

Open and social

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Open and Social: Portraying the resilient, social and competitive, upcoming enterprise

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Abstract

Purpose – This article seeks to characterize and assess a new type of resilient, socially-conscious and competitive enterprise that simultaneously encompasses open and social innovation—aligning both business and social outcomes—and which will gain increasing importance in post-pandemic competitiveness.

Design/methodology/approach – A mixed method approach based on sequential deductive triangulation analysis (QUAN→qual) is used. First, data gathered from the Chilean innovation survey is used to quantify the percentage of firms implementing open and social innovation simultaneously, and to assess their relative performance in relation to other types of innovative firms. Second, a qualitative multiple-case study analysis reveals the perceptions of senior managers regarding the applicability of this approach in terms of building resilience and strengthening future competitiveness in line with sustainable development goals (SDGs).

Findings – Social innovation is a relatively rare event (7.2% of firms in the sample). Whilst social innovation occurs equally in monopolistic and perfectly competitive industries, our findings suggest that in order to adopt social and open innovation effectively, firms need to set entry barriers such as economies of scale. On the other hand, open innovation is a more common event (15.4% of firms in the sample), which correlates closely with absolute and relative performance indicators. Moreover, the results suggest that open innovation enables a greater understanding of societal needs, thus making social innovation more effective.

Research implications/limitations – Theoretical developments coupled with descriptive and qualitative evidence reveal the innovative capabilities that up-and-coming enterprises may possess. The findings suggest that at times of far-reaching technological, social and political change, enterprises should share some of their knowledge and resources with wider society. Only then will more equal, resilient and cohesive societies be built.

Originality/value – This article combines two seemingly unrelated literature streams (open and social innovation) in order to elucidate the enterprise of tomorrow, which will

be capable of achieving sustainable development whilst reaching high levels of competitiveness.

Keywords – social innovation; open innovation; sustainable development goals (SDGs); COVID-19 pandemic; mixed methods.

Paper type – Research paper.

Open and Social: Portraying the resilient, social and competitive, upcoming enterprise

1. Introduction

The COVID-19 crisis adds to a large number of political, economic and technological shifts that are changing society as we know it, and must therefore open up to more sustainable ways of generating value (Martí, 2018; Tisdell, 2020). The first paradigm shift starts with relatively high and sustained growth in the return of capital rate, which is much higher than economic growth. This imbalance in growth rates increases levels of income inequality, which are now converging with pre-world war levels (Piketty, 2018). Second, there are global value chains prompting the economic development of many countries (Baldwin, 2018; Opazo-Basáez *et al.*, 2021) but, at the same time, are weakening the industrial fabric of some developed nations, shifting the balance of economic forces to the East. Hence, there are increasing political demands calling for trade and migration restrictions (e.g. Brexit, Trumpism) (Guillen, 2020). Third, there is the technological change threatening to replace labor with machines: a paradigm shift that could change the way we conceive work and democracy (Marsh, 2012). Faced by these paradigm shifts, this study seeks to disclose the innovation approaches that companies need to develop in order to ensure both private returns and sustainable development goals (SDGs), including economic growth, equality and social welfare.

This study is grounded on two seemingly unrelated literature streams in order to present a new company type possessing both cooperative and social capabilities. First, open innovation is examined, which considers innovation activities as an open system rather than an internal process (Chesbrough and Appleyard, 2007). Some authors have shown that engaging in open innovation leads to the development of a dynamic understanding of firms' innovation boundaries (Laursen and Salter, 2014). This dynamic perspective enables firms to internalize new and valuable knowledge from external organizations such as externally-oriented research and development (R&D) labs (Mowery, 2009; Chesbrough, 2012), and

universities/government bodies (Bakici *et al.*, 2013). Second, social innovation is explored, which is largely implemented by hybrid organizations, i.e. private enterprises that are capable of carrying out commercial and societal missions simultaneously (Spieth *et al.*, 2019; Ambos *et al.*, 2020). Social innovation can vary from small-scale projects pursuing new ways of reducing poverty and inequality to larger-scale projects seeking to resolve the grand challenges facing humanity such as pandemics or climate change (Grodal and O'Mahony, 2017). Social innovation is therefore perfectly aligned with SDGs (Kroeger and Weber, 2014).

Here it is argued that, by combining open and social innovations, hybrid organizations will display greater social and business intelligence, which will ultimately enable them to produce real social impact. By opening up to research centers and public institutions, these hybrid organizations will gain a better understanding of social concerns, and be able to develop more effective solutions to the issues affecting society. Open innovation also allows companies to share investments in social innovations with other economic agents. This new type of enterprise is novel, and thus needs to be empirically characterized. To our knowledge, no empirical research has been conducted to date which reveals the existence of a company archetype that combines both innovation strategies (i.e. open and social innovation) in order to maintain competitiveness alongside sustainable development. Moreover, no study has thus far typified this company type by using a distinctive configurational arrangement—based on these innovations strategies—to elucidate the competitive features and actions performed by such firms in turbulent or unstable business environments, such as the Covid-19 pandemic.

To this end, this study analyzes responses to various hindsight and foresight questions (Nathan, 2004). Hindsight questions include; what percentage of these companies makes up the business fabric? In which industrial sectors are they most prevalent? And, how big are they and what is their competitive capacity to patent and export? Foresight questions include; why does the company implement its chosen innovation strategy? When does the company implement its chosen innovation strategy? And how does the chosen innovation strategy help to overcome external contingencies, build resilience and thus strengthen future competitiveness?

The above questions are answered in the case of Chile, a geographically isolated country (Vendrell-Herrero *et al.*, 2017) with high COVID-19 incidence rates and a latent need for private companies to contribute to society (Gozzi *et al.*, 2021). This analysis applies mixed methods (Lafuente *et al.*, 2019, 2021), and first examines the hindsight questions using

quantitative analysis based on a questionnaire answered by more than 1,000 innovative Chilean companies. The foresight questions are then examined using qualitative analysis based on four in-depth interviews conducted in companies displaying different combinations (i.e. configurational arrangements) of open and social innovation. As a result of these analyses, the study offers three important contributions. First, it reveals the existence, and provides the specificities, of a particular company type that is capable of combining both open and social innovation in pursuit of competitiveness and sustainable development. Second, by means of distinctive configurational arrangements, it characterizes four distinct organization types emerging from the interrelation (or absence) of open and social innovation. Third, it provides insights into how the different configurational arrangements have managed to build resilience and cope with the COVID-19 pandemic.

The article is structured as follows: Introduction; Section 2 presents the theoretical framework and sets out the theoretical expectations; Section 3 describes the method, and quantitative and qualitative design; Section 4 presents the findings; and Section 5 discusses the conclusions and their implications.

2. Theoretical framework and positioning of the study

As set out by the research objectives, two major streams of research underpin the theoretical framework of this study—open innovation and social innovation—both of which form distinctive organizational arrangements with marked strategic orientations. This section substantiates our research claims, illustrates these different organizational layouts, and defines the different company types included in analysis.

2.1. Open innovation

Open innovation has been widely acknowledged as the new imperative for organizing corporate innovation, in line with the fundamental premise that firms can improve their innovativeness, and therefore their competitive position, by establishing collaborative and interactive interorganizational arrangements with external knowledge sources (Schroll and Mild, 2011; Chesbrough and Brunswicker, 2014). This paradigm shift in innovation management theory fundamentally emerged as a response to the limitations of traditional or “closed” innovation models (i.e. internally-based R&D), which restrain firms' capacity to identify, assimilate and utilize external knowledge sources in order to develop and sustain innovation (Dodgson *et al.*, 2006; Hagedoorn and Zobel, 2015). Consequently,

within the open innovation domain, firms “open up” their innovation activity to external partners by leveraging purposeful knowledge inflow and outflow across organizational boundaries—so as to explore and capture new knowledge and technologies, and thus gain greater internal knowledge (e.g. integrating novel, external insights, approaches, ideas, concepts, designs, etc.), accelerate innovation practices/processes, increase innovation success, and consequently reap the benefits of innovation (Cassiman and Veugelers, 2006; Remneland-Wikhamn and Wikhamn, 2011; Singh *et al.*, 2019).

The widespread, global concern regarding major societal issues articulated around the SDGs set out by the United Nations (UN) has broadened the scope of open innovation research to domains beyond the innovation performance of for-profit firms by applying its principles to society's “grand challenges” (i.e. issues that are complex, systemic, interconnected and urgent) such as poverty, inequality, climate change, environmental degradation, prosperity, and peace and justice (Bogers *et al.*, 2020; McGahan *et al.*, 2020; Bag *et al.*, 2021). Such concerns disrupt traditional innovation logic by calling for multi-sector collaborative efforts, as well as for cross-cutting organizational arrangements. Arrangements that span the boundaries of private and public sectors and connect institutional fields of expertise in order to develop holistic and multi-disciplinary solutions that incorporate socio-economic considerations into the innovation process (Tunalioglu and Karatas-Ozkan, 2016; O’Shea *et al.*, 2019; Pedersen, 2020). In this regard, studies show that by including various types of partners or stakeholders with diverse knowledge and technology in open innovation initiatives—aimed at societal challenges—firms are more effective at scanning and monitoring changes in the external environment, identifying problems and assessing potential solutions from different viewpoints, which may lead to broader, longer-lasting social and economic value (Grimaldi *et al.*, 2013; Rauter *et al.*, 2019). Hence, under the open innovation lens, the development of socio-economic innovation (e.g. inclusive products, services and processes) should be undertaken in conjunction with an extensive, multi-sector stakeholder network involving both private (e.g. users/customers, employees, suppliers, competitors) and public agents (i.e. government agencies, regulators, non-governmental organizations [NGOs]), so as to better encompass the entire realm of the social and economic dimensions relating to innovative efforts (see West *et al.*, 2014; Ahn *et al.*, 2019; Garcia *et al.*, 2019).

While adopting an open innovation approach with multi-disciplinary background teams has been denoted as a well-established configuration to increase the likelihood of

successfully addressing the uncertainty and complexity of society's grand challenges (Garcia *et al.*, 2019; Rauter *et al.*, 2019; Singh *et al.*, 2019), the opening up of a firm's innovation activity creates a multitude of communication links that require real and virtual interfaces in order to liaise between internal and external activities (Bag *et al.*, 2020; Modgil *et al.*, 2021). This perspective therefore posits the need to establish an integrative technological infrastructure that allows timely access to relevant information (both inward and outward) so as to enhance innovation monitoring and alignment, reduce inter-firm friction, speed up decision making, and improve cohesion and trust (Lyu *et al.*, 2019; Galera-Zarco *et al.*, 2020; Vendrell-Herrero *et al.*, 2021). The above (i.e. as a whole) facilitates the identification and provision of a rapid and effective response to environmental changes by all the innovation network members (Cui *et al.*, 2015; Eckhardt *et al.*, 2018; Modgil *et al.*, 2020).

It is argued here that open innovation, as a whole, provides firms with the capability to "sense" the external environment to be explored in order to identify both social and market/industry demands in conjunction with private and public entities (Adamides and Karacapilidis, 2020). Firms can thus grasp and interpret complex socioeconomic phenomena from a multi-criteria viewpoint, that provides them with different perspectives on how to address such phenomena effectively. In this regard, dynamic capabilities theory (Teece *et al.*, 1997) is used as the foundation for conceptualizing firms' capacities to sense social concerns under a varied institutional lens. More specifically, the Baden-Fuller and Teece (2020) framework is employed, so sensing is depicted as a firm's cognitive process of identifying external opportunities and threats, which then become the foundation for further innovation-related decisions.

2.2. Social innovation

Social innovation has become a prominent topic of discussion in both policy and practice due to the increasing concern that new responses need to be found to deal with the pressing social challenges facing governments (Martí, 2018). Defined as the "*design and implementation of new products, processes and methods that, in a creative and sustainable manner, offer a better solution to one or several social demands*" (Unceta *et al.*, 2016, p. 193). This type of innovation differs from traditional business innovation in that the related efforts are not made imperatively for profit per se, but rather to fulfill societal needs or solve social issues (Van Wijk *et al.*, 2019; Foroudi *et al.*, 2021).

Therefore, social innovation has been widely conceptualized as an instrument capable of transforming organizations in order to improve the bottom-line result and wellbeing of society as a whole by bringing about lasting social change (Defourny and Nyssens, 2010; Phillips *et al.*, 2015). Well-known examples of social innovation can be found in the fields of microfinance (e.g. Grameen Bank), education (e.g. the Open University), environmental sustainability (e.g. emissions trading or cap and trade) and sustainable trade practices (e.g. Fair Trade Certified products), and others (Lampugnani and Cappelletti, 2017; Gupta *et al.*, 2020).

While social innovation and business innovation are motivated by different goals, both processes call for innovative answers to complex chronic, and emergent, social issues that feature substantial interdependencies between multiple systems and actors, and that have redistributive implications for entrenched interests (Grimm *et al.*, 2013; Van Wijk *et al.*, 2019). As such, developing and implementing social innovation requires collaboration across sectorial boundaries, involving public and private stakeholders (i.e. for-profit and non-profit organizations), in order to deliver on social mission goals without undermining their business performance (Acs *et al.*, 2013; Cacciolatti *et al.*, 2020). Hence, collaborative, cross-sector arrangements enable organizations to access a vast array of physical, financial and human/knowledge assets, which are crucial to ensure the availability and allocation of the resources needed to engender and maintain social innovations (Sun and Im, 2015; Cui *et al.*, 2017). In turn, effective resource orchestration enables partners to benefit from resource complementarity, thus reducing costs and sharing the risks involved in innovation among multiple stakeholders (Dentoni *et al.*, 2016; Kassem *et al.*, 2020). Altogether, social innovation transmutes existing modes whereby stakeholders collaborate and participate in innovation processes, bringing about the need to enhance levels of cross-sector strategic alignment (van de Wetering *et al.*, 2017; Marić *et al.*, 2021), foster stakeholder engagement (Herrera, 2016), establish transparent operational structures and processes (Aksoy *et al.*, 2019), create and maintain a strong organizational culture (Pittz and Intindola, 2021), and make a clear statement of intent to stimulate economic and social change among participants (Herrera, 2015).

In recent years, the dichotomy of pursuing business approaches with a social mission has given rise to a new organizational form which, as an organizational process, centers on the search for new logics and ways of creating and capturing value for both business and society; the so-called hybrid organization (Dionisio and de Vargas, 2020; Vrontis *et al.*,

2021). This emerging organization archetype focuses on the development of innovations that combine both social and business logics which, in co-creation with shareholders (i.e. business agents) and stakeholders (i.e. social agents), enables business and social value to be generated in conjunction (Bull and Ridley-Duff, 2019; Cornelissen *et al.*, 2020). From this viewpoint, in hybrid organizations, co-creation emerges as a “*process in which multiple stakeholders jointly define and solve social problems by mutually selecting and constructing resources to generate both social and economic values*” (De Silva *et al.*, 2020, p. 471). From this perspective, co-creation between multiple (both internal and external) stakeholders institutes varied and innovative ways of doing, organizing, and framing and knowing, making the hybrid organization more resilient in the face of market and societal disruptions (Bonomi *et al.*, 2021). In this respect, hybrid organizations therefore need to align their multi-stakeholder approach effectively (Zheng *et al.*, 2020) with a clear in-house orientation toward achieving profits and social objectives alike, as well as building resilience (Chui, 2020; Lee *et al.*, 2021). Despite the burgeoning research on social innovation, organizational hybridization (i.e. concurrently pursuing commercial and social outcomes), has attracted limited attention to date. Hence, this study responds to recent calls (see, for instance, Tabares, 2021; Lee *et al.*, 2021) relating to how this organizational arrangement is currently represented, and how it might influence business performance.

On the whole, it is posited here that social innovation endows firms with the capacity to “shape” social demands into new solutions (i.e. product/service, process and methods) that are capable of generating both economic and social value (Vrontis *et al.*, 2021). The study also argues that social innovation enables organizations to materialize and systematize external opportunities and demands in conjunction with a variety of private and social actors (Cacciolatti *et al.*, 2020). In this regard, on the basis of dynamic capabilities theory to develop a configurational synthetic strategy (explained in full in the next section) where social innovation—in terms of “seizing” (i.e. materializing innovations) and “reconfiguring” (i.e. systematizing new knowledge)—supplements and complements an organization’s capability to “sense” the external environment to be explored (Tabaklar *et al.*, 2021).

Figure 1 shows the proposed theoretical framework so that the constitutive concepts and interrelationships established for the study objectives can be clearly distinguished. In general, from this framework standpoint, open innovation provides hybrid (social)

organizations with interorganizational relationships between private and public stakeholders in order to identify and develop social and economic solutions.

--- Insert Figure 1 about here ---

2.3. *Configurational arrangements of innovations strategies*

As shown in Figure 2, it is argued that adopting open and social innovation allows firms to configure four distinctive organizational arrangements—distributed in quadrants I, II, III and IV—with differential strategic approaches to market and social demands. This section characterizes the different configurational options and defines the different company types arising from each configuration.

Our central argument is based on the premise that social innovation possesses differentiating features compared with other forms of innovation (Phillips *et al.*, 2015). Specifically, social innovation is the only innovation that could solve or help reduce the social challenges which are not (or not properly) addressed by existing institutions (Souza *et al.*, 2019; Van Wijk *et al.*, 2019). Even though economic development models can also help to alleviate social ills, they normally require costly welfare systems with high business and personal tax rates (Lee *et al.*, 2013). From our point of view, social innovation cannot therefore allow companies to pay lower tax rates. It can, however, enable companies to contribute equivalent or better targeted value to society via more specific projects or actions of greater interest to and potential impact on the company and community (Saji and Ellingstad, 2016; Rey-García *et al.*, 2019).

As theoretically described, interest in capturing both social and economic value has enabled the development of a new type of hybrid organization that intersects the social and economic realms, and simultaneously balances the pursuit of social and business value (Dionisio and de Vargas, 2020). A contribution is made to this type of organization by adding the need for a clear understanding of social issues by means of open innovation (García *et al.*, 2019). To present our argument, exemplary studies on social innovation focused on energy provision are used (see Maruyama *et al.*, 2007; Hiteva and Sovacool, 2017; Lorek and Spangenberg, 2019).

Building on these examples, the viewpoint adopted is that of an energy company wishing to work toward the eradication of energy poverty. This issue is rooted in the very nature of the industry (i.e. energy production and distribution) but, at the same time, has

connotations that underlie other factors such as urban demography, energy-efficient housing (infrastructure) and access to the credit/labor market, to name a few. Thus, thorough analysis of this issue requires a multidimensional/holistic approach that can only be achieved through collaboration with external agents, including for-profit and non-profit organizations, and government agencies (Rauter *et al.*, 2019; Cacciolatti *et al.*, 2020).

This study argues that a company which succeeds in combining open and social innovation is the company type that will be most capable of solving social issues and needs efficiently, and of ensuring social progress. A high percentage of these types of companies could therefore reduce social inequalities without the need for high tax rates. This company type is particularly capable of detecting socioeconomic issues in all their dimensions and complexities by using an open innovation process and looking for solutions that may help reconfigure social welfare systems. Quadrant I shows this company type, defined here as *Open and socially-conscious firms* (OSC).

The configurational model described above (i.e. including open and social innovations) puts forward two alternative strategic approaches. The first approach incorporates the ability to create new and innovative solutions to solve social issues, without, however, adopting open innovation. In this respect, the limitation lies in its incapability to understand social issues in all their dimensions. As in the previous example, the energy company could only reduce energy poverty via a positive price discrimination policy, where people at risk of social exclusion pay reduced rates (Zhang *et al.*, 2015). The company is not, however, able to prompt regulatory changes, energy-efficient housing, or funding opportunities. This company type, in Quadrant II and defined as *Closed and socially-conscious firms* (CSC) is therefore of great importance in order to mitigate social disparity. However, its lack of openness to leverage opportunities to “sense” social issues leads to organizational myopia (Swanson, 2008), which restricts its contribution to a somewhat limited number of social challenges.

Quadrant III represents a category of company that, despite opening up its innovation process to external agents, which in turn allows companies to gain a broad understanding of the environment and social issues, does not use the knowledge acquired to develop social innovations. As such, this company type generates less social value than those previously described. However, it possesses an attribute of note; the fact that being open to collaborations provides it with a broad stakeholder approach. In other words, and still in reference to the energy company example, companies described as *Open and socially-*

indifferent (OSI) do not seek to solve energy poverty, but rather develop projects in conjunction with other stakeholders (suppliers, municipalities, financial institutions, research centers, etc.) that will ultimately benefit both the company itself and its collaborators, including public companies.

Lastly, quadrant IV, *Closed and socially-indifferent firms* (CSI), exemplifies capitalist-type companies, which seeks only to maximize shareholder value (Jansson, 2005). In this company type, the stakeholder vision focuses on the owners of capital and ignores all other stakeholders, as well as society as a whole.

The configurational arrangements described in Figure 2 raise certain questions. First and foremost, assessing the representativeness of these company types in society is of great importance. In an ideal society, a high percentage of Quadrant I-type companies and low percentage of Quadrant IV-type companies would be expected. However, the type of education being offered at business schools, which prevalently focuses on business profitability, suggests that the real percentages are far from ideal.

Second, it is important to consider in which industries (i.e. industrial specificities) these company types prevail, as categorized above, and, at the same time, to distinguish their differences in size (i.e. sales and employees), absolute performance (i.e. patents) and relative performance (labor productivity and export intensity). This exercise enables the differences in social innovation performance to be compared between companies that adopt open innovation and those that do not.

Finally, the driving forces or motives leading to the implementation of social and open innovation (or their absence) need to be understood, by posing questions such as why, when, and how, in order to gain additional insights into the firm's contingencies and actions taken in relation to the chosen innovation strategy.

--- Insert Figure 2 about here ---

3. Method

3.1. Mixed method

This research uses a mixed method approach based on sequential deductive triangulation analysis (QUAN→qual) (Lafuente *et al.*, 2019, 2021). A mixed method approach is used in order to gain a deep understanding of both the economic impact and perceived potential capabilities of OSC firms. A mixed method approach to research design and enquiry goes

beyond isolated quantitative or qualitative methods as it combines the advantages of both research approaches in order to gain novel insights and understanding, which is not possible by relying on a single method (Creswell and Clark, 2017). The main benefit of this approach is to improve information accuracy and offer a more holistic perspective of the phenomenon analyzed (Bryman and Bell, 2015). This research uses secondary data collection for quantitative analysis and primary data collection for qualitative analysis. In both cases, the selected firms are representative of the wider population of innovative Chilean firms. Data triangulation is explicitly highlighted where it takes place (Denscombe, 2008; Morse and Niehaus, 2009). The use of complementary sequential qualitative analysis mainly serves to address the 'soft' components, which are key to our study, namely how OSC firms can lead a transformational change in society that brings about the coexistence of social values with private profits.

3.2. *Quantitative method*

The Chilean Innovation Survey aims to provide information on the structure of companies' innovation processes in Chile, and show the relationships between this process and companies' innovation strategies, innovative efforts, factors influencing their ability to innovate and their economic performance for the period measured. The Survey measures variables such as the innovation type (product, process, organizational, cooperative and social) in the country's different productive sectors and regions. The survey's format design and methodology comply with the general guidelines suggested by the OECD and Eurostat Community Innovation Survey (CIS), which are set out in the Oslo Manual and applied in most member countries (Opazo-Basaez *et al.*, 2022). The results and statistics can therefore be compared at international level (Cirera and Muzi, 2000). The survey's eleventh wave is used, which was conducted for the period 2017-2018 by the Chilean National Institute of Statistics. The sample is representative of the economy in terms of company size, and industrial and regional makeup. The resulting sample contains 5,961 firms.

3.3. *Qualitative method*

The qualitative analysis in this study makes use of a multiple-case study research design, deemed a valid qualitative methodology in order to gain new insights and construct new theories (Dubois and Araujo, 2007). The multiple-case study method enables different cases to be compared and contrasted, thus improving external validity (Eisenhardt, 1989; Yin,

2014). To this end, four organizations are analyzed that clearly represent the four typologies of innovative enterprises identified in the configurational arrangements; hence, the selection pursued research-specific objectives, avoiding randomness (Greene et al., 1989). Four in-depth, face-to-face interviews with senior managers were then conducted. The interviews explored respondent perceptions concerning social and cooperative innovations. Particular attention was paid on how such innovations may serve as elements of resilience and strategic constituents so as to strengthen future competitiveness. The interviews were conducted between January and February 2021. The interviews lasted between 60 and 90 minutes and were guided by three main exploratory questions—why, when and how—followed by probing questions (Urbinati *et al.*, 2020). At the beginning of the interview, senior managers were given a brief description of the theoretical framework analyzed, setting COVID-19 as the background context, so that the respondent could assess perceived applicability/value before, during and after the outbreak of the pandemic. This layout is consistent with previous research supporting the suitability of this approach (Wagner and Eggert, 2016; Morioka *et al.*, 2017).

4. Findings

4.1. Quantitative results

The quantitative analysis is descriptive. The sample's different characteristics are evaluated with regard to their adopting open and social innovation. First, it should be borne in mind that only 20% of firms in the sample perform innovation activities (1,192 out of 5,961). In this context, the prevalence of companies with both open and social innovation (as in Quadrant I, Figure 2) can be considered. The sample reveals that only 2.5% of innovative firms (30 out of 1,192 innovative companies), and only 0.5% of firms (30 out of 5,961 companies) can be categorized as OSC. This implies that OSC is a rare event. When looking at the other groups, the most prevalent is the group representing the traditional capitalist company, whose sole vocation is to maximize shareholder value. CSI firms comprise 80% of the sample (952 out of 1,162 innovative companies). The remaining 17.5% is divided between the two remaining groups. Open innovation is more prevalent than social innovation. 12.9% of companies in the sample (154 out of 1,162 innovative companies) with open innovation have not implemented social innovation, while only 4.6% of companies implement social innovation without resorting to open innovation.

The first step to investigate OSC firms is to analyze industrial heterogeneities in adopting jointly social and open innovation (e.g. Bustinza *et al.*, 2019). Table 1 shows the sample's industrial makeup. Interestingly, energy and financial industries seem to be preponderant in the small group of OSC enterprises, but only account for 27% of this company type. Other industries such as ICT, agriculture and food processing also account for a significant share of these firms (a further 27% in three industries). OSC is not specific to industries where a few firms hold a large market share (monopolistic power); OSC also occurs in perfectly competitive industries such as agriculture, food processing or ICT, to name a few.

If the analysis adopts a more global vision and adds other groups of innovative companies, the interpretation of these results can be broadened. Thus, instead of focusing on each sector's percentage within the OSC group, the OSC group's percentage within each industry can be examined. In this sense, it can be seen that the conditional probability of being OSC is 27% (3 out of 11) in the energy industry, 14% (2 out of 14) in the water distribution industry, 4.7% (5 out of 106) in the banking and finance industry, and 2.9% (4 out of 136) in agriculture. Figure 3 shows these percentages for all industries with at least one OSC firm. When other groups of companies are analyzed, it can be seen that the OSI group is especially prevalent in the R&D sector, at 67% (25 of 37) of firms. This result is interesting because it confirms that collaborative innovation occurs more frequently in knowledge-intensive industries. Companies in the CSC group are in industries with social vocation such as energy (27%) but are also widely seen in creative industries such as arts and entertainment (21%), and literature and music publishing (10%). Finally, CSI companies are especially prevalent in traditional industries such as administrative services industries (93%), transportation (89%) or metallurgy (87%).

--- Insert Table 1 and Figure 3 about here ---

The second step to investigate OSC firms is to analyze differences in intrinsic characteristics (e.g. size, productivity, internationalization, patenting). The top of Table 2 shows the mean values and t-tests for the relevant objective variables/ intrinsic characteristics. The first two variables relate to absolute size (revenues and employees), the next two are relative performance indexes (export intensity and labor productivity), and the final variable is the number of patents granted.

--- Insert Table 2 about here ---

These results provide interesting facts. First, in absolute terms, OSC firms are larger than all other company types. OSC firms have, on average, approximately 2,000 employees, which is 2.5 times larger than OSI firms, 4 times larger than CSC firms and 8 times larger than CSI firms. The initial results confirm that combining social and open innovation effectively requires a certain degree of economies of scale. Internal resources are important to raise enough funds to support social innovation and enough tacit (non-imitable) knowledge to develop open innovation projects securely.

Second, OSC firms have more patents than CSC (0.4 vs. 0.02) and CSI (0.4 vs. 0.12) firms, whose result is statistically significant at 1%, whereas OSC firms underperform in patenting compared with OSI (0.4 vs. 0.44) firms; the result, however, is not statistically significant. The second result suggests that patenting is particularly important in open innovation firms (OSC and OSI), who need protection from knowledge leaks in collaborative projects, but is not a requirement for social innovation (CSC firms hold, on average, only 0.02 patents).

Third, OSC firms export more than other company types. On average, OSC firms export 12% of their annual revenues. This higher degree of internationalization is statistically significant in relation to CSC (4%) and CSI (6%) firms, but non-significant in relation to OSI firms (9%). The idea that highly innovative firms are more internationally competitive than less innovative firms is consistent with previous literature (e.g. Altomonte *et al.*, 2013; Aquilante and Vendrell-Herrero, 2021), and highlighted here by the fact that OSC firms export more than other groups.

Finally, in terms of productivity, OSC firms perform equally as well as private-oriented corporations that implement open innovation but do not implement social innovation (0.23 vs. 0.31), and significantly outperform firms with social-oriented goals that do not adopt open innovation (0.23 vs. 0.14). Moreover, CSC firms underperform compared with CSI firms (0.14 vs. 0.27), whose result is statistically significant. Therefore, within socially-oriented firms, open innovation outperforms lack of open innovation. The same applies to non-socially oriented firms. Altogether, the results suggest that cooperative innovation is a prerequisite in order to achieve superior performance. Cooperative innovation seems to be an important booster for business competitiveness throughout innovative firms. This result is also consistent with the results on exports and patenting. Therefore, sharing knowledge resources

with other companies becomes strategic. The fact that social innovation does not enhance performance is perfectly consistent with the nature of hybrid organizations, whose vision stretches beyond shareholder return.

As a robustness test, stochastic (non-parametric) analysis was also performed to complement the t-test (stochastic) analysis. In stochastic analysis, instead of looking at the differences in mean between groups, the differences in the distributions of variables are analyzed (Cassiman *et al.*, 2010; Vendrell-Herrero *et al.*, 2021). Therefore, stochastic analysis does not require assumptions regarding the sample composition (e.g. normal distribution). Following Delgado *et al.*'s (2002) model, stochastic analysis can be divided into two parts; first, graphical analysis comparing each sample's distributions and second, the distribution equality test, also called the Kolmogorov-Smirnov test.

Figure 4 shows the graphical analysis. It can be seen that the OSC group has the lowest probability density for the low values of the variables analyzed (workers, patents, exports and productivity). This result is fully consistent with the t-test analysis in Table 2. Nonetheless, it is worth noting that OSC companies do not seem to achieve the highest values for patents, exports and productivity (achieved by OSI and CSI firms). This can be attributed to the fact that the number of observations in this group is small; just 30 observations. Even more relevant is the correspondence between the t-test and Kolmogorov-Smirnov analysis (see bottom of Table 2) where, despite some small differences, the results are qualitatively the same, providing solid robustness to the results obtained.

--- Figure 4 about here ---

4.2. Qualitative results

The qualitative results are based on in-depth interviews with four senior managers, each of whom represent one of the distinctive configurational arrangements (organization types) outlined for this study; OSC, CSC, OSI and CSI. The interviews were deliberately structured according to three key questions; "why", "when" and "how". The main characteristics of the company types analyzed and their businesses are shown in Table 3.

First, the "why" question focused on the company's motives behind implementing its chosen innovation strategy. The results obtained indicate that CSI firms (case A) are primarily guided by individualistic economic motives. In this respect, the representative CSI firms stated that their main objective behind their chosen strategy had been to increase

company profitability. The respondent reported that, in this regard, figures are what matters most in the retail industry, so the business purpose had historically been focused on maximizing individual transaction profitability in each customer segment throughout the firm's departments and divisions. By contrast, at the other extreme, OSC firms (Case D) are seen to be driven by altruistic motives alongside economic ones. In this regard, and according to the respondent, motivation comes from developing comprehensive economic and environmental solutions that have a positive impact on society and allow sustainable business development over time. As such, the company does not perceive its business in terms of profitability and solvency, but rather as a constant search for the solution to a primary need in society—energy access.

With regard to OSI firms (Case B), these companies are not driven by social benefit, but very much understand the importance of being constantly aware of both social and environmental issues in relation to their product development and company subsistence. In this respect, the respondent stated that their company's innovation approach essentially relies on the need to ensure their products meet the target market's technical and environmental regulations. Finally, CSC firms (Case C) operate on the basis of providing benefit to the community and, consequently, to society. Hence, companies focus on society as their fundamental purpose and goal. In this respect, their innovation logic centers on what the respondent described as the delivery of projects of significant benefit to the community.

Second, the “when” question was oriented toward discovering if the chosen innovation strategy had been implemented since the business' inception, or if it had evolved over the years as the result of efforts to find the most effective innovation strategy. The interview results revealed that, in the case of CSI firms, the innovation strategy had been adopted from the outset of business activity. As reported by the respondent, it was the predominant strategy in their industry and, consequently, that followed by most companies in the sector. Similarly, in the case of OSC firms, the strategy adopted had been established since the birth of the company—as a guiding philosophy. In this respect, the respondent stated that otherwise it would not have been possible to integrate all the collaborating parties in such a complex and sophisticated business environment. Conversely, in the case of OSI and CSC firms, the innovation strategy was adopted as a response to the current competitive landscape. In this respect, OSI firms were initially based on internal R&D and commercialization, but as business expanded internationally, the need arose to adapt and to start collaborating with other parties to learn about experiences and strategies, and to gain technical knowledge and

learning from other markets. In this respect, the firm's representative stated that the company would not be able to compete at the global forefront without collaborating with partners, as they are essential in order to innovate constantly on an established course. Conversely, the CSC firm started as a company that collaborated with different agents aimed at offering events and projects. However, the sector's complexity and difficulty in uniting collaborators in pursuit of the same objectives drove them to develop the proposals internally, and offer them to the community independently. On reflection, the respondent stated that incorporating different organizations (both private and public) into the development of cultural proposals is highly complex because each party has different sensibilities and prefers to develop a cultural strategy individually.

Third and finally, the "how" question aimed to discover if the chosen innovation strategy may help to overcome external contingencies, build resilience, and thus, strengthen future competitiveness. As stated, the background context of COVID-19 was set so that the respondent could make a clear distinction between before, during and after the outbreak of the pandemic. The results indicate that CSI firms are highly vulnerable to unexpected external contingencies (i.e. adverse events), especially those restraining population mobility. In this sense, the economic impact was extremely severe in the short term, which led to multiple trial-and-error strategies to ensure effective customer communication channels. Nonetheless, the company has been unable to recover its pre-pandemic levels, and so continues to implement strategies (mostly short-term) to encourage the consumption of its products. In this respect, the respondent stressed that it had been very difficult to survive the COVID-19 stampede, and that the whole industry was undergoing a restructuring process—from the bottom up. On the other extreme, this analysis showed that OSC firms, as opposed to CSI firms, managed the COVID-19 crisis in a totally different, and remarkable, fashion. OSC firms were, in particular, better equipped to withstand the impact of external contingencies due to their extensive collaboration network with other institutions (private and public agents). This allowed the firm under study to adapt its offer and, in some cases, effectively overcome the difficulties arising (e.g. electricity overconsumption). Consequently, the company managed to maintain its operations at a fairly successful level, to such an extent that the company created a new consumption-forecasting department that incorporates new factors overlooked prior to the pandemic. In this context, the respondent stated that as soon as the authorities declared the existence of COVID-19 cases in the country, the company contacted its different collaborators to design in-house (company-oriented) and external

(community-oriented) operational protocols. Similarly, in conjunction with other key partners, the company developed contingency plans, oriented toward multiple scenarios, in order to provide uninterrupted energy supply with the least possible impact on the environment.

OSI firms were significantly affected by external contingencies, which considerably undermined company competitiveness compared with previous years. In this sense, the company under study has seen a severe reduction in both its production and profits. This is mainly due to the company's incapability to access critical raw materials and gain entry to overseas markets, where the firm competes via its products: all due to the closure of borders worldwide. In this regard, the respondent stated that many collaborators, both local and foreign, had to slow down their operations or close down due to complications arising from COVID-19; this made the company restructure its partnership network so as to focus mainly on the domestic market. In conclusion, as in the case of CSI firms, CSC firms are highly vulnerable to unexpected external contingencies affecting people's mobility. The company has therefore seen its operations completely halted for a long period since it has been unable to gather people in closed spaces and/or in outdoor public spaces. This has inflicted historic losses in the industry and forced companies in the sector to reformulate their planning, design, promotion and dissemination strategies in order to keep on operating. In this respect, the respondent said that arts and culture were one of the sectors most affected by COVID-19, and that the industry is currently at a critical moment in time.

--- Insert Table 3 about here ---

5. Discussion and conclusion

This article makes important contributions to the literature on innovation by, on the one hand, integrating two different innovation orientations (i.e. open and social) in order to develop distinctive innovation-oriented configurational approaches and, on the other, by identifying and characterizing the different company types that emerge from such configurations (i.e. OSC, CSC, OSI and CSI). Seen from dynamic capabilities theory (Teece *et al.*, 1997), the results suggest that jointly adopting open and social innovation provides firms with the capacity to better "sense" their competitive environment, and hence better understand socio-economic challenges. Moreover, embracing social and open innovation in conjunction facilitates the firm's capacity to "seize" (i.e. materialize innovations) and "reconfigure" (i.e.

systematize new knowledge) innovation processes so as to create and capture value for both business and society (Tabaklar *et al.*, 2021). The findings herein have a number of important theoretical and managerial implications for researchers and practitioners.

5.1. Theoretical implications

The results reveal the existence of a company type which, by integrating both innovations (in comparison with its counterparts), effectively balances its social and economic objectives as well as its competitive capacity (Cacciolatti *et al.*, 2020; Vrontis *et al.*, 2021). In this sense, this article empirically analyzes the specificities of this company type in terms of revenues, workers, labor productivity, export intensity and patents granted in order to discover this type of organization's intrinsic characteristics. Furthermore, by using a qualitative approach structured around exploratory questions (i.e. "why", "when" and "how"), this analysis provides insight into the potential to overcome external contingencies, build resilience and, thus, strengthen future competitiveness. In this sense, the results obtained show that, compared with their counterparts, these companies; defined here as *Open and socially-conscious firms* (OSC) are better equipped to adapt to sudden changes in the environment, to adapt their business model, to innovate in convoluted times, and to maintain their objectives and socio-economic results.

5.2. Managerial implications

This study's findings reveal that companies which simultaneously integrate open and social innovation are better prepared to respond to external contingencies since they can *interpret* and *materialize* both market requirements and social needs more effectively. According to the results, this company type benefits from its wide range of collaborators in that it better withstands the impact of external disruptions and adapts rapidly to new business realms (Chui, 2020; Lee *et al.*, 2021). Innovation managers should therefore consider the joint, rather than separate, implementation of these innovations, in order to reap greater socio-economic benefits in complex environments. In this regard, this study highlights the need to cooperate with various entities (i.e. business and social agents) so as to gain a holistic perspective of commercial and social needs. This favors the development of innovations that are capable of achieving the company's commercial and social objectives (Acs *et al.*, 2013; Cacciolatti *et al.*, 2020). A key implication of this study is that organizations should not perceive social

concerns as a limitation to business performance but rather as opportunities or niches for innovation and sustainable development.

5.3. Limitations and directions for further research

Although the results offer an interesting perspective to explore innovations and their social and economic effect, this study only analyzes the adoption of such strategies, and excludes the organizational mechanisms for their successful integration. Therefore, future studies should shed light on the organizational requirements needed for the effective execution of both innovation strategies. Similarly, this research considers innovation dichotomously. This approach is widely followed in CIS-based studies (e.g. Opazo-Basaez *et al.*, 2022). However, the CIS survey alone is unable to identify innovation intensity. Future studies should make use of other data sources that can measure open and social innovation intensity, and should also depict the economic and social impact of OSC firms more clearly. Moreover, this research is cross-sectional. Subsequent research analyzing the adoption and performance dynamics of jointly implementing open and social innovation should include a longitudinal dimension consisting of both quantitative studies (e.g. panel data) and qualitative studies. Finally, this research analyzes the context of Chile. It cannot be ruled out that the dynamics of jointly implementing open and social innovation are context specific in this case. Future research on the topic should therefore employ a cross-country comparative approach.

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Figure 1: Constitutive concepts and interrelationships established for the study

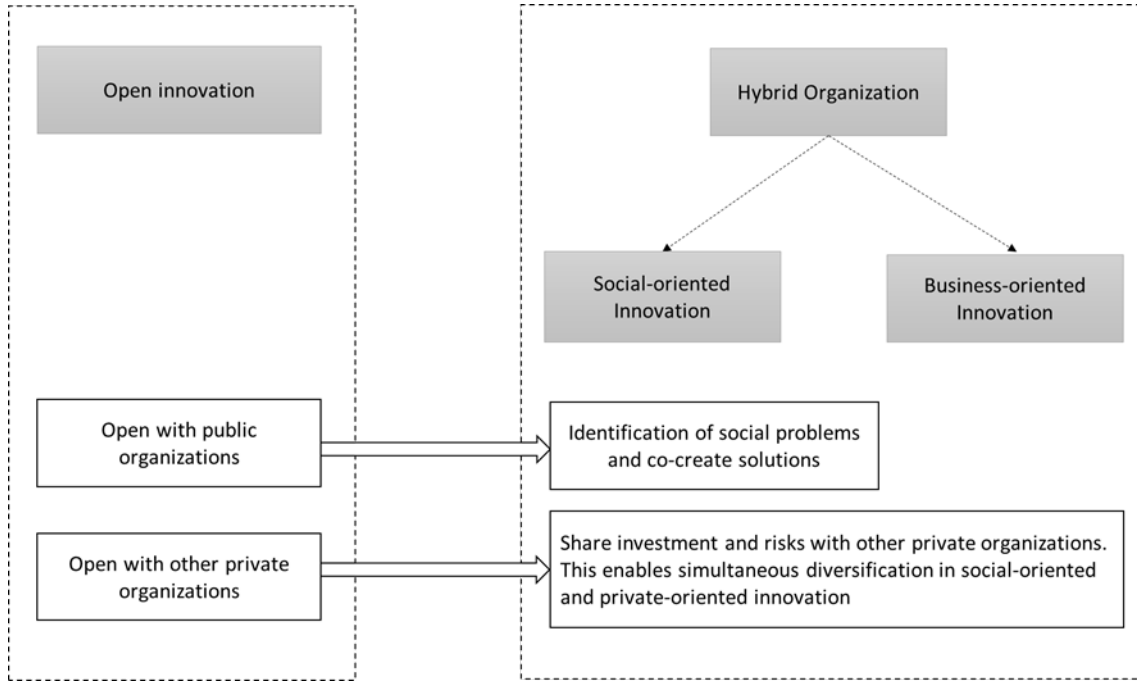
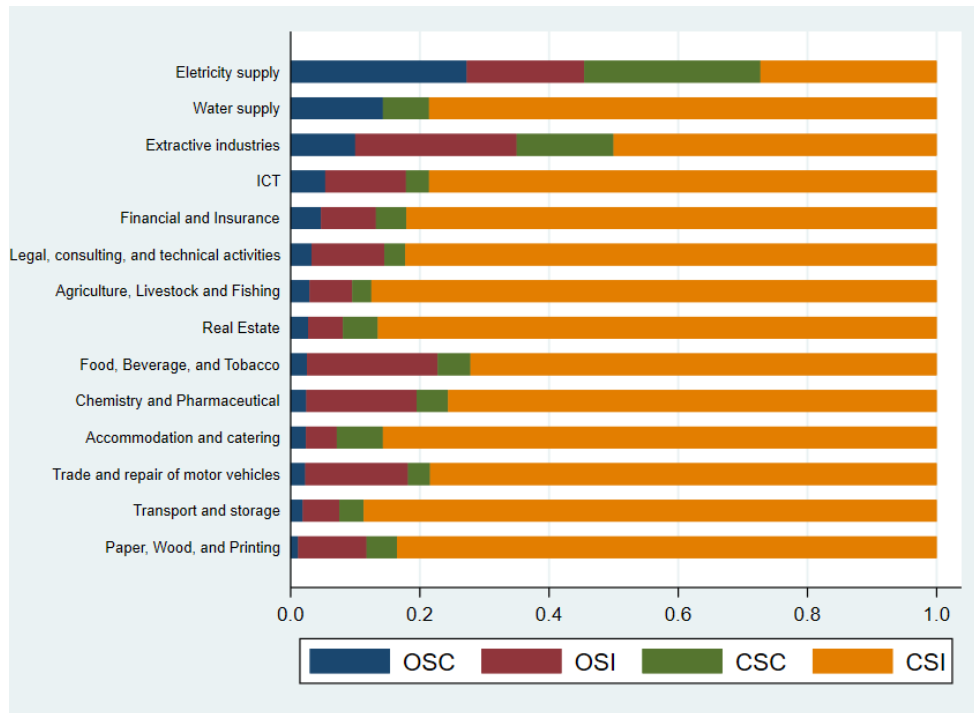


Figure 2: Configurational arrangements of innovations strategies that integrate open and social innovation

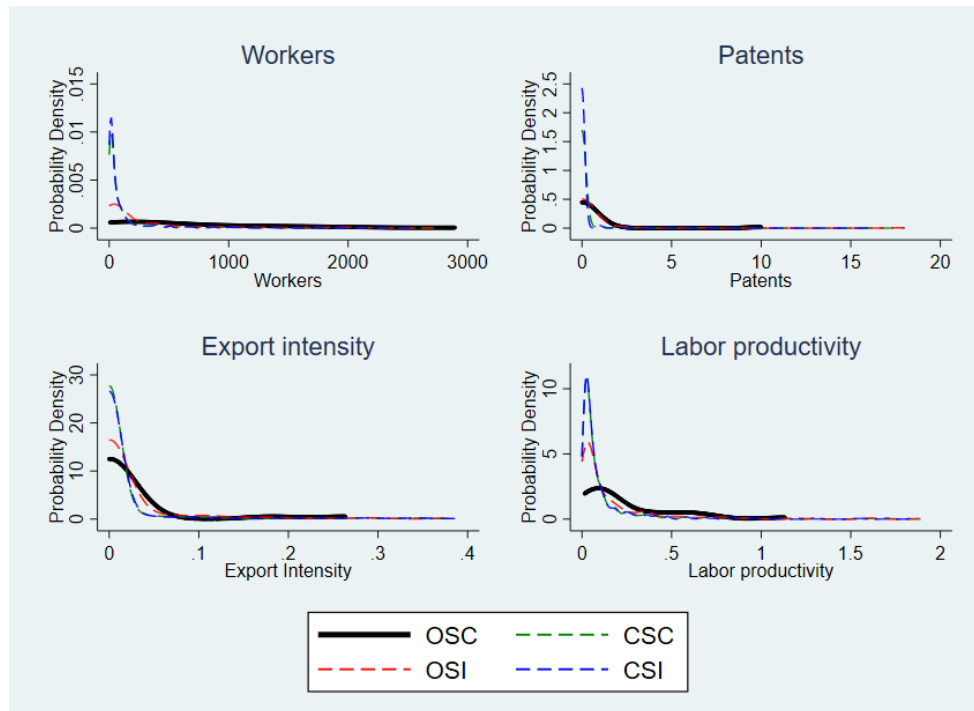
		<i>Social Innovation (Solving social needs)</i>	
		YES	NO
<i>Open Innovation (Sensing social needs)</i>	YES	Quadrant I Open and socially-conscious firms (OSC)	Quadrant III Open and socially-indifferent firms (OSI)
	NO	Quadrant II Closed and socially-conscious firms (CSC)	Quadrant IV Closed and socially-indifferent firms (CSI)

Figure 3: Clustered bar chart showing the percentage of OSC firms in selected industries.



Note: Figure 3 only includes industries where the OSC percentage is positive, and the industries are sorted according to the OSC percentage. OSC are more prevalent in industries with monopolistic power (electricity and water supply) and knowledge-intensive industries (e.g. ICT, consultancy).

Figure 4: Density functions of the selected objective variables according to company type.



Note: Figure 4 shows the distribution (probability density) of the key variables that differentiate OSC from other company types. For the sake of clarity, the highest values for each variable are trimmed to 1%. Revenues distributions are not reported because a size-related variable (i.e. workers) is included, and both correlate closely. Differences in distributions were tested using the Kolmogorov-Smirnov test. No significant differences from this test and the t-test reported in Table 2 were detected.

Table 1: Industrial distribution of the sample

ISIC	Industry Description	CSI	CSC	OSI	OSC	TOTAL
A01-03	<i>Agriculture, Livestock and Fishing</i>	119	4	9	4	136
%		12.5%	7.1%	5.8%	13.3%	11.4%
B04-08	<i>Extractive industries</i>	10	3	5	2	20
%		1.1%	5.4%	3.2%	6.7%	1.7%
C10-12	<i>Food, Beverage, and Tobacco</i>	57	4	16	2	79
%		6.0%	7.1%	10.4%	6.7%	6.6%
C16-18	<i>Paper, Wood, and Printing</i>	71	4	9	1	85
%		7.5%	7.1%	5.8%	3.3%	7.1%
C20-21	<i>Chemistry and Pharmaceutical</i>	31	2	7	1	41
%		3.3%	3.6%	4.5%	3.3%	3.4%
C24-25	<i>Metal products</i>	47	1	6	0	54
%		4.9%	1.8%	3.9%	0.0%	4.5%
C26-27	<i>Informatics and Electronics</i>	15	0	5	0	20
%		1.6%	0.0%	3.2%	0.0%	1.7%
C28-29	<i>Machinery, Equipment and Vehicles</i>	29	0	7	0	36
%		3.0%	0.0%	4.5%	0.0%	3.0%
C-other	<i>Other manufacturing</i>	46	1	6	0	53
%		4.8%	1.8%	3.9%	0.0%	4.4%
D	<i>Electricity supply</i>	3	3	2	3	11
%		0.3%	5.4%	1.3%	10.0%	0.9%
E	<i>Water supply</i>	11	1	0	2	14
%		1.2%	1.8%	0.0%	6.7%	1.2%
F41-43	<i>Construction and Civil Engineering</i>	69	4	10	0	83
%		7.2%	7.1%	6.5%	0.0%	7.0%
G	<i>Trade and repair of motor vehicles</i>	69	3	14	2	88
%		7.2%	5.4%	9.1%	6.7%	7.4%
H	<i>Transport and storage</i>	47	2	3	1	53
%		4.9%	3.6%	1.9%	3.3%	4.4%
I	<i>Accommodation and catering</i>	36	3	2	1	42
%		3.8%	5.4%	1.3%	3.3%	3.5%
J58-60	<i>Film/music editing and production</i>	17	2	1	0	20
%		1.8%	3.6%	0.6%	0.0%	1.7%
J61-63	<i>ICT</i>	44	2	7	3	56
%		4.6%	3.6%	4.5%	10.0%	4.7%
K	<i>Financial and Insurance</i>	87	5	9	5	106
%		9.1%	8.9%	5.8%	16.7%	8.9%
L	<i>Real Estate</i>	32	2	2	1	37
%		3.4%	3.6%	1.3%	3.3%	3.1%
M69-71	<i>Legal, consultancy, and technical activities</i>	51	2	7	2	62
%		5.4%	3.6%	4.5%	6.7%	5.2%
M72	<i>Scientific Research & Development</i>	11	1	25	0	37
%		1.2%	1.8%	16.2%	0.0%	3.1%
N	<i>Administrative and support service activities</i>	28	1	1	0	30
%		2.9%	1.8%	0.6%	0.0%	2.5%
R	<i>Artistic, entertainment and recreational activities</i>	22	6	1	0	29
%		2.3%	10.7%	0.6%	0.0%	2.4%
Total		952	56	154	30	1192

%		100%	100%	100%	100%	100%
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Table 2: Parametric and Stochastic analysis comparing OSC firms with the other groups

		Revenues (Q) ⁱⁱ	Workers (L) ⁱⁱⁱ	Labor Productivity (Q/L)	Export Intensity (E/Q)	Patents Granted ^{iv}
Mean	OSC	416	1995	0.23	0.12	0.4
	CSC	167	521	0.14	0.04	0.02
	OSI	253	804	0.31	0.09	0.44
	CSI	41	223	0.27	0.06	0.12
T-test	OSC vs. CSC	<i>0.03</i>	<i>0.00</i>	<i>0.07</i>	<i>0.06</i>	<i>0.06</i>
	OSC vs. OSI	<i>0.18</i>	<i>0.01</i>	<i>0.37</i>	<i>0.26</i>	<i>0.46</i>
	OSC vs. CSI	<i>0.00</i>	<i>0.00</i>	<i>0.46</i>	<i>0.06</i>	<i>0.08</i>
K-Sⁱ	OSC vs. CSC	<i>0.00</i>	<i>0.00</i>	<i>0.02</i>	<i>0.12</i>	<i>0.10</i>
	OSC vs. OSI	<i>0.00</i>	<i>0.01</i>	<i>0.01</i>	<i>0.48</i>	<i>0.62</i>
	OSC vs. CSI	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.16</i>	<i>0.09</i>

P-values in *italics*

(i) K-S stands for Kolmogorov Smirnov test.

(ii) Monetary values converted into thousands of millions of Chilean Pesos.

(iii) Number of full time equivalent workers. Mean for the entire year, 2018.

(iv) Patents granted nationally and internationally during period 2017-2018.

Table 3: Qualitative analysis: Enterprise characteristics

	Case A: Closed and socially-indifferent (CSI)	Case B: Open and socially-indifferent (OSI)	Case C: Closed and socially-conscious (CSC)	Case D: Open and socially-conscious (OSC)
Number of employees	4,000 employees	400 employees	150 employees	1,100 employees
Business age	40 years in the market	10 years in the market	8 years in the market	15 years in the market
Sector / activity	<p>Department store retailer</p> <p>The company sells clothing, accessories and home products via department stores, specialized stores and shopping malls. The company also distributes food to hypermarkets and supermarkets. In addition, the company is a textile manufacturer.</p>	<p>Agrochemicals</p> <p>The company focuses on Research & Development (R&D) and the commercialization of chemical biocide products for the pharmaceutical, and food & beverage industries.</p>	<p>Arts and cultural events</p> <p>The company offers arts and cultural initiative design, planning, promotion and coordination, as well as music education programs. It also offers rental auditoriums and stages for multiple events.</p>	<p>Hydroelectric and wind energy</p> <p>The company produces renewable energy with low carbon emissions via hydroelectric and wind farm power stations.</p>
Geographic location (headquarters) / degree of internationalization	<p>Located in Santiago. The company serves the domestic market and has expanded its operations across Latin America.</p>	<p>Located in Valparaiso. The company serves international markets across Asia, Africa, Europe, North America, and South America.</p>	<p>Located in Concepción. The company serves the domestic market.</p>	<p>Located in Santiago. The company focuses on serving the domestic market.</p>

Type of Private-oriented innovation	Constant improvement in manufacturing and logistics processes, and in the development of E-commerce strategies.	R&D in the biotechnology field of cost-effective and eco-friendly processes and resources.	Design of audio-visual content, and promotion of a wide and high quality cultural offer (i.e. plays, exhibitions, congresses) for the enjoyment of residents and tourists.	R&D of clean, renewable and energy-efficient technologies, and efficient demand management/response.
Type of Collaborative-oriented innovation	N.A.	Planning and development of new products in conjunction with industrial laboratories and chemical technology innovation centers. Collaboration with strategic partners oriented toward the search for new markets and areas of application.	N.A.	Collaborative projects with public administration, private investors, rural/indigenous communities, environmental organizations and NGOs aimed at reducing natural landscape fragmentation, habitat loss, and the protection of biodiversity.
Type of Social-oriented innovation	N.A.	N.A.	Development of outdoor cultural productions and activities aimed at making arts and culture accessible to isolated communities and groups at risk of social exclusion.	Provide access to high quality, cost-effective, sustainable energy services oriented toward improving people's opportunities, living standards and quality of life.