

RELEVANCE OF INFORMATION SOURCES TO SUPPORTING SOCIAL INNOVATION OUTCOMES IN THE SERVICE SECTOR

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Abstract: Despite the advancements made in comprehending the determinants of social innovation, there remain crucial aspects to explore concerning the collaborative process among actors within the innovation ecosystem and the utilization of information within this framework. This study aims to examine the impact of diverse information sources on social innovation outcomes in the service sector. Building upon estimating an innovation equation dependent on human capital, firm size, and research and development investment, this study utilizes micro-level data from the Chilean Innovation Survey spanning 2021-2022. Through probit regression analysis conducted on 522 service sector enterprises, we study the effects of various knowledge sources on social innovation outputs. The results reveal that institutional information sources derived from public research institutes significantly influence social innovation. Other knowledge sources have insignificant impacts on social innovation among service sector firms. This work has the novelty of focusing exclusively on the determinants of social innovation among service sector firms, finding that the only information source that significantly promotes social innovation in the service sector is from public research institutions. This finding enriches the comprehension of how diverse knowledge sources influence social innovation in the service sector, offering novel insights for firms and policymakers aiming to shape evidence-based innovation policies. This empirical evidence can be used to promote social innovation, leading to the development of new services that have the potential to address critical social issues, such as health, nutrition, education and security.

Key words: social innovation, service sector, knowledge, internal information sources, external information sources

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Introduction

Social innovation, defined as new ideas or solution proposals to the needs of humans which have not been fulfilled to increase their life standards and welfare (Bulut et al., 2013), has captured the attention of policymakers and researchers in the last decade because countries require innovative solutions to overcome significant

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current issues, such as pollution, climate change, social inequalities, and food and energy inefficiency. In this line, recent studies have supported the crucial role of social innovation in addressing environmental and social issues (Wittmayer et al., 2020; Hansen et al., 2022; Aakjaer and Wegener, 2023).

Innovations are vital in achieving sustainable economic growth (Wronowska, 2013; Urbaniec, 2015). In this sense, social innovation has long been recognized as a crucial driver of sustainable production and welfare distribution among firms and their communities. As societies and economies become increasingly complex and interconnected, the ability of firms to support sustainability becomes ever more essential. Therefore, understanding the factors that contribute to successful social innovation is paramount for policymakers, researchers, and business leaders.

It has been widely acknowledged that firms need to look beyond their internal resources and tap into external knowledge to foster innovation (Campos et al., 2023; Ehls et al., 2020; Akram et al., 2021; Aliasghar et al., 2023; Conroy et al., 2023). However, the specific mechanisms through which diverse knowledge sources influence social innovation outcomes particularly require further investigation. Over the years, progress has been made in developing theoretical models aimed at explaining how businesses acquire knowledge and design and implement social innovations. It has been established that social innovation involves transitioning through distinct phases such as mapping and development, consolidation, and scaling up (Souza João-Roland and Granados, 2020). Furthermore, it has been emphasized that during these phases, businesses need to interact with other organizations and stakeholders, including consumers, local communities, and government agencies (Tanimoto, 2012; Mulyaningsih et al., 2014; Senent-Bailichart and Rey-Marti, 2017; Vezina et al., 2019). Much of the previous literature that highlights the interaction in innovation processes follows the idea of the absorptive capacity described by Cohen et al. (2002) and focuses on manufacturing firms.

Despite these advances in understanding the determinants of social innovation, important aspects remain to be investigated regarding the collaboration process among actors in the innovation ecosystem and the use of information in this process. Particularly, studies have analysed the influence of different sources of information on the generation of innovation without delving into social innovation in the service sector (Quiroz-Rojas, P., and Teruel, M., 2024; Lauterbach, 2024). In order to develop effective strategies for stimulating social innovation in the service sector, it is essential to understand the role of information sources in this process. This is particularly important in economies that are heavily reliant on the tertiary sector.

The service sector is the largest contributor to Chile's economy, accounting for more than 50% of the country's gross domestic product (GDP) each year. In 2023, financial and business services and personal services contributed more than 35 trillion Chilean pesos to the national economy (Statista, 2024). Recent studies indicate that the modern service sector, specifically professional services, contributes to innovation, productivity growth and economic growth in Latin American countries (Pereira et al., 2023).

Therefore, it is relevant to better understand the role played by information from diverse sources and with diverse qualities, such as consumers, competitors, suppliers, universities, consultants, or internal sources, in obtaining knowledge that leads to social innovation in service sector organisations. More specifically, it is necessary to seek answers to the following important question: Which sources of information used by service companies for innovating are most associated with developing social innovation?

Previous research has investigated the effects of information sources on the innovation performance of all firms in the productive sector. This research examines the impact of diverse information sources on social innovation outcomes, specifically in the service sector, to determine if social innovation drivers are similar across sectors.

This paper aims to contribute to the existing body of knowledge by examining the role of diverse knowledge in social innovation, specifically focusing on evidence from Chilean service sector firms. Therefore, the primary objective of this paper is to estimate an empirical model that reveals the causal relationships between diverse types of information sources and social innovation output among service businesses. To accomplish this, the authors leverage reliable innovation survey data collected in Chile from 2021 to 2022. The proposed model considers the evolution of empirical research on the determinants of innovation output and considers that social innovation is typically a non-technological innovation, which includes adopting existing technologies to improve society's well-being and firm relations.

This research offers novel insights into the impact of information sources on innovation outcomes, building upon existing knowledge in the realm of social innovation and particularly focusing on service sector firms. Uniquely, the present study delves deeper into investigating the impact of various sources of information on the progression of innovation in the service sector in Chile, which is a dynamic and emerging economy that has made significant efforts to foster social innovation. The study specifically emphasises innovation directed towards safeguarding communities, the environment, and society in a developing country such as Chile, which bases its economic activity largely on providing services (Statista, 2024). Enhancing the understanding of the influence of information sources in Chilean companies is valuable, as South American countries face significant social challenges, such as a high percentage of poverty and inadequate secondary education, which could be addressed through social innovation.

This study also provides valuable insights for policymakers, researchers, and firms looking to enhance the connection between profitable and sustainable community relations. The empirical evidence presented here serves as a foundation for evidence-based policy recommendations aimed at fostering social innovation in the tertiary sector to propel the local communities of developing countries forward. Latin American developing countries require services that meet the needs and solve the problems of the most vulnerable social sectors. It is, therefore important to

strengthen the innovative capabilities of organizations so that they can generate innovative services in critical areas such as health, education, financing and security.

Literature Review

Absorptive capacity, which refers to a firm's ability to acquire, assimilate, and utilize external knowledge to foster innovation, has been, for many years, one of the focuses in the study of innovation information sources. In the work by Turner (2013), absorptive capacity was reinterpreted through the lens of social practice theory, emphasizing the role of informal, community-based learning within organizations. The traditional cognitive focus of Cohen and Levinthal's model was criticized, and ethnographic evidence was introduced to highlight how power dynamics and everyday interactions shape knowledge absorption. In the study by Grillitsch et al. (2023), developmental psychology has been integrated with absorptive capacity theory to explore how regional actors manage complex, paradoxical challenges. A nuanced view of how absorptive capacity functions in regional innovation was offered.

In today's competitive business environment, firms constantly seek ways to improve their innovation capabilities and outcomes. Therefore, the study of information sources and their impact on firm-level innovation performance is motivated by the recognition of innovation as a critical driver of firm success. Understanding the role of information sources in this process is essential for firms aiming to leverage knowledge effectively and achieve sustainable, innovative performance. Table 1 summarises the main documents of our literature review and their contributions.

In previous research, light has been shed on the influence of diverse types of information sources on innovation. In Arvanitis et al. (2013), a study was conducted based on panels of Dutch and Swiss innovating firms, finding that both "buying", and "cooperating" have a positive effect on innovation. However, simultaneous utilization of these information sources does not necessarily lead to higher innovation performance. Pejić Bach et al. (2015) emphasized the catalytic role of information sources in innovation improvement utilizing CIS data from Croatia, France, and the Netherlands. Their findings indicated that internal sources, customers, suppliers, and universities are valuable information sources for internal and external RandD activities across the three countries. Interestingly, firms from the Netherlands exhibit different patterns in utilizing information sources, relying more on competitors than firms from Croatia and France. Additionally, government information sources have less impact on firms' innovative performance.

The distinction between internal and external sources of information or cooperation has been explored in relation to the generation of product and process innovation in several works, including Gómez et al. (2016), Damanpour et al. (2018), Dotzel and Faggian (2019), and Tomášková and Kaňovská (2022). Furthermore, the effects of different combinations of knowledge sources on innovation output have been explored in the literature. Basit and Medase (2019) and Moya-Fernandez and Seclen-Luna (2023) highlighted the positive link between knowledge diversity and firm-

level innovation performance, emphasizing the importance of knowledge from customers in the private and public sectors and competitors. Basit (2021) extended this research by examining the impact of external knowledge sources on the willingness of small and medium-sized enterprises (SMEs) to introduce organizational innovation, revealing the greater importance of external knowledge for small firms and their propensity to utilize diverse sets of external knowledge. The influence of information sources on the generation of innovation in service firms has been analysed by a limited number of studies. A significant relation between the use of both internal and external sources of information and the implementation of innovations by public organizations has been supported because, according to Lagunes Marin and Rubalcaba Bermejo (2015), external sources are shown to be more relevant for the implementation of services that are new to the public sector. Moreover, firms provided with information from market sources and internal sources, as well as those involved in science-based collaboration for their product innovations, are more likely to introduce new market innovations in the service industry (Mention, 2011). The influence of information sources on innovation in service companies has been revealed by these studies; however, they have not been focused on the study of social innovation.

Table 1. The Effects of Information Sources on Innovation Outputs

Question	Findings	Sources
How do various information sources influence innovation outcomes?	Found that both buying information and cooperating have a positive effect on innovation. However, simultaneous use does not increase performance further. The social innovation process has phases: mapping and development, consolidation, and scaling up.	Arvanitis, Lokshin, Mohnen, and Wörter (2013)
		De Souza João-Roland and Granados (2020) proposed
	Internal sources, customers, suppliers, and universities are valuable information for internal and external RandD activities.	Pejić Bach et al. (2015) Mion et al. (2023)
Are there differences between internal and external information sources for innovation output?	Found that the importance of external sources of information varies depending on the type of innovation considered (process, product and organization)	Gómez, Salazar, and Vargas (2016)
	Internal information has a stronger effect than external information in influencing innovation adoption.	Damanpour, Sanchez-Henriquez, and Chiu (2018)

When are external information sources more valuable for innovation output?	Developing strategies to leverage external information significantly influences innovation outcomes. External knowledge is of greater importance to smaller firms.	Sofka and Grimpe (2010)
	External knowledge sourcing has a higher impact on promoting product, process, and green innovation in rural U.S. firms.	Dotzel and Faggian (2019)
Does diversity of knowledge sources play a role in innovation outcomes?	Found that knowledge diversity is positively related to firm-level innovation performance	Moya-Fernandez and Seclen-Luna (2023)
	There is a positive link between knowledge diversity and firm-level innovation performance.	Criscuolo et al. (2018)
	It was found that smaller firms using external knowledge increase their chance to introduce organizational innovation.	Basit (2021)

The literature on information sources and innovation has supported the idea that diverse knowledge utilization is crucial in driving firm-level technological and social innovation performance. The interplay between diverse types of information sources, whether originating from paid deals or cooperation agreements and whether derived from internal or external agents, offers valuable insights for firms aiming to enhance their innovation capabilities and achieve innovation outcomes. In consideration of the evidence, we propose that the use of information should also positively influence the generation of social innovation in service businesses belonging to the tertiary sector in Chile. The following hypothesis is therefore established:

- Hypothesis 1: The utilization of information sources has a beneficial effect on social innovation outcomes in Chilean service firms.

Furthermore, given the existing literature on the impact of different knowledge sources on innovation output and the evidence supporting the effect of diverse information sources on innovation (Abdul Basit and Medase, 2019; Basit, 2021; Moya-Fernandez and Seclen-Luna, 2023), it is proposed that the type of information source should influence social innovation output differently. Considering the evidence, a hypothesis is put forth as follows:

- Hypothesis 2: The impact of diverse sources of information on the outcome of social innovation in Chilean services firms varies.

Research Methodology

The theoretical modelling in this study draws upon the idea put forth with the CDM model by Crepon, Duguet, and Mairesse (1998). In the model, it was proposed that Research and Development (RandD), innovation, and productivity are interconnected variables, and therefore, they can be explained together within a framework of equations. It was shown that innovation output is mainly the result of

human capital intensity, information sources, and RandD investment. CDM has been cited by many authors, who have investigated several questions related to the determinants of RandD spending, the causes of innovation success, and their relation to firm productivity.

In Perez et al.'s (2019) work, CDM was used to study the factors that drive innovation performance in Chile and Peru. The work by Audretsch et al. (2020), based on the model by CDM, identified how information sources, among other factors, influence innovation performance in small service sector firms. In recent work, Basit and Medase (2019) and Lauterbach (2024) used a similar innovation equation to suggest that product, process, marketing, and organizational innovation can be attributed to firm size, RandD investment and human capital, with different information sources exerting varying effects on diverse types of innovation outputs. Building on the existing literature, a basic binary model is proposed, wherein social innovation is contingent upon five main independent variable groups. Firstly, our interest is focused on sources of information that we describe with a set of dummies informing whether each source was used or not. Secondly, the level of sales is represented by firm size, and the extent to which social innovation may be more likely in larger firms is controlled by it. The proportion of professional employees' controls for the fact that firms with more human capital may be likely to innovate more. RandD expenditure and innovation activity expenditure capture the effect of financial commitment on innovation over social innovation output. Finally, the economic sector captures specific sector-level effects that can influence the social innovation output. This research is focused on analysing the incidence of information sources on social innovation outcomes. The level of sales, the proportion of professionals, RandD expenditure, innovation activity expenditure, and the economic sectors are considered control variables since previous research has shown these variables to be related to innovation output. The specific components of the model are outlined as follows:

$$SocInn_i = \alpha + x_i\beta_1 + \mu_i \quad (1)$$

Where $x_i = (RandD_i, OtherInn_i, HC_i, Sales_i, Inf_i^1, \dots, Inf_i^n, Act_i^1, Act_i^2, Act_i^3)$

In this equation, $SocInn_i$ is a dummy variable that takes value 1 if the firm introduced a social innovation and 0 if it did not. Social innovation is a variable that derives directly from the innovation survey database and is a dummy variable because firms can either declare they performed social innovation or not. It has the advantage of measuring the occurrence of social innovation directly, but it has the disadvantage of not informing about different kinds of specific social innovations and not reflecting the degree of importance of social innovation when it is achieved. The variable $RandD_i$ represents RandD investment and shows whether the firm invested in RandD internally in the period 2021-2022. Similarly, $OtherInn_i$ is a dummy variable that shows whether the firm invested in other kinds of innovations like machinery, training or market research. HC_i stands for human capital intensity

and is the proportion of highly skilled workers hired by the firm. $Sales_i$ is the log of total sales and represents a measure of firm size. $Inf_i^1, \dots, Inf_i^n$ are dummy variables indicating whether the source of ideas for innovation developed with information from internal, market, institutional and other sources and $Act_i^1, Act_i^2, Act_i^3$ are specific economic sector dummies.

The use of the selected information sources as determinants of innovation performance is based on the idea that both internal and external information sources have been claimed by previous authors to explain innovation output. This classification of information sources has been explained by OECD/Eurostat (2018) and has been used, among other authors, by Basit and Medase (2019) and Basit (2021). The use of the level of sales, the proportion of professionals, RandD expenditure, innovation activity expenditure, and the economic sector as independent variables is explained in the work by CDM and the empirical literature that follows their model.

Data and Variable Descriptions

Various studies of innovation determinants and the relationship between firm characteristics, innovation inputs, and innovation outputs, based on innovation survey data and econometric research, have been conducted over the past three decades. In the work by Mairesse and Mohnen (2010), an overview of the history, evolution, and content of innovation surveys was provided, discussing the characteristics of the data they encompass and the challenges they pose to analysts and econometricians. The two primary purposes for which these data have been utilized were also documented: the construction of scoreboards for monitoring innovation and scholarly analysis of various issues related to innovation. A sizeable portion of the literature employing innovation survey data has been focused on examining the determinants, effects, complementarities, and dynamics of innovation.

For the empirical analysis in this study, micro-level data from the Chilean National Innovation Survey (ENI) 2021-2022 were utilized. The database was published by the Division of Studies and Statistics of the Ministry of Science of Chile (2020) and is freely accessible under a Creative Commons license for open content (version 4.0) of Public Domain (CC0) and Attribution CC-BY. The database is made from a probabilistic design (representative of all those companies registered in the Chilean Tax Service (SII), and sales start at USD\$100,000 per year. The survey comprises a sample of 9,811 firms, which are representative of a universe of 214,406 Chilean firms across all economic sectors, including Manufacturing, Mining, Energy, and Services.

The National Innovation Survey (ENI) aims to provide information on the structure of the innovation process of companies in Chile (inputs and results) and to show the relationships between said process and the innovation strategy of companies, the innovative effort, the factors that influence their ability to innovate and the economic performance of companies. Furthermore, the survey was conducted in 1995, and its

questionnaire aligns with the guidelines outlined in the fourth edition of the Oslo Manual OECD/EUROSTAT (2018).

ENI measures variables such as the type of innovation (product and business processes), degree of novelty, intellectual property rights and innovative activities (including research and development, RandD) conducted by Chilean companies in different economic sectors and regions of the country. The survey also captures information on firm characteristics, sales, exports, employment by education levels, innovation output, information sources, other innovative investments, RandD activities, RandD cooperation, and innovation obstacles. Notably, the Chilean Innovation Survey also captures non-technological innovation, such as marketing, organizational, and social innovation.

Social innovation was used as the dependent variable. On the Chilean ENI, social innovation is defined as the development of a process, product, service, or model with quantifiable impact, which is more sustainable than what exists or which solves a problem of public interest, and where the value generated is distributed among society members. It is defined as a dummy variable because the survey contains the answer of whether the firm did or did not introduce such an innovation during the covered period.

The control variables used include a log of total sales, the professional labour force share, and dummy variables indicating if the firms performed internal RandD, other innovation spending, or belonged to specific economic sectors. These variables were also included in the innovation equation on the CDM model. In Table 2, all the main variables used for this research were defined.

Table 2. Description of Variables

Variable Name	Type	Description
Social innovation	Dummy	1 if the firm introduced social innovation in 2021-2022 and 0 otherwise
Internal source of knowledge	Dummy	1 if the firm uses internal information sources in innovation projects and 0 otherwise
Knowledge from markets	Discrete from 0 to 4	Summation of the four market's information sources used for innovative ideas and 0 otherwise.
Knowledge from providers (market)	Dummy	1 if the firm uses providers' information sources in innovation projects and 0 otherwise
Knowledge from customers (market)	Dummy	1 if the firm uses customers' information sources in innovation projects and 0 otherwise
Knowledge from competitors (market)	Dummy	1 if the firm uses competitors' information sources in innovation projects and 0 otherwise

Knowledge from consulting agents (market)	Dummy	1 if the firm uses consulting information sources in innovation projects and 0 otherwise
Knowledge from institutional sources	Discrete from 0 to 2	Summation of the institutional information sources used for innovative ideas and 0 otherwise.
Knowledge from universities (institutional)	Dummy	1 if the firm uses university information sources in innovation projects and 0 otherwise.
Knowledge from the government research institutions (institutional)	Dummy	1 if the firm uses government research institutions sources in innovation projects and 0 otherwise.
Knowledge from other sources	Discrete from 0 to 4	Summation of other information sources for innovative ideas in current innovation projects in 2021–2022 and 0 otherwise.
Knowledge from conferences (other)	Dummy	1 if the firm uses conference sources in innovation projects and 0 otherwise.
Knowledge from journals (other sources)	Dummy	1 if the firm uses journal sources in innovation projects and 0 otherwise.
Knowledge from firm associations (other)	Dummy	1 if the firm uses firm association sources in innovation projects and 0 otherwise.
Knowledge from internet (other)	Dummy	1 if the firm uses internet sources in innovation projects and 0 otherwise.
Log Total sales	log	The log of total sales as a measure of firm size.
Professional employees	Discrete	Number of graduate employees (professional, master or PhD) to the total number of employees in 2020.
Internal RandD	Dummy	1 if the firm conducted internal RandD activities in 2021-2022 and 0 otherwise.
Other Innovation Activities	Dummy	1 if the firm conducted other innovation activities in 2021-2022 and 0 otherwise.

Source: ENI 2021-2022

Note: All sources of information are used for innovative ideas in current innovation projects in 2021-2022

In Table 3, a description of the base model variables employed in this research is presented. The database was originally made of 9,811 observations, of which only those firms that declared some kind of innovation output were required to give further detail on innovation information sources. There were a total of 1,374 innovative firms over the period 2021-2022, and the sample used contained all valid information on 522 observations from the service sector for statistical analysis.

Table 3. Database Summary Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Log Total sales	522	10,17	2,20	3,37	19,54
Professional employees	522	40,72	280,39	0	5395
Internal RandD	522	0,28	0,45	0	1
Other Innovation Activities	522	0,90	0,30	0	1

Source: Own elaboration based on ENI 2021-2022

For the statistical analysis of this research, it was firstly considered that we have a binary dependent variable. Therefore, a probit model was chosen for our regression analysis. Probit models are commonly used in statistical analysis, particularly in the field of binary classification of the dependent variable. The probit model is based on the probit function and uses the cumulative distribution function of the standard normal distribution to model the relationship between the predictors (knowledge sources or X vector) and the probability of the event (social innovation or Y dependent variable) occurring. The model takes the form:

$$P(Y=1 | X)=\Phi(X^T \beta)$$

Where, P is the probability, and Φ is the cumulative distribution function of the standard normal distribution. The parameters β are typically estimated by maximum likelihood.

It follows that the coefficient values on the probit model do not directly represent the marginal effects. They represent the change in the probability of the event (social innovation) being equal to 1. For the rank and dummy variables, the coefficient represents the change in the probability of the event caused by being on that specific rank ($x=1$) compared to being on the reference group ($x=0$).

In the case of a nonlinear probit model, we are not able to estimate R-squared values. Nevertheless, pseudo R² was used as a measure of the share of the dependent variable that is explained by the independent variables for the case of non-linear probit models. A Wald Chi-Squared Test was used as a parametric statistical measure to confirm whether a set of independent variables are collectively 'significant' for a model or not.

Even though in previous work, RandD was described as an endogenous determinant of innovation, it is argued that this is not the case for non-technological innovation such as social innovation. Therefore, it was proposed that the use of instrument variables is not appropriate in this case because social innovation is not considered to have a causal effect on RandD investment.

Previously, a Pearson correlation analysis was also used to evaluate the existence of linear relations between each pair of variables on the main model. All the statistical analysis was conducted using Stata 18.

Research Results

In Table 4, the characteristics of the dependent variable and the main independent variables that we used for our analysis were summarized. It was found that among

innovative firms in the service sector of the Chilean innovation survey, 9,6 per cent declared to have performed social innovation in 2021-2022. It was found that 73.6 per cent of the firms in the sample used internal sources of information for innovation. Of the four market information sources on the survey, on average, firms declared to have used 1.49 of them. The most used market information sources were from customers and providers, while the least used market information source was from consulting agents, with 17,4 per cent of firms using it. This is consistent with firms with low levels of trust with external market agents while being more able to trust agents with direct market interaction with them.

Table 4. Main Regression Variables Summary Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Social innovation	522	0,096	0,295	0	1
Internal source of knowledge	522	0,736	0,441	0	1
Source of knowledge from markets	522	1,490	1,156	0	4
knowledge from providers (market)	522	0,512	0,500	0	1
knowledge from customers (market)	522	0,525	0,500	0	1
knowledge from competitors (market)	522	0,280	0,449	0	1
knowledge from consulting agents (market)	522	0,174	0,380	0	1
knowledge from institutional sources	522	0,249	0,574	0	2
knowledge from universities (institutional)	522	0,149	0,357	0	1
knowledge from government research institutions (institutional)	522	0,100	0,300	0	1
knowledge from other sources	522	1,169	1,248	0	4
knowledge from conferences (other)	522	0,251	0,434	0	1
knowledge from journals (other)	522	0,186	0,389	0	1
knowledge from firm associations (other)	522	0,144	0,351	0	1
knowledge from internet (other)	522	0,588	0,493	0	1

Source: Own elaboration based on ENI 2021-2022

The findings of this paper are presented in this section. The estimation method uses a set of probit regressions based on 522 valid observations for which data on each model variable was collected. In Table 5, the impact of the use of internal information sources for innovation on social innovation output was explored. It is found that the use of internal information has a positive but insignificant effect on social innovation outcomes.

Table 5. Internal Information Sources

Dependent variable: Social Innovation	Coefficients
Internal source of knowledge	0.071
	(0.191)

Log Total Sales	-0.014 (0.036)
Professional Employees	0.000 (0.000)
Internal RandD	0.815 (0.177)**
Other Innovation Spending	0.716 (0.295)*
Constant	-2.176 (0.480)**
Prob>Chi2	0.000
Pseudo R2	0.074
N	522

Source: Own elaboration based on ENI 2021-2022. All regressions Wald X-squared tests were significant at $p < 0.01$

Note: Standard errors in parenthesis * $p < 0.05$; ** $p < 0.01$

In Table 6, the impact of market information sources on social innovation outputs was addressed. In the first column, the dependent variable expresses whether any market information source was used: providers, competitors, customers, and consulting partners. It is found that, in general, external market information sources do not have a significant impact on social innovation. It is demonstrated by the results that the utilisation of market information sources is not a significant factor in achieving social innovation outcomes in the tertiary sector, thereby not validating hypothesis 1.

Table 6. Market Information Sources
Dependent variable: Social Innovation

Knowledge from markets	0.079 (0.069)				
knowledge from providers		0.070 (0.160)			
knowledge from customers			0.051 (0.162)		
knowledge from competitors				0.223 (0.170)	
knowledge from consulting agents					0.178 (0.199)
Log Total Sales	-0.015 (0.036)	-0.014 (0.036)	-0.013 (0.036)	-0.010 (0.037)	-0.020 (0.037)
Professional Employees	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Internal RandD	0.772 (0.181)**	0.816 (0.176)**	0.816 (0.177)**	0.779 (0.179)**	0.791 (0.180)**
	0.660	0.708	0.701	0.660	0.703

Other Innovation Spending	(0.297)*	(0.295)*	(0.297)*	(0.295)*	(0.294)*
Constant	-2.176 (0.466)**	-2.151 (0.467)**	-2.150 (0.468)**	-2.177 (0.466)**	-2.080 (0.466)**
Prob>Chi2	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.078	0.074	0.076	0.079	0.077
N	522	522	522	522	522

Source: Own elaboration based on ENI 2021-2022. All regressions Wald X-squared tests were significant at $p < 0.01$

Note: Standard errors in parenthesis * $p < 0.05$; ** $p < 0.01$

The importance of institutional information sources for social innovation is presented in Table 7. The first column shows that institutional information positively and significantly impacts social innovation, whether it comes from universities, government institutions or both. The following columns confirm that only information source from government research institutions has a positive and significant impact on social innovation in the tertiary sector. Hypothesis 1 is validated by this result. This is, in our view, the most important finding of this paper because it has direct policy implications that could help promote social innovation in the service sector through the support of interactions between government institutions and productive firms.

Table 7. Institutional Information Sources

Dependent variable: Social Innovation			
knowledge from institutions	0.312 (0.122)*		
knowledge from universities		0.377 (0.197)	
knowledge from government institutions			0.580 (0.225)**
Log Total Sales	-0.027 (0.037)	-0.020 (0.037)	-0.027 (0.037)
Professional Employees	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Internal RandD	0.694 (0.185)**	0.729 (0.184)**	0.729 (0.182)**
Other Innovation Spending	0.693 (0.295)*	0.668 (0.295)*	0.746 (0.297)*
Constant	-2.041 (0.468)**	-2.061 (0.468)**	-2.072 (0.466)**
Prob>Chi2	0.000	0.000	0.000
Pseudo R2	0.094	0.085	0.094
N	522	522	522

Source: Own elaboration based on ENI 2021-2022. All regressions Wald X-squared tests were significant at $p < 0.01$

Note: Standard errors in parenthesis * $p < 0.05$; ** $p < 0.01$

In Table 9, it is shown that other information sources are not demonstrated to be important determinants of social innovation. Information from conference participation, information from professional associations, and information from the internet have positive but insignificant effects on social innovation outcomes. Overall, the analysis of the sources of information revealed that not all information sources are important for social innovation outcomes in the tertiary sector, thereby supporting the proposed hypothesis 2.

Table 9. Other Information Sources

Dependent variable: Social Innovation					
Other knowledge sources	0.029 (0.062)				
knowledge conferences		0.163 (0.179)			
knowledge journals			-0.166 (0.206)		
knowledge professional associations				0.252 (0.203)	
knowledge Internet					0.015 (0.168)
Log Total Sales	-0.014 (0.036)	-0.016 (0.037)	-0.011 (0.036)	-0.019 (0.037)	-0.013 (0.037)
Professional Employees	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Internal RandD	0.797 (0.185)**	0.771 (0.185)**	0.857 (0.181)**	0.781 (0.179)**	0.821 (0.180)**
Other Innovation Spending	0.695 (0.296)*	0.682 (0.296)*	0.723 (0.295)*	0.668 (0.295)*	0.712 (0.297)*
Constant	-2.132 (0.464)**	-2.106 (0.465)**	-2.141 (0.466)**	-2.061 (0.467)**	-2.140 (0.472)**
Prob>Chi2	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.075	0.077	0.076	0.079	0.074
N	522	522	522	522	522

Source: Own elaboration based on ENI 2021-2022. All regressions Wald X-squared tests were significant at $p < 0.01$

Note: Standard errors in parenthesis * $p < 0.05$; ** $p < 0.01$

With respect to our main control variables, there are a few points worth further attention. In the first place, no evidence that firm size has a robust positive impact on social innovation output was found. This may be because social innovation takes a flexible approach that may be easier to follow for smaller firms. Secondly, it was found that the proportion of professional workers does not impact social innovation

output; this may be related to firms mainly performing social innovation that is not complex but aims to improve the relationship with society and the environment. Thirdly, RandD spending does have a positive and significant effect on social innovation, similar to previous work that found that RandD positively affects most innovation outcomes. Other innovation spending also has a positive and significant impact on our regressions.

In all our regressions, Chi2 tests are highly significant, which implies that the independent variables are significant as a group for the determination of the dependent variable. Additionally, the researchers used a pseudo R2 approach to show how much of the dependent variable movement is caused by the regressors of the model. It was found that between 7 and 9 per cent of the dependent variable is explained by the independent variables, which is an acceptable result given that our aim is not to predict but rather to identify positive or negative impacts.

Conclusion

To consolidate our understanding of the role of external knowledge sources in promoting firms' social innovation, the effects of sourcing knowledge from various external actors were investigated in this study. These were categorized into four groups: internal, market, institutional and other information sources. In this research, the question of which sources of information used by service sector companies for innovating are most associated with developing social innovation was investigated. Hypothesis 1 was validated by regression results, which state that information sources influence social innovation. Furthermore, it was demonstrated that the impact of several information sources on social innovation outcomes varies, thereby supporting hypothesis 2. The findings have underscored the importance of external sources of knowledge in driving social innovation outcomes in the tertiary sector.

Information sourced from government research institutions has shown a relevant and positive effect on the probability of service firms' social innovation. Internal information sources and other information sources, such as private consultants, conferences, and professional associations, were not found to have any significant impact on social innovation. These findings demonstrate that information from non-market formal institutions substantially determines social innovation in service sector firms. Moreover, information from market or trade-related partners does not have a role in firms' social innovation.

The evidence obtained in this research is in accordance with recent management and economic literature in that information flows are important determinants of technological and not technological innovation. Much of the previous literature follows the idea of the importance of firms' absorptive capacity described by Cohen et al. (2002) and focuses on manufacturing firms. In this regard, the significance of external information flows from the market (Aboal and Garda, 2016) and from suppliers and customers (Gómez et al., 2016) has been acknowledged regarding the innovation performance of firms.

Our results are aligned with research on social innovation, which highlights the value of forging connections with other organisations and the importance of monitoring the environment to identify social issues and source innovative solutions from external actors such as government institutions, local communities and sector experts (Mulyaningsih et al., 2014; Senent-Bailichart and Rey-Martí, 2017; Vezina et al., 2019). Moreover, it has been postulated that social innovation does not emanate from the actions of a solitary entrepreneur but rather represents the culmination of collaborative endeavours involving a multiplicity of stakeholders, including customers, civil society organisations, local businesses, researchers, and other pertinent parties. (Tanimoto, 2012).

For the service sector on which our study is centred, we could not confirm the role played by universities in advancing social innovation, underscored by their interactions with society and industry. This relation was proposed by previous studies focusing on universities in Portugal and Spain (Moeenian et al., 2022). Other studies highlighted how cooperation between businesses, governments and universities can result in the joint creation of innovative solutions, benefiting both enterprises and local communities, especially in emerging economies such as China (Gómez Zermelo and Alemán de la Garza, 2021; Monteiro et al., 2021). This different result can be explained by considering that the involvement of Chilean universities in the productivity of the productive sector is still an ongoing challenge. Although there has been progress in recent decades in linking universities with the productive sectors, with projects focused on sectors such as mining and agriculture, there are still opportunities for these institutions to expand their contribution to developing social innovations in the Chilean service sector.

Furthermore, while previous studies have shown that internal information does have an impact on innovation, this study has not specifically supported the idea that internal sources of information are a factor that promotes social innovation outcomes in service firms. This idea was supported by Pejić Bach et al. (2015), who proposed that internal sources constitute a useful information source for both internal and external RandD activities across the three countries in their study, and by the conclusions of Quiroz-Rojas and Teruel (2024), who reported a positive impact of internal information on social innovation outcomes, without delving into the specifics of the service business. The lower relevance of internal sources in social innovation in the tertiary sector can be explained by the collaborative and user-centred approach of service design methods, which focus on analysing user experiences (Trischler and Scott, 2016).

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ZNACZENIE ŹRÓDEŁ INFORMACJI DLA WSPIERANIA INNOWACYJNOŚCI SPOŁECZNEJ W SEKTORZE USŁUG

Streszczenie: Pomimo postępów w zrozumieniu czynników determinujących innowacyjność społeczną, nadal pozostają do zbadania kluczowe aspekty dotyczące współpracy między podmiotami w ekosystemie innowacji oraz wykorzystania informacji w tych ramach. Celem niniejszego badania jest zbadanie wpływu różnych źródeł informacji na wyniki innowacji społecznych w sektorze usług. Opierając się na oszacowaniu równania innowacyjności zależnego od kapitału ludzkiego, wielkości przedsiębiorstwa oraz inwestycji w badania i rozwój, w niniejszym badaniu wykorzystano dane mikroekonomiczne pochodzące z chilijskiego badania innowacyjności przeprowadzonego w latach 2021–2022. Za pomocą analizy regresji probitowej przeprowadzonej na 522 przedsiębiorstwach sektora usług zbadano wpływ różnych źródeł wiedzy na wyniki innowacji społecznych. Wyniki pokazują, że instytucjonalne źródła informacji pochodzące z publicznych instytutów badawczych mają znaczący wpływ na innowacje społeczne. Inne źródła wiedzy mają nieistotny wpływ na innowacje społeczne wśród przedsiębiorstw sektora usług. Nowatorski charakter niniejszej pracy polega na skupieniu się wyłącznie na czynnikach determinujących innowacje społeczne wśród przedsiębiorstw sektora usług oraz stwierdzeniu, że jedynym źródłem informacji, które znacząco promuje innowacje społeczne w sektorze usług, są publiczne instytucje badawcze. Odkrycie to wzbogaca wiedzę na temat wpływu różnych źródeł wiedzy na innowacje społeczne w sektorze usług, oferując nowe spostrzeżenia dla przedsiębiorstw i decydentów politycznych dążących do kształtowania polityki innowacyjnej opartej na dowodach. Te empiryczne dowody mogą zostać wykorzystane do promowania innowacji społecznych, prowadząc do rozwoju nowych usług, które mają potencjał rozwiązywania kluczowych problemów społecznych, takich jak zdrowie, odżywianie, edukacja i bezpieczeństwo.

Słowa kluczowe: innowacje społeczne, sektor usług, wiedza, wewnętrzne źródła informacji, zewnętrzne źródła informacji