasoning and argue that overcoming NIHS and NSHS is a necessary condition to benefit from OI. While aware that other factors influence the OI – OI performance relationship, we argue that transforming negative attitudes related to closed innovation enables effective OI implementation for two reasons. First, OI's success depends largely on developing a culture that overcomes NIHS and NSHS (Bogers *et al.,* 2019). That is, transitioning from closed to open innovation requires transforming negative attitudes toward knowledge into positive ones (overcoming NIHS and NSHS). Second, recent literature calls for fuller understanding of "the human side of OI" (Bogers *et al.,* 2019; Gao *et al.,* 2020).

2.2.Not-Sold-Here Syndrome and Not-Invented-Here Syndrome

Many specialized studies identify employee attitudes that limit innovation's effect on organizations (Clagett, 1967; Katz and Allen, 1982; Cohen and Levinthal, 1990; Menon and Pfeffer, 2003; Michailova and Husted, 2003). These attitudes emerge in knowledge exchange with external agents (suppliers, clients, public organizations, etc.) due to employees' reluctance to acquire or exploit external knowledge (Burcharth *et al.*, 2014). Research shows these attitudes to be motivated by cultural and organizational tensions that arise when companies begin to interact with external partners (Van de Vrande *et al.*, 2009), due to negative attitudes to such interaction in knowledge transfer (Antons *et al.*, 2017). Although numerous studies analyze OI, limited research examines these syndromes (Hussinger and Wastyn, 2016).

Only recently have studies begun identifying NIHS and NSHS as factors negatively limiting firms' implementation of OI strategies (Burcharth *et al.*, 2014). We identify two main trends in NIHS and NSHS research. For Burcharth *et al.* (2014), some studies find employees unwilling to collaborate (Michailova and Husted, 2003; Mortara and Minshall, 2011); others document overly positive attitudes toward knowledge insourcing (Menon and Pfeffer, 2003; Menon *et al.*, 2006). Both extremes can hinder organizations' knowledge management. Refusal to acquire knowledge from outside the organization can prevent companies from benefitting from this knowledge. However, excessive tendency to view all external knowledge as beneficial prevents development of internal knowledge, keeping that knowledge inside the company. Analyzing this dual trend of syndromes, Lichtenthaler *et al.* (2006) integrate negative and overly positive trends into companies' knowledge management, identifying six attitudes: internal and external knowledge acquisition, internal and external knowledge accumulation, and internal and external knowledge exploitation. A company's strategy of acquisition, accumulation, and exploitation of knowledge—internal or external—depends on employees' attitudes and presence/absence of a syndrome in the strategy adopted: NIHS vs. Buy-In Syndrome for knowledge acquisition; All-Stored-Here vs. Relate-Out Syndrome for knowledge accumulation; and Only-Used-Here vs. Sold-Out Syndrome for knowledge exploitation (Lichtenthaler *et al.*, 2006).

NIH was initially considered a negative attitude, with "syndrome" (coined by Clagett in 1967) connoting a serious problem or disease. Not until 1982 did Katz and Allen use NIHS to refer to a non-ideal situation, "a profound attitude-based bias toward knowledge (ideas, technologies) derived from a source or contextual background that is considered

outside or external to the perspective of the individual" (Antons and Piller, 2015, p. 194). Although these authors focus on individuals, they identify habits and connotations in the individual, social, and cultural environment that lead individuals to reject everything not created in the organization. NIHS and NSHS differ in what employees reject—acquisition of knowledge from outside the organization (outside-in) vs. exploitation of internal knowledge outside the organization (inside-out) (Burcharth *et al.*, 2014). NIHS is associated with the former (negative attitude toward acquiring external knowledge) (Katz and Allen, 1982) and NSHS with the latter (negative attitude toward exploiting internally generated knowledge outside the organization) (Chesbrough *et al.*, 2006).

Van de Vrande *et al.* (2009) and Mortara and Minshall (2011) show that organizational and cultural issues are the first obstacles to applying OI-related strategies when organizations interact externally. This is where NIHS and NSHS shape employees' ability to adopt positive and/or negative attitudes that determine construction of learning. Our study analyzes the effect of overcoming NIHS and NSHS on OI.

Many articles examine the moderating role of capabilities in OI (Lichtenthaler, 2009; Bianchi and Lejarraga, 2016; Roldán Bravo *et al.*, 2016; Wang *et al.*, 2017; Zobel, 2017) but not capabilities' moderating role in mediation of overcoming syndromes that affect the OI – IP relationship (how capabilities help overcome these syndromes). We chose both capabilities because openmindedness constitutes the microfoundations of both absorptive and desorptive capabilities (Zobel and Hagedoorn, 2020). Our dynamic capabilities perspective can transform negative attitudes to OI, a perspective Zobel and Hagedoorn (2020) recognized as valuable for future research.

2.3. Absorptive and Desorptive Capability

The literature recognizes the importance of dynamic capabilities in facilitating inter-organizational knowledge flow (Lichtenthaler and Lichtenthaler, 2009; Cheng and Chen, 2013). Lichtenthaler (2016) and Fisher and Qualls (2018) identify three sequential processes that influence pre-existing knowledge related to a firm's ability to use external knowledge: knowledge exploration (acquisition of external knowledge), knowledge retention (maintenance of this knowledge over time), and knowledge exploitation (application of acquired knowledge). These capacities enable organizations to transfer and manage external knowledge, and include the absorptive and desorptive capacity of each member in the relationship (Roldán Bravo *et al.*, 2016).

Desorptive capacity is key to external exploitation of organizational knowledge (Lichtenthaler, 2007). It enables inter-organizational knowledge transfer. Organizations have desorptive capacity when they can identify opportunities to exploit and transfer knowledge effectively (Lichtenthaler and Lichtenthaler, 2009). Hu *et al.* (2015) identify desorptive capacity as a dynamic capability composed of sensing, seizing, and transforming capabilities. Defined as "the firm's ability to externally exploit knowledge" (Lichtenthaler and Lichtenthaler, 2009, p. 1322), desorptive capacity has two phases: identification of knowledge transfer opportunities while protecting organizations' core proprietary knowledge; and knowledge transfer and facilitation of recipients' application of that knowledge (Ziegler *et al.*, 2013).

Desorptive and absorptive capacity are two sides of one coin (Dell'Anno and Del Giudice, 2015). Absorptive capacity is an organization's ability to recognize, assimilate, transform, and exploit knowledge (Cohen and Levinthal, 1990; Zahra and George, 2002). Based on

Cohen and Levinthal's (1990) components, Zobel's (2017) model identifies three measures of absorptive capacity. Recognition capacity explores, identifies, and values external knowledge resources. Assimilation capacity analyzes, processes, and diffuses external knowledge. Exploitation capacity determines applications of assimilated knowledge resources, and refines, extends, and leverages existing competences (Zobel, 2017). Organizations that develop sufficient absorptive capacity generally apply knowledge effectively (Tranekjer and Knudsen, 2012; Wagner, 2012; Tavani *et al.*, 2013). In the OI context, absorptive capacity is crucial to facilitating transfer of knowledge from outside the organization.

According to dynamic capabilities theory, firms' prosperity depends on constantly searching for (sensing and shaping) opportunities and threats, analyzing (seizing) opportunities, and maintaining competitiveness by improving, combining, protecting, and reconfiguring the firm's tangible and intangible assets (Teece, 2007). In an OI context, these opportunities emerge through acquisition, maintenance, and exploitation of knowledge outside the organization. In outside-in innovation activities, mere exposure to external sources does not guarantee internal knowledge acquisition (Wang *et al.*, 2017). For innovation practices to succeed, firms must develop and maintain their capabilities to connect external to internal knowledge (Lowik *et al.*, 2017). While absorptive capacity has received much study (Mariano and Walter, 2015), desorptive capacity is a more recent concept that emerged with the OI literature (Stephen and Ferris, 2018), which uses both constructs as moderators between different fields. Absorptive capacity moderates relationships of absorbed and unabsorbed slack (Wang *et al.*, 2017) to technological and market turbulence (Lichtenthaler, 2009), as well as relationships involving IP (Zobel, 2017), among others. Research has studied the more recent concept desorptive capacity

in facilitating knowledge transfer, especially in technology licensing (Bianchi and Lejarraga, 2016).

2.4. Hypotheses

2.4.1. Mediating role of the syndromes

2.4.1.1. Mediating role of overcoming Not-Invented-Here Syndrome

In the financial services context, Martovoy (2014) demonstrates that cooperation for innovation depends on time costs associated with cooperation and bureaucracy/conflicting rules. Since banking involves frequent customer-employee interaction, profitability depends on essential employee attitudes and behaviors (Burcharth *et al.*, 2014).

NIHS limits innovation from the outside (Arias-Pérez *et al.*, 2017). Defined as "attitude-induced decision-making bias that occurs during the evaluation of knowledge from origins being external due to contextual (disciplinary) spatial, or organizational (functional) boundaries" (Antons *et al.*, 2017, p. 1228), NIHS leads employees to believe knowledge must be developed internally, to view knowledge generated within the firm as more legitimate so as not to discredit the firm's capabilities (Burcharth *et al.*, 2014). NIHS leads groups to perceive external knowledge as a factor that risks the very concept of the firm; accepting and valuing external knowledge may seem to degrade group's achievements and competence. Members reject ideas from outside the organization primarily to defend their group identity (Tajfel and Turner, 1979). NIHS is thus consistent with group favoritism; people who identify with their organization connect their self-esteem to belonging and thus to the firm's status in its environment. Ultimately, social comparison among groups can induce distinctive evaluation of the organization's identity

(Bartel, 2001). For scholars, the stronger the NIHS, the less impact inbound innovation practices have on the firm (Burcharth *et al.*, 2014).

Martovoy *et al.* (2015) show that the role of external knowledge sources in financial firms remains moderate for multiple reasons: complexity of new financial offerings, government regulation of financial services, conservatism regarding financial innovation, organizational culture, etc. Further, this sector's organizational culture is inherently conservative. Its reluctance to innovate from the outside may seek to keep knowledge away from competitors or prefer to rely on internal and semi-internal knowledge sources (i.e., bank group members) (Martovoy *et al.*, 2015). Reluctant to acquire external knowledge, employees reject it, potentially limiting the firm's innovation and diminishing its performance. NIHS thus also hinders outside-in innovation in the financial sector, and vice versa: overcoming NIHS can foster outside-in innovation. Since absence of NIHS in an organization implies positive employee attitudes toward external knowledge, banks must develop dedicated effective means to overcome these obstacles (Martovoy *et al.*, 2015) to benefit from outside-in OI.

Although extensive scholarship debates NIHS, few studies relate overcoming NIHS to innovative capability and performance (Hussinger and Wastyn, 2016; Lichtenthaler and Ernst, 2006). Since scholars argue separately that outside-in innovation and NIHS influence IP, we must explore whether absence of NIHS (avoiding or overcoming NIHS in the organization) is a positive mediating factor between outside-in innovation and IP.

H1a. Overcoming NIHS has a positive mediating effect on the relationship between outside-in OI practices and IP.

2.4.1.2. Mediating role of overcoming NSHS

NSHS is a protective attitude of reluctance to share knowledge with actors in the environment (Lichtenthaler *et al.*, 2010). A significant barrier to knowledge transfer, it blocks firms' development of OI strategies. This obstacle must be overcome with models to promote attitudinal change, especially in those who manage and intervene in knowledge transfer. NSHS's negative effects reveal the importance of organizational cultures that prioritize values of openness to teamwork and exchange of information/knowledge. Knowledge work is inherent to organizations, and all organizations seek to develop innovation management capabilities. The firm's strategy must be supported by flow and exchange of knowledge with customers (as in the financial sector), commercialization of copyright, and sale of technologies requiring transfer of specific knowledge to users (Tranekjer and Knudsen, 2012). The emergence of NSHS follows dynamic capabilities theories that protectionist attitudes can distort employees' exploitation of external knowledge, hindering transfer of knowledge outside the organization (Lichtenthaler *et al.*, 2010).

In the financial sector, the greatest obstacle to accepting a model of OI is, however, the operation's cost. OI involves not only cost, but an almost superhuman effort to exchange knowledge successfully with external agents (Martovoy *et al.,* 2015). Other obstacles in the literature are organizational resistance at the bank, fear of losing control over proprietary knowledge or solutions, and bureaucracy and conflicting rules among partners, which can hamper external knowledge use. Fear of cannibalization of existing products and services can also inhibit use of external knowledge sources (Martovoy *et al.*, 2012). These obstacles are associated with employees' reluctance to sell new products to the market that have not been developed internally and thus with failure to exploit synergies offered by external partners. NSHS thus hinders implementation of outbound

OI activity and vice versa; overcoming NSHS fosters inside-out innovation. Absence of organizational NSHS implies employees' willingness to transfer internal knowledge to external knowledge sources.

Our study analyzes absence of NSHS as a positive mediator between inside-out OI and performance.

H1b. Overcoming NSHS has a positive mediating effect on the relationship between inside-out OI practices and IP.

2.4.2. Moderating role of absorptive and desorptive capacity

2.4.2.1. Moderating role of absorptive capacity

Confronting NIHS explains the relationship between outside-in OI and innovative performance (Arias-Pérez *et al.*, 2017). Antons and Piller (2015) present two possible solutions to mitigate NIHS: changing negative attitudes towards external ideas and creating de-biasing mechanisms to prevent negative attitudes from influencing behavior. Amann (2019) suggests the need for new abilities. Following these proposals, with Arias-Pérez *et al*. (2017), we propose that the set of abilities constituting absorptive capacity strengthens the positive effect of overcoming NIHS and enables firms to benefit from OI.

Firms' level of various dimensions of absorptive capacity (recognition capacity, assimilation capacity, exploitation capacity) enable and condition the degree to which they capture value from outside-in OI activities. First, recognition capacity is an antecedent in the relationship between access to external resources and performance. Strong recognition capability, characterized by high learning orientation, motivates and enables organizations to acquire new external knowledge (Jansen *et al.,* 2005). In the financial sector, market research early in new process development is crucial to successful

new financial offerings (Martovoy *et al.*, 2015). However, firms cannot benefit from outside-in OI alone (Zobel, 2017). Assimilation capacity is needed to translate externally accessed resources into exploitable knowledge within the firm. The assimilation component of absorptive capacity is especially important in differentiating successful from unsuccessful outside-in OI firm activities (Zobel, 2017). Finally, since high exploitation capacity is positively related to competitive advantage in IP (Zobel, 2017), the exploitation capabilities composing absorptive capacity likely influence firm performance through product and process innovation (Zahra and George, 2002).

Other authors demonstrate that absorptive capacity influences the OI – performance relationship. Jasimuddin and Naqshbandi (2019) stress firms' effectiveness in acquiring new knowledge and ideas from external sources, arguing that absorptive capacity enhances outside-in OI. Similarly, Cassiman and Veugelers (2006) find that acquiring external know-how increases IP significantly only when firms simultaneously pursue internal R&D.

Absorptive capacity pressures and molds employees' perception of outside knowledge, even aligning that knowledge with organizational aims to demand maximum use of this resource (Arias-Pérez *et al.*, 2017). In such situations, employees are more willing to act without bias towards outside knowledge; they believe the knowledge does not jeopardize their personal interest (Arias-Pérez *et al.*, 2017). Absorptive capacity is thus essential to effective knowledge acquisition, which helps to overcome the NIHS associated with inbound OI practices. The mediated effect is stronger at different levels of absorptive capacity.

H2a. Absorptive capacity moderates the mediating effect of overcoming NIHS on the relationship between outside-in OI practices and IP. Specifically, the indirect effect is stronger when absorptive capacity is high rather than low, and the moderating effect occurs between overcoming NIHS and IP.

2.4.2.2. Moderating role of desorptive capacity

When employees lack sufficient knowledge of external partners and markets whose knowledge they exploit (Greco *et al.*, 2019), they may not trust external partners and may develop NSHS, becoming reluctant to transfer knowledge. Conversely, inside-out OI requires that firms transfer knowledge safely across boundaries, an ability dependent on their desorptive capacity. Desorptive capacity impacts the flows of both people and knowledge that enable OI (Hong *et al.*, 2018), enhancing employees' willingness and ability to engage in inside-out OI.

This capability helps both to identify the firm's knowledge transfer opportunities and to perform the transfer without undermining the firm's competitive advantage (Lichtenthaler and Lichtenthaler, 2010; Ziegler *et al.*, 2013). Desorptive capacity leads employees to adopt behaviors for safe open knowledge transfer across boundaries, "systemizing their approach to inside-out transfers" (Greco *et al.*, 2019, p. 5). We focus on how organizational desorptive capacity influences employees' perceptions of externally exploited internal knowledge, enhancing their ability to overcome bias against knowledge transfer. Exploitation of knowledge requires desorptive capacity to strengthen the influence of overcoming the NSHS associated with inside-out OI practices. The mediated effect's strength varies with the level of desorptive capacity.

H2b. Desorptive capacity moderates the mediating effect of overcoming NSHS on the relationship between inside-out OI practices and IP. Specifically, the indirect effect is stronger when desorptive capacity is high rather than low, and the moderation effect occurs between overcoming NSHS and IP.

Figure 1 presents the conceptual framework, proposing the mediating effect of overcoming NIHS and NSHS on the relationship between OI practices and IP. We introduce dynamic capabilities (absorptive and desorptive capacity) to analyze these capabilities' moderating role in enhancing the positive effect of overcoming the syndromes on the OI – IP relationship.

Figure 1 here

3. Method

3.1 Sampling and data collection

To test these hypotheses, an empirical study was conducted with data gathered by surveying employees of major bank entities in Spain. The questionnaire was designed by a research team and tested initially by university research and bank experts. The pilot test enabled revision of item wording and survey structure.

The study population was obtained from the Bank of Spain (132 bank entities). A database was created with each entity's branch offices, yielding a population of 28,959 branch offices. From this population, we chose 1500 banks through simple random sampling and visited them to present the study and identify and survey respondents.

Research team assistants collected employees' completed questionnaires from the offices. We gathered 288 questionnaires from 72 branch offices of 13 bank entities. After evaluating these questionnaires for inconsistent responses, we obtained 274 usable questionnaires, yielding a response rate of 18.26%.

Table I displays the sample characteristics.

Table I here

3.2 Measures

Dimensions of OI

OI was measured following the scale from Cheng and Huizingh (2014). The final OI activities scale contained 9 items representing 2 dimensions (outside-in activities: 5 items; inside-out activities: 4 items). Survey respondents indicated their degree of agreement/disagreement with the statements on a 5-point Likert scale (1=totally disagree, 5=totally agree). For outside-in OI, one item was deleted because of low factor loadings.

OI capabilities

Absorptive capacity

Absorptive capacity was assessed through 10 items constructed from theoretical discussion in Zahra and George (2002) and Hurmelinna-Laukkanen and Olander (2014). Each item was measured on a 7-point Likert scale that assessed respondents' perceptions of their branch's inclination to acquire and use knowledge, an approach Kumar *et al*. (1993) confirm to be useful.

Desorptive capacity

Desorptive capacity was assessed through 8 items constructed using scales by Hoegl *et al.* (2011) and Roldán Bravo *et al.* (2016). Survey respondents indicated their degree of agreement/disagreement with the statements on a 7-point Likert scale (1=totally disagree, 7=totally agree). One item for desorptive capacity was removed due to low factor loadings.

Overcoming NIHS and NSHS

Overcoming NIHS and NSHS was assessed by adapting the scale by Burcharth *et al.* (2014) measuring overall level of employees' attitude to knowledge. Responses were measured on a 5-point Likert scale. The overcoming NIHS scale contained 3 items on positivity of employees' attitudes toward external knowledge. The overcoming NSHS scale contained 4 items assessing willingness to transfer internal knowledge to external sources. One item of NSHS was removed due to low factor loadings.

Innovation performance

We measured IP with scales used in Cheng and Huizingh (2014). These scales measure new service innovativeness through 4 items (Salomo *et al.*, 2008) and new service success through 6 items (Baker and Sinkula, 1999). Employees' responses were recorded on a 5-point Likert scale measuring degree of agreement/disagreement with the statements. One item of new service success was deleted due to low factor loadings.

Control variables

To account for the effect of external variables, firm size, bank entity to which they belong and technological market turbulence were included. Respondent characteristics were

assessed by age, sex, experience, education,. The literature generally asserts a positive relationship between firm size and innovation (Huang *et al.,* 2015) and influence of market and technological turbulence on innovation-related performance (Cheng and Huizingh, 2014). We included experience because tenured professionals seem more prone to NIHS (Katz and Allen, 1982).

3.4 Reliability and validity

After analyzing each scale's one-dimensionality and internal consistency individually, we performed confirmatory factor analysis using EQS 6.2 software. Covariance-Based SEM with EQS 6.2 software has unique capability to handle non-normal variables, compute multivariate Lagrange multiplier and Wald tests, and estimate measurement model reliability (Narayanan, 2012).

The factor loadings, all are highly significant and above the normally accepted minimum of 0.4 (Nunally, 1978). We then confirmed internal consistency through Cronbach's alphas (see Table II) and calculated average variance extracted (minimum recommended value 0.5). All scales fulfill acceptable limits, indicating a good measurement model. All indicators of the scales' goodness of fit were tested by analyzing absolute and incremental goodness of fit and model parsimony. The indicators were recommended acceptable levels (Hair *et al.*, 1998).

Finally, we studied the scales' discriminant validity by analyzing whether the square root of the AVE for each construct was larger than its correlations with all other constructs (see Table II) (Fornell and Larcker, 1981).

Table II here

Following Armstrong and Overton (1977), we assessed non-response bias in the sample, comparing early and late respondents. Comparison (early respondents=82; late respondents=184) indicated no systematic non-response bias in the survey data (p=0.05).

4. Results

Hypothesis testing examined two nested models. First, we performed mediation analysis following Preacher and Hayes' (2008) bootstrapping procedure to estimate the indirect effect (H1). Second, we conducted moderated-mediation analysis with Preacher *et al.*'s (2007) bootstrapping procedure to test the proposed conditional indirect effects (H2). Bootstrapping implies resampling with replacement. Sampling distribution of the indirect effect can be used to build confidence intervals. Confidence intervals that exclude zero demonstrate significant indirect effects (Shrout and Bolger, 2002). Analyses were conducted using PROCESS for SPSS (Hayes, 2013). Although hypotheses on direct effects from the moderated-mediation models were not proposed, product terms were mean-centered to better interpret direct effects in these models.

H1a proposed an indirect effect of overcoming NIHS on the relationship between outside-in OI and IP. The findings show a significant direct effect of outside-in OI on overcoming NIHS (a=0.347, p<0.000), a direct effect of overcoming NIHS on IP (b effect=0.21, p<0.000), and an indirect effect through overcoming NIHS (indirect effect=0.0727, CI_{95}=0.0405, 0.115). The remaining direct effect of outside-in OI on IP (c′ effect=0.1098, p<0.003) indicates partial mediation, as the outside-in OI – IP path remains significant.

H1b predicted an indirect effect of overcoming NSHS on the relationship between inside-out OI and IP. This hypothesis was supported, showing significant indirect effects. We

find a significant direct effect of overcoming NSHS on inside-out OI (a=0.46, p<0.000), a direct effect of overcoming NSHS on IP (b effect=0.08, p<0.05), and an indirect effect through overcoming NSHS (indirect effect=0.0396, $CI_{.95}$=0.0017, 0.0849). As in previous studies, these results suggest (c´=0.1596, p<0.003) partial mediation (Baron and Kenny, 1986).

Tables III and IV present the results of the mediation analysis to test the hypotheses.

Table III here

Table IV here

H2a predicted that absorptive capacity would moderate the indirect effect from H1a, such that high absorptive capacity produces a stronger indirect effect. H2a was supported, with significant interaction terms in the moderated-mediation models. We find a significant positive interaction term in the overcoming NIHS – IP path (effect=0.115, p<0.036). Additionally, the index of moderated-mediation indicates that any two conditional indirect effects defined by different values of overcoming NIHS are statistically different (index=0.0382, CI_{90}=0.0003, 0.0772). Comparing the mediation and moderated-mediation models indicates that they explain additional variance in IP (ΔR^2=0.029).

Table V and Figure 2 illustrate these moderated indirect effects through changes in absorptive capacity level for IP. The higher the absorptive capacity, the more significant and stronger the positive indirect effects.

Table V here

H2b predicted that desorptive capacity would moderate the indirect effect from H1b, such that high desorptive capacity produces a stronger indirect effect. H2b was supported with significant interaction terms in the moderated-mediation models. We obtain a significant

positive interaction term in the overcoming NSHS – IP path (effect=0.079, p<0.052). Additionally, the index of moderated-mediation indicates that any two conditional indirect effects defined by different values of overcoming NSHS are statistically different (index=0.0414, CI_{95}=0.0009, 0.0875). Comparing the mediation and moderated-mediation models explains additional variance in IP (ΔR^2=0.027).

Table VI and Figure 3 illustrate these moderated indirect effects through changes in desorptive capacity level for IP. Low and medium levels of desorptive capacity have a non-significant indirect effect, while high levels of desorptive capacity have significant and increasingly strong positive indirect effects.

Table VI here

The results indicate that the indirect effect on the relationship between both dimensions of OI and IP is conditional upon absorptive and desorptive capacity, such that higher levels of both capacities increase the indirect effect.

Figure 2 here

Figure 3 here

4.1. Robustness and additional checks

Further checks assessed stability of our findings and model consistency. Inconsistency is the main threat to endogeneity (Antonakis *et al*., 2014). First, measurement errors can cause endogeneity. All model scales presented alpha coefficients above 0.70, indicating little or no measurement error (Davis *et al*., 2002). Second, common method bias, a potential source of inconsistency due to measurement error (Antonakis *et al*., 2014), is not a concern here. We performed Harman's single-factor test (Podsakoff *et al*., 2003),

loading all variables in the exploratory factor analysis and constraining the number of factors to 1. The first component accounts for less than 49% of all variables, discounting common method variance problems.

Second, traditional management approaches posit that firms' strategies drive choice and relevance of data, not vice versa (Gnizy, 2020). To eliminate reverse dynamics in our model, we tested the model's robustness by estimating two alternative/competing models. In the first, a moderated-mediation model, we tested whether the indirect effect of overcoming NIHS and NSHS on IP through OI practices was moderated by absorptive and desorptive capacities. Moderation occurred between OI practices and IP. Tables VI and VI show the results of the index of moderated mediation for this first alternative model (Alternative Models 1a and 1b). The point estimates of this index are 0.0345 and 0.0389 for Models 1a and 1b, respectively, with 95% bias-corrected confidence intervals (Model 1a: -0.0388, 0.1029; Model 1b: -0.0047, 0.0791). Since these confidence intervals contain zero, they show no evidence that the indirect effect of overcoming NIHS and NSHS on IP through OI practices is moderated by absorptive and desorptive capabilities. The alternative model is not preferred to our original model.

The second alternative (Model 2a and 2b) tested a moderated-mediation model to assess whether the indirect effects of overcoming NIHS and NSHS on the relationship between OI practices and IP were moderated by absorptive and desorptive capacities. Here, the moderating effect occurs between OI practices and overcoming NIHS and NSHS. Tables VI and VII present the results of the index of moderated mediation for this alternative model (point estimates for Models 2a and 2b are 0.0066 and -0.0113, respectively). Since the confidence intervals with 95% corrected-bias contain zero (Model 2a: -0.0410,

0.0604; Model 2b: -0.0362, 0.0017), we reject this alternative model and prefer our original model. We thus confirm that the indirect effect of OI practices on IP through overcoming NIHS and NSHS is moderated by absorptive and desorptive capabilities but that moderation occurs between overcoming NIHS and NSHS, and IP.

5. Discussion, implications, limitations, and future research directions.

5.1. Discussion of results

This study examined the theoretical assumption that NIHS and NSHS constitute cognitive barriers that must be eliminated for organizations to benefit from OI. Our context is the financial sector. The empirical results indicate that overcoming NIHS and NSHS at least partially explained the OI – IP relationship. This finding contrasts with prior literature arguing the direct relation between OI practices and IP (Laursen and Salter, 2006; Cheng and Shiu, 2015) as both positive (Cheng and Huizingh, 2014; Lichtenthaler, Ernst, and Hoegl, 2010) and negative effect (Fu *et al.*, 2018; Laursen and Salter, 2006). Our findings thus provide a theoretical foundation for the OI – IP relationship. Firms can capture value from OI not merely by engaging in OI activities, but by overcoming NIHS and NSHS, among other actions.

These results concur with recent research advocating dependence of the OI – IP relationship on firm-level conditions (Gesing *et al*., 2015). The results are valuable given the increased importance of syndromes for business purposes and the need to expand understanding of NIHS and NSHS and their influence on OI practices. Taken together, the results from H1a and H1b fulfill our first and second research goals. They expand the growing literature that supports the indirect relationship between OI and performance in

the financial sector context through greater understanding of the mediating role of overcoming NIHS and NSHS syndromes.

Moderating effects of absorptive and desorptive capacity were found to enhance the effect of overcoming NIHS and NSHS, respectively, on OI performance. Ours is among the first empirical studies to demonstrate neutralization of the negative effects of NIHS and NSHS. These findings contribute to literature arguing that scholars overestimate the negative effect of NIHS and NSHS on innovation results (Arias-Pérez *et al*., 2017), as these negative effects can be countered.

We demonstrate the value of developing absorptive and desorptive capacity measures to counter employee attitudes, extending research initiated by studies like Antons and Piller (2015), which theorize several solutions to neutralize these syndromes. Our findings also agree with studies arguing that higher absorptive capacity enables effective application of knowledge in the organization (Chen *et al.*, 2009; Tranekjer and Knudsen, 2012; Wagner, 2012; Tavani *et al.*, 2013). They also support Arias-Pérez *et al.* (2017) by explaining absorptive capacity's benefits for IP. This effect aligns with literature supporting absorptive capacity's role as moderator in OI practices (Wang *et al.*, 2017; Lichtenthaler, 2009; Zobel, 2017; Bianchi and Lejarraga, 2016). Finally, this result presents a way to mitigate NIHS and helps clarify the relation between inbound OI and performance (Jasimuddin and Naqshbandi, 2019; Cassiman and Veugelers, 2006). Our findings extend research on desorptive capacity (Bianchi and Lejarraga, 2016; Roldán Bravo *et al.*, 2016) by demonstrating that it moderates the indirect effect of overcoming NSHS on the relationship between inside-out OI and IP, reinforcing Amann (2019). Combined results from H2a and H2b fulfill our third research goal, providing effective strategies to mitigate these syndromes' effects on the OI – IP relationship.

5.2.Theoretical and practical implications

5.2.1. Theoretical implications

Our findings make several important contributions to the literature. First, they attempt to explain discrepancies in the sign of the OI – IP relationship (Laursen and Salter, 2006; Lichtenthaler and Lichtenthaler, 2010) by introducing overcoming NIHS and NSHS as factors enabling the relationship, in accordance with other research (Arias-Pérez *et al.*, 2017; Burcharth *et al.*, 2014). Our study thus identifies a cognitive antecedent of OI performance by demonstrating that employees' attitudes contribute to understanding variance in OI performance in the financial sector.

Second, we extend theory by considering moderators of these relationships. Few studies use comprehensive models of absorptive and desorptive capacities in OI (Jasimuddin and Naqshbandi, 2019; Martin de Castro, 2015; Meinlschmidt *et al.*, 2016; Roldán Bravo *et al.*, 2016; Whitehead *et al.*, 2016). Our findings support an integrative framework to understand OI activities and their outcomes. We build on these findings, incorporating absorptive and desorptive capacities in the OI – IP relationship, which is mediated by overcoming NIHS and NSHS. Integrating NIHS and NSHS literature with dynamic capabilities, we identify absorptive and desorptive capacities as countermeasures that enhance the impact of desirable attitudes, depending on which attitude prevails. Third, we extend OI literature in the financial sector, recognizing innovation as an important tool in new product development (Kiziloglu, 2015) and financial services' dependence on external knowledge inputs (Martovoy *et al.*, 2015).

5.2.2. Practical implications

Our study makes important contributions to financial-sector managerial practice. First, results show that a bank's embrace of OI alone is insufficient for success. Managers must realize that OI performance depends on NIHS and NSHS levels. Employees uncomfortable with OI practices may sabotage their performance. Bank managers committed to outside-in OI must prioritize counteracting employees' negative attitudes toward acquiring knowledge from external sources (NIHS). In banks more committed to inside-out OI, managers must mitigate employees' negative attitudes toward transferring knowledge to external sources (NSHS).

Moreover, we propose dynamic capabilities to enhance the effects of overcoming syndromes. Absorptive capacity can enhance knowledge acquisition and desorptive capacity as facilitators of knowledge exploitation in banks. Bank managers should develop these capacities in the organization to overcome employees' resistance to OI. As NIHS and NSHS feed employees' reluctance to accept opportunities of external access to/transfer of knowledge, we recommend that managers enhance employees' absorptive and desorptive capacity by implementing training programs to promote employees' knowledge diversity (Lowik *et al*., 2017). Knowledge diversity facilitates employees' ability to absorb and transfer knowledge and undermine NIHS and NSHS, nurturing open-mindedness. Similarly, knowledge diversity expands employees' external network diversity, developing their absorptive and desorptive capacities and inhibiting NIHS and NSHS. Practitioners should send employees with undesirable attitudes to network meetings, conferences, or trade fairs (Kraaijenbrink, 2007). External network diversity can predict employees' external knowledge exchange activities, as it represents heterogeneity of contacts with people from widely varied knowledge domains (Todorova and Durisin, 2007) outside the bank. Finally, managers must design recruitment and

selection processes to identify potential NIH and NSH attitudes and not hire the wrong people for OI in banks. Together, these considerations enable banks to optimize and benefit from their OI efforts through better IP.

5.3 Limitations and future research directions

This study's limitations suggest issues for subsequent investigation. First, the study is cross-sectional, evaluating participants in specific situations at a specific time. Future studies with longitudinal surveys could collect long-term data on organizations. Second, this study focuses on the financial sector. Alam (2012) advises replicating such studies in other financial firms and in countries with similar characteristics to contrast results. Without such study, generalizability of our findings to other industries is uncertain. Further research should analyze more varied industrial and geographical settings to extend our findings. It would also be interesting to test the effect of human resources management practices such as teamwork, sharing capability, valuing ideas and information from outside the organization, and leadership style on neutralizing NIHS and NSHS.

References

- Alam, I. I. (2012), "New service development in India's business-to-business financial services sector", *Journal of Business & Industrial Marketing,* Vol. 27 No. 3, pp. 228-241
- Amann, M. and Granström, G. (2019), "Mitigating Not-Invented-Here & Not-Sold-Here problems: leveraging external ideas through corporate innovation hubs", *working paper*, Luleå University of Technology, 5 June.
- Antonakis, J., Bendahan, S., Jacquart, P. and Lalive, R. (2014), "Causality and

endogeneity: problems and solutions", in Day, D.V. (Ed.), *The Oxford Handbook of Leadership and Organizations*, Oxford University Press, New York, NY, pp. 93-117.

- Antons, D. and Piller, F.T. (2015), "Opening the black box of "not invented here": attitudes, decision biases, and behavioral consequences", *Academy of Management Perspectives*, Vol. 29 No. 2, pp. 193-217.
- Antons, D., Declerck, M., Diener, K., Koch, I. and Piller, F.T. (2017), "Assessing the not-invented-here syndrome: development and validation of implicit and explicit measurements", *Journal of Organizational Behavior*, Vol. 38, pp. 1227-1245.
- Arias-Pérez, J., Perdomo-Charry, G. and Ráos, C.C. (2017), "Not-invented-here syndrome and innovation performance: the confounding effect of innovation capabilities as organisational routines in service firms". *International Journal of Innovation Management,* Vol. 21 No. 6, pp. 1-20.
- Armstrong, J.S. and Overton, T.S. (1977), "Estimating nonresponse bias in mail surveys", *Journal of Marketing Research*, Vol. 14 No. 3, pp. 396-402.
- Badir, Y.F., Frank, B. and Bogers, M. (2020), "Employee-level open innovation in emerging markets: linking internal, external, and managerial resources", *Journal of the Academy of Marketing Science,* Vol. 48, 891-913.
- Bagherzadeh, M., Markovic, S., Cheng, J. and Vanhaverbeke, W. (2020), "How does outside-in open innovation influence innovation performance? Analyzing the mediating roles of knowledge sharing and innovation strategy", *IEEE Transactions on Engineering Management,* Vol. 67 No. 3, pp. 740-753.
- Baker, W. E., and Sinkula, J. M. (1999), "The synergistic effect of market orientation and learning orientation on organizational performance", *Journal of*

Academy of Marketing Science, Vol. 27 No. 4, pp. 411-427.

- Baron, R., and Kenny, D. (1986), “The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations”, *Journal of Personality and Social Psychology,* Vol. 51 No. 6, pp. 1173-1182.
- Bartel, C.A. (2001), "Social comparisons in boundary-spanning work: effects of community outreach on members’ organizational identity and identification", *Administrative Science Quarterly*, No. 46, pp. 379-413.
- Bianchi, M. and Lejarraga, J. (2016), "Learning to license technology: the role of experience and workforce’s skills in Spanish manufacturing firms", *R&D Management*, Vol. 46 No. 2, pp. 691-705.
- Bogers, M., Chesbrough, H., Heaton, S. and Teece, D.J. (2019), “Strategic management of open innovation: a dynamic capabilities perspective”, *California Management Review*, Vol. 62 No. 1, pp. 77-94.
- Burcharth, A.L., Knudsen, M.P. and Sondergaard, H.A. (2014), “Neither invented nor shared here: the impact and management of attitudes for the adoption of open innovation practices”, *Technovation*, Vol. 34, pp. 149-161.
- Cassiman, B. and Veugelers, R. (2006), “In search of complementarity in innovation strategy: internal R&D and external knowledge acquisition”, *Management Science*, Vol. 52 No. 1, pp. 68-82.
- Chen, H., Zeng, S., Yu, B. and Xue, H. (2020), "Complementarity in open innovation and corporate strategy: the moderating effect of ownership and location strategies," *IEEE Transactions on Engineering Management*, Vol. 67 No. 3, pp. 754-768.
- Cheng, C.C.J. and Chen, J. (2013), "Breakthrough innovation: the roles of

dynamic innovation capabilities and open innovation activities", *Journal of Business & Industrial Marketing*, Vol. 28 No. 5, pp. 444-454.

- Cheng, C. C. J., and Huizingh, E. K. R. E. (2014), "When is open innovation beneficial? The role of strategic orientation", *Journal of Product Innovation Management* Vol. 31 No. 6, pp. 1235-1253.
- Cheng, C.C.J. and Shiu, E.C. (2015), "The inconvenient truth of the relationship between open innovation activities and innovation performance", *Management Decision,* Vol. 53 No. 3, pp. 625-647.
- Chesbrough, H. (2003), "Open innovation: the new imperative for creating and profiting from technology", *Harvard Business School Press*, Boston, Massachusetts.
- Chesbrough, H. (2006), Open innovation: a new paradigm for understanding industrial innovation. In Henry Chesbrough, Win Vanhaverbeke and Nerea San-Martín-Albizuri and Arturo Rodríguez-Castellanos *Telos* Vol. 14, No. 1 (2012) 83-101 Joel West (Eds.). Open innovation: reaching a new paradigm. Oxford University Press, USA. (pp. 1-12).
- Clagett, R.P. (1967), "Receptivity to innovation: overcoming N.I.H", *Master's Thesis,* Massachusetts Institute of Technology.
- Cohen, W. and Levinthal, D. (1990), "Absorptive capacity: a new perspective on learning and innovation", *Administrative Science Quarterly*, Vol. 35, pp. 128-152.
- Davis, P.S., Dibrell, C.C. and Janz, B.D. (2002), "The impact of time on the strategy-performance relationship: implications for managers", *Industrial Marketing Management*, Vol. 31 No. 4, pp. 339-347.
- D' Este, P., Rentocchini, F. and Vega-Jurado, J. (2014), "The role of human Capital in lowering the barriers toe engaging in innovation: evidence from the Spanish

innovation survey", *Industry and Innovation,* Vol. 21 No. 1, pp. 1-19.

- De Faria, P., Noseleit, F. and Los, B. (2020), "The influence of internal barriers on open innovation", *Industry and Innovation*, Vol. 27 No. 3, pp. 205-209.
- Dell´Anno, D. and Del Giudice, M. (2015), "Absorptive and desorptive capacity factors within university-industry relations: does technology transfer matter?", *Journal of Innovation and Entrepreneurship,* Vol. 4 No. 1, pp. 1-20.
- Fornell, C. and Larcker, D.F. (1981), "Structural equation models with unobservable variables and measurement error: algebra and statistics", *Journal of Marketing Research*, Vol. 18 No. 3, pp. 382-388.
- Fisher, G.J. and Qualls, W. J. (2018), "A framework of interfirm open innovation: relationship and knowledge based perspectives", *Journal of Business & Industrial Marketing,* Vol. 33 No. 2, pp. 240-250.
- Fu, L., Liu, Z. and Zhou, Z. (2018), "Can open innovation improve firm performance? An investigation of financial information in the biopharmaceutical industry", *Technology Analysis & Strategic Management,* Vol. 31 No. 7, pp. 776-790.
- Gao, H., Ding, X-H. and Wu, S. (2020), "Exploring the domain of open innovation: bibliometric and content analyses", *Journal of Cleaner Production,* Vol. 275, 1-16.
- Garriga, H., Von Krogh, G. and Spaeth, S. (2013), "How constraints and knowledge impact open innovation", *Strategic Management Journal,* Vol. 34 No. 9, pp. 1134-1144.
- Gassmann, O. and Enkel, E. (2004), "Towards a theory of open innovation: three core process archetypes", *Proceedings of the R&D Management Conference*, Lisbon.

- Gerstlberger, W., Kreuzkamp, M., and da Mota Pedrosa, A. (2010), "Innovation management in the German savings banks", *Innovative Marketing*, Vol. 6 No. 3, pp. 60-71.
- Gesing, J., Antons, D., Piening, E.P., Rese, M. and Torsten, O.S. (2015), "Joining forces or going it alone? On the interplay among external collaboration partner types, interfirm govern modes, and internal R&D", *Journal of Product & Innovation Management,* Vol. 32 No. 3, pp. 424-440.
- Gianiodis, P.T., Ettlie, J.E. and Urbina, J.J. (2014), "Open service innovation in the global banking industry: inside-out versus outside-in strategies", *Academy of Management Perspectives,* Vol. 28 No. 1, pp. 76-91.
- Gnizy, I. (2020), "Applying big data to guide firms' future industrial marketing strategies", *Journal of Business & Industrial Marketing,* Vol. 35 No. 7, pp. 1221-1235.
- Greco, M., Grimaldi, M. and Cricelli, L. (2019), "Benefits and costs of open innovation: the BeCO framework", *Technology Analysis & Strategic Management*, Vol. 31 No. 1, pp. 53-66.
- Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1998), Multivariate Data Analysis, *Prentice-Hall*, Upper Saddle River, NJ.
- Hannen, J., Antons, D., Piller, F., Salge, T.O., Coltman, T. and Devinney, T.C. (2019), "Containing the Not-Invented-Here Syndrome in external knowledge absorption and open innovation: the role of indirect countermeasures", *Research Policy*, Vol. 48 No. 9, pp. 1-17.
- Hayes, A. F. (2013), "Introduction to mediation, moderation, and conditional process analysis: a regression-based approach", *The Guilford Press*, New York.
- Hoegl, M., Lichtenthaler, U., and Muethel, M. (2011), "Is your company ready for

open innovation?", *MIT Sloan Management Review, Vol.* 53 No. 1, pp. 45-48.

- Hong, J. F. L., Zhaoa, X. and Snell, R. S. (2018). "Collaborative-based HRM practices and open innovation: a conceptual review", *International Journal of Human Resource Management*, Vol. 30 No. 1, pp. 31-62.
- Hu, Y., McNamara, P. and McLoughlin, D. (2015), "Outbound open innovation in bio-pharmaceutical outlicensing", *Technovation*, Vol. 35, pp. 46-58.
- Huang, H.C., Lai, M.-C. and Huang, W.W. (2015), "Resource complementarity, transformative capacity, and inbound open innovation", *Journal of Business & Industrial Marketing,* Vol. 30 No. 7, pp. 842-854.
- Huizingh, K.R.E. (2011), "Open innovation: State of the art and future perspectives", *Technovation*, Vol. 31, No. 1, pp. 2-9.
- Hurmelinna-Laukkanen, P. and Olander, H. (2014), "Coping with rivals' absorptive capacity in innovation activities", *Technovation*, Vol. 34, pp. 3-11.
- Hussinger, K. and Wastyn, A. (2016), "In search for the not-invented-here syndrome: the role of knowledge sources and firm success", *R&D Management,* Vol. 46 No. 3, pp. 945-957.
- Jansen, J. J. P., van den Bosch, F. A. J. and Volberda, H. W. (2005), "Managing potential and realized absorptive capacity: how do organizational antecedents matter?", *Academy of Management Journal*, Vol. 48, pp. 999-1015.
- Jasimuddin, S. M. and Naqshbandi M. M. (2019), "Knowledge infrastructure capability, absorptive capacity and inbound open innovation: evidence from SMEs in France", *Production Planning and Control*, Vol. 30 No. 10–12, pp. 893-906.
- Katz, R. and Allen, T.J. (1982), "Investigating the Not Invented Here (NIH) syndrome: a look at the performance, tenure, and communication patterns of 50

R & D Project Groups", *R&D Management*, Vol. 12, pp. 7-20.

- Kim, N.K. and Ahn, J.M. (2019), "What facilitates external knowledge utilisation in SMEs? An optimal configuration between openness intensity and organisational moderators", *Industry and Innovation,* Vol. 27 No. 3, pp. 210-234.
- Kiziloglu, M. (2015), "The effect of organizational learning on firm innovation capability: an investigation in the banking sector", *Global Business and Management Research: An International Journal, Vol.* 7 No. 3, pp. 17-34.
- Knudsen, P. and Mortensen, B. (2011), "Some immediate – but negative – effects of openness on product development performance", *Technovation,* Vol. 31 No. 1, pp. 54-64.
- Kraaijenbrink, J. (2007), "Engineers and the Web: an analysis of real life gaps in information usage", *Information Processing & Management*, Vol. 43 No. 5, pp. 1368-1382.
- Kumar, N., Stern, L. W. and Anderson, J. (1993), "Conducting interorganizational research using key informants", *Academy of Management Journal,* Vol. 36 No. 6, pp. 1633-1651.
- Laursen K. and Salter A. (2006), "Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms", *Strategic Management Journal*, Vol. 27 No. 2, pp. 131-150.
- Lazzarotti, V., Bengtsson, L., Manzini, R., Pellegrini, L. and Rippa, P. (2017), "Openness and innovation performance: an empirical analysis of openness determinants and performance mediators", *European Journal of Innovation Management*, Vol. 20 No. 3, pp. 463-492.

- Lichtenthaler, U. (2007), “The drivers of technology licensing: an industry comparison”, *California Management Review*, Vol. 49 No. 4, pp. 67-89.
- Lichtenthaler, U. (2009), "Outbound open innovation and its effect on firm performance: examining environmental influences", *R&D Management,* Vol. 39 No. 4, pp. 317-330.
- Lichtenthaler, U. (2010), "Technology exploitation in the context of open innovation: finding the right ‘job’ for your technology", *Technovation,* Vol. 30, pp. 429-435
- Lichtenthaler, U. (2016), “Determinants of absorptive capacity: the value of technology and market orientation for external knowledge acquisition.” *Journal of Business & Industrial Marketing,* Vol. 31 No. 5, pp. 600-610.
- Lichtenthaler, U. and Lichtenthaler, E. (2009), "A capability-based framework for open innovation: complementing absorptive capacity", *Journal of Management Studies,* Vol. 46 No. 8, pp. 1315-1338.
- Lichtenthaler, U. and Lichtenthaler, E., (2010), "Technology transfer across organizational boundaries: absorptive capacity and desorptive capacity", *California Management Review,* Vol. 53 No. 1, pp. 154-170.
- Lichtenthaler, U. and Ernst, H. (2009), "Opening up the innovation process: the role of technology aggressiveness", *R&D Management,* Vol. 39, pp. 38-54.
- Lichtenthaler, U. and Ernst, H. (2006). "Attitudes to externally organizing knowledge management tasks: a review, reconsideration and extension of the NIH syndrome", *R&D Management,* Vol. 36 No. 4, pp. 367-386.
- Lichtenthaler, U., Ernst, H. and Hoegl, M. (2010), "Not-sold here: how attitudes influence external knowledge exploitation", *Organization Science, Vol.* 21 No. 5,

pp. 955-1123.

- Lowik, S., Kraaijenbrink, J. and Groen, A.J. (2017), "Antecedents and effects of individual absorptive capacity: a micro-foundational perspective on open innovation", *Journal of Knowledge Management,* Vol. 21 No. 6, pp. 1319-1341.
- Martín-de Castro, G., (2015), "Knowledge management and innovation in knowledge-based and high-tech industrial markets: the role of openness and absorptive capacity" *Industrial Marketing Management*, Vol. 47, pp. 143-146.
- Lüdecke, S.G., Torres de Oliveira, R. and P.J. (2020), "Does organizational structure facilitate inbound and outbound open innovation in SMEs?, *Small Business Economy,* Vol. 55, pp. 1091-1112.
- Mariano, S. and Walter, C. (2015), "The construct of absorptive capacity in knowledge management and intellectual capital research: content and text analyses", *Journal of Knowledge Management*, Vol. 19 No. 2, pp. 372-400.
- Martovoy, A., Kutvonen, A., Mention, A. and Torkkeli, M. (2012) "Open innovation in banking services: advantages and disadvantage, ***ISPIM Conference Proceedings; Manchester,*** 1-21. Manchester: International Society for Professional Innovation Management (ISPIM).
- Martovoy, A. (2014). "Advantages and disadvantages of open innovation: evidence from financial services", *Innovation in Financial Services: A Dual Ambiguity,* Cambridge Scholars Publishing, Newcastle upon Tyne, pp. 259-294.
- Martovoy, A., Anne-Laure Mention, A-L. and Torkkeli, M. (2015), "Inbound open innovation in financial services", *Journal of Technology Management and Innovation,* Vol. 10 No. 1, pp. 117-131.
- Marullo, C., Di Minin, A., De Marco, C. and Piccaluga, A. (2020), "Is open innovation always the best for SMEs? An exploratory analysis at the project

level", *Creativity and Innovation Management,* Vol. 29 No. 2, pp. 209-223.

- Meinlschmidt, J. Foerstl, K. and H. F. Kirchoff. (2016), "The role of absorptive and desorptive capacity in sustainable supply management", *International Journal of Physical Distribution & Logistics Management,* Vol. 26 No. 2, pp. 117-211.
- Menon, T. and Pfeffer, J. (2003), "Valuing internal vs. external knowledge: explaining the preference for outsiders", *Management Science*, Vol. 49 No. 4, pp. 497-513.
- Menon, T. L. Thompson, H. and Choi, S. (2006), "Tainted knowledge vs. tempting knowledge: people avoid knowledge from internal rivals and seek knowledge from external rivals", *Management Science,* Vol. 52 No. 8, pp. 1129-1144.
- Mention, A.L., Martovoy, A. and Torkkeli (2014), "Open innovation in financial services: what are the external drivers?", *International Journal of Business Excellence*, Vol. 7 No. 6, pp. 530-548.
- Mergel, I. (2018), "Open innovation in the public sector: drivers and barriers for the adoption of Challenge.gov", *Public Management Review,* Vol. 20 No. 5, pp. 726-745.
- Michailova, S. R. and Husted, K. (2003), "Knowledge-sharing hostility in Russian firms", *California Management Review*, Vol. 45, pp. 59-77.
- Milan, E., Ulrich, F., Faria, L.G.D. and Li-Ying, J. (2020), "Exploring the impact of organisational, technological and relational contingencies on innovation speed in the light of open innovation", *Industry and Innovation,* Vol. 27 No. 7, pp. 804-836.
- Mortara, L. and Minshall, T. (2011), "How do large multinational companies implement open innovation?", *Technovation*, Vol. 31, pp. 586-597.

- Tavani, S., Sharifi, H., Soleimanof, S. and Najmi, M. (2013), “An empirical study of firm’s absorptive capacity dimensions, supplier involvement and new product development performance”, *International Journal of Production Research*, Vol. 51 No. 11, pp. 3385-3403.
- Narayanan, A. (2012), “A review of eight software packages for structural equation modeling”, *American Statistician*, Vol. 66, pp. 129-138.
- Nunally, J. (1978), "Psychometric theory". New York: McGraw-Hill.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y. and Podsakoff, N.P. (2003), “Common method biases in behavioral research: a critical review of the literature and recommended remedies”, *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903.
- Preacher, K. J. and Hayes, A. F. (2008), "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models", *Behavior Research Methods*, Vol. 40, pp. 879-891.
- Preacher, K. J., Rucker, D. D. and Hayes, A. F. (2007), "Assessing moderated mediation hypotheses: theory, methods, and prescriptions", *Multivariate Behavioral Research*, Vol. 42, pp. 185-227.
- Randhawa, K., Wilden, R. and Hohberger, J., (2016), "A bibliometric review of open innovation: setting a research agenda", *Journal of Product Innovation Management,* Vol. 33 No. 6, pp. 750-772.
- Roldán Bravo, M. I., Ruiz Moreno, A. and Llorens-Montes, F. J. (2016), "Supply network-enabled innovations: an analysis based on dependence and complementarity of capabilities", *Supply Chain Management: An International Journal,* Vol. 21 No. 5, pp. 642-660.
- Salampasis, D., Mention, A. and Torkkeli, M. (2015), “Human resources

management and open innovation adoption in the banking sector: a conceptual model", *International Journal of Business Excellence*, Vol. 8 No. 4, pp. 433-457.

- Salomo, S., Talke, K. and N. Strecker, N. (2008), "Innovation field orientation and its effect on innovativeness and firm performance", *Journal of Product Innovation Management,* Vol. 25, pp. 560-576.
- Schueffel, P. and Vadana, I. (2015), "Open innovation in the financial services sector: a global literature review", *Journal of Innovation Management,* Vol. 3 No. 1, pp. 25-48.
- Shrout, P. and Bolger, N. (2002), "Mediation in experimental and nonexperimental studies: new procedures and recommendations", *Psychological Bulletin*, Vol. 7, pp. 422-445.
- Spithoven, A., Clarysse, B. and Knockaert, M. (2011), "Building absorptive capacity to organise inbound open innovation in traditional industries", *Technovation*, Vol. 31 No. 1, pp. 10-21.
- Stephen, J.D. and Ferriss, A. (2018), "Absorption, combination and desorption: knowledge-oriented boundary spanning capacities", *Journal of Knowledge Management,* Vol. 22 No. 7, pp. 1425-1441.
- Suh, Y. and Kim, M.. (2012), "Effects of SME collaboration on R&D in the service sector in open innovation". *Innovation: Management, Policy & Practice,* Vol. 14, pp. 349-362.
- Tajfel, H. and Turner, J. (1979), "An integrative theory of intergroup conflict", *Organizational identity: A reader*, Vol. 56, pp. 33-48.
- Teece, D. J. (2007), "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance", *Strategic Management Journal*, Vol. 28, pp. 1319-1350.

- Todorova, G. and Durisin, B. (2007), “Absorptive capacity: valuing a reconceptualization”, *Academy of Management Review*, Vol. 32 No. 3, pp. 774-786.
- Tranekjer, T.L. and Knudsen, M.P. (2012), “The (unknown) providers to other firms’ new product development: what’s in it for them?”, *Journal of Product Innovation Management*, Vol. 29 No. 6, pp. 986-999.
- Van de Vrande, V., de Jong, J., Vanhaverbeke, W. and de Rochemont, M. (2009), "Open innovation in SMEs: trends, motives and management challenges", *Technovation*, Vol. 29, pp. 423-437.
- Wagner, S.M. (2012), “Tapping supplier innovation”, *Journal of Supply Chain Management*, Vol. 48 No. 2, pp. 37-52.
- Walter, F., Lam, C. K., Van der Vegt, G. S., Huang, X. and Miao, Q. (2015), "Abusive supervision and subordinate performance: instrumentality considerations in the emergence and consequences of abusive supervision", *Journal of Applied Psychology*, Vol. 100, pp. 1056-1072.
- Wang, Y., Guo, B. and Yin, Y. (2017), “Open innovation search in manufacturing firms: the role of organizational slack and absorptive capacity”, *Journal of Knowledge Management*, Vol. 21 No. 3, pp. 656-674.
- West, J., Salter, A., Vanhaverbeke, W. and Chesbrough, H. (2014), “Open innovation: the next decade”, *Research Policy*, Vol. 43 No. 5, pp. 805-811.
- West, J. and Bogers, M. (2017), “Open innovation: current status and research opportunities”, *Innovation: Organization & Management*, Vol. 19 No. 1, pp. 43-50.
- Whitehead, K. K., Zacharia, Z. G. and Prater, E. L. (2016), “Absorptive capacity versus distributive capability: the asymmetry of knowledge transfer”,

International Journal of Operations & Production Management, Vol. 36 No. 10, pp. 1308-1332.

- Zacharias, N.A., Daldere, D. and Winter, C.G.H. (2020), "Variety is the spice of life: how much partner alignment is preferable in open innovation activities to enhance firms´ adaptiveness and innovation success?, *Journal of Business Research,* Vol. 117, pp. 290-301.
- Zahra, S.A. and George, G. (2002), "Absorptive capacity: a review, reconceptualization, and extension", *Academy of Management Review*, Vol. 27 No. 2, pp. 185-203.
- Ziegler, N., Ruether, F., Bader, M.A. and Gassmann, O. (2013), "Creating value through external intellectual property commercialization: a desorptive capacity view", *Journal of Technology Transfer*, Vol. 38, pp. 930-949.
- Zobel, A.K., (2017), "Benefiting from open innovation: a multidimensional model of absorptive capacity", *Journal of Product Innovation Management,* Vol. 34 No. 3, pp. 269-288.
- Zobel, A.K. and Hagedoorn, J. (2020), "Implications of open innovation for organizational boundaries and the governance of contractual relations", *Academy of Management Perspectives*, Vol. 34 No. 3, pp. 400-423.