Knowledge sources, innovation, and market and environmental performance in knowledge-intensive business services

Fuentes de conocimiento, innovación, y desempeño de mercado y medioambiental en empresas de servicios intensivos en conocimiento

Jean Pierre Seclen-Luna*

Departamento Académico de Ciencias de la Gestión, Pontificia Universidad Católica del Perú, Perú.

jseclen@pucp.pe • https://orcid.org/0000-0003-1683-0570

Javier Fernando Del Carpio Gallegos

Facultad de Ingeniería, Universidad ESAN, Perú.

jdelcarpio@esan.edu.pe • https://orcid.org/0000-0001-6050-5754

Martín Beaumont

Departamento Académico de Ciencias de la Gestión, Pontificia Universidad Católica del Perú, Perú.

mbeaumont@pucp.edu.pe • https://orcid.org/0000-0002-5318-6799

• Article received:
21 April, 2025

• Article accepted:
10 April, 2026

• Published online in articles in advance:
27 August, 2026

* Corresponding Author
Jean Pierre Seclen-Luna

DOI:
https://doi.org/10.18845/te.v20i3.8845

Abstract: Knowledge-intensive business services (KIBS) are vital to modern innovation systems by enabling the creation, transfer, and use of knowledge across firms and sectors. Despite the increased interest in KIBS, empirical evidence on what drives innovation and how it relates to firm performance, especially in emerging economies, remains limited. This research investigates how knowledge sources contribute to technological and non-technological innovation, and how these sources relate to market and environmental performance in KIBS firms. Analyzing data from Peru's 2018 National Innovation Survey, which includes 587 KIBS, mostly in technological and professional services, the study employs confirmatory factor analysis and structural equation modeling to examine the relationships among knowledge sources, innovation types, and performance. The results show that knowledge sources are positively associated with both technological and non-technological innovation. However, neither type of innovation is significantly associated with eco-innovation performance. This suggests that while knowledge sources drive KIBS' innovation, translating innovation into measurable success depends on additional organizational and market factors. The study advances the literature by offering a deeper understanding of innovation processes in knowledge-intensive business services, while distinguishing between technological and non-technological innovation. In addition, the study emphasizes the importance of knowledge sources in shaping innovation and reveals that the link between innovation and firm performance may be more complex than generally assumed.

Keywords: Knowledge sources · Innovation · KIBS · Firm's performance · Perú.

Resumen: Los servicios empresariales intensivos en conocimiento (SEIC) son fundamentales para los sistemas de innovación modernos, ya que facilitan la creación, transferencia y uso del conocimiento entre diversas empresas y sectores. A pesar del creciente interés en los SEIC, los datos empíricos sobre qué impulsa la innovación y cómo esta se relaciona con el desempeño empresarial, especialmente en economías emergentes, siguen siendo limitados. Esta investigación analiza cómo las fuentes de conocimiento contribuyen a la innovación tecnológica y no tecnológica, así como su relación con el desempeño de los SEIC en el mercado y en el medio ambiente. Al analizar datos de la Encuesta Nacional de Innovación de Perú de 2018, que incluye

587 SEIC —clasificados en tecnológicos y profesionales—, el estudio emplea análisis factorial confirmatorio y modelado de ecuaciones estructurales para explorar las relaciones entre las fuentes de conocimiento, las actividades de innovación y el desempeño, considerando el tamaño y la antigüedad de las empresas como variables de control. Los resultados indican que las fuentes de conocimiento fomentan significativamente ambos tipos de innovación, aunque no se encuentra una relación directa entre la innovación y las métricas de desempeño relacionadas con el mercado y el medio ambiente. Esto sugiere que, si bien las fuentes de conocimiento impulsan la innovación en los SEIC, convertirla en un éxito medible depende de otros factores organizativos y de mercado. El estudio avanza en la literatura de tres maneras: primero, aporta evidencia empírica sobre los impulsores de la innovación en los SEIC en un contexto de economía emergente, un área aún poco explorada; segundo, diferencia entre innovación tecnológica y no tecnológica, ofreciendo una comprensión más profunda de los procesos innovadores en los SEIC; y tercero, destaca la importancia de las fuentes de conocimiento en la configuración de la innovación y revela que la relación entre innovación y desempeño empresarial puede ser más compleja de lo que generalmente se asume.

Palabras clave: Fuentes de conocimiento · Innovación · SEIC · Desempeño empresarial · Perú.

1. Introduction

Knowledge-Intensive Business Services (KIBS) are vital to modern innovation ecosystems because they facilitate the creation, sharing, and application of specialized knowledge among organizations (Miles, 2005). These firms act as knowledge brokers and are essential in promoting innovation within the service sector and beyond (Ciriaci et al., 2015; Lafuente et al., 2017; Seclen-Luna et al., 2026). Therefore, investigating the factors that influence innovation in KIBS and their relationship to business performance is an important area of focus in the literature on innovation and competitiveness.

KIBS are characterized by a dense concentration of expert staff, including many graduates and professionals working in high-skill, often well-paid roles (Lafuente et al., 2010). They depend heavily on information and communication technologies and primarily provide high-value services to other businesses and the public sector (Seclen-Luna & Miles, 2023). Although the literature often considers KIBS as innovators (Chichkanov et al., 2021; Corrocher et al., 2009), previous evidence shows that not all KIBS are equally innovative (Rodríguez & Camacho, 2010). Additionally, differences among KIBS sub-sectors have not been fully examined (Rodríguez et al., 2017). Therefore, it is important to be cautious when generalizing about innovation in KIBS, as they have diverse knowledge bases (Pina & Tether, 2016).

Seclen-Luna and Miles (2023) note that, although many issues are common across KIBS, they have traditionally been categorized into two main groups: professional services (P-KIBS) and technological services (T-KIBS). P-KIBS typically includes conventional professional services such as legal, accounting, bookkeeping, payroll, management, and other consulting services, mainly focused on organizational procedures and regulatory frameworks. In contrast, T-KIBS focuses more on science and technology, covering engineering, computer services, technical testing, research and development, and related fields.

Research shows that KIBS often rely on external interactions to innovate (Rodríguez et al., 2017; Wyrwich, 2019). Connections with clients, suppliers, competitors, and universities provide access to information, ideas, and technology that help develop new services, processes, or organizational models (Laursen & Salter, 2006). This aligns with the open innovation concept, which posits that firms enhance their internal capabilities by strategically leveraging external knowledge sources (Chesbrough, 2003; Cassiman & Valentini, 2016).

Numerous studies have demonstrated that service innovations exhibit characteristics distinct from those in manufacturing sectors (Moya-Fernández & Seclen-Luna, 2024). Service innovations are generally more intangible, more incremental, and more closely linked to customer interactions (Djellal & Gallouj, 2018). As a result, the relationship between innovation and business performance is often more complex and less direct than in other industries. Although there has been progress in this area of research, notable gaps remain, particularly in emerging economies. The majority of research on KIBS has concentrated on developed countries (Doloreux et al., 2019). In contrast, empirical data for these sectors in Latin America are scarce (Seclen-Luna & Moya-Fernández, 2020).

This study aims to contribute to the existing literature by examining how knowledge sources influence the development of both technological and non-technological innovations. It also explores their relationship with the market and the environmental performance of KIBS firms in Peru. To accomplish this, the research uses structural equation modeling with data from Peru's National Innovation Survey covering Manufacturing Industries and KIBS. The sample includes 587 KIBS firms that have used external sources of knowledge and implemented innovations in products, processes, services, organizational structures, or marketing. It assesses how these innovations impact market share, productivity, and environmental outcomes.

In Peru, between 2015 and 2017, KIBS grew moderately, increasing its contribution to GDP from 8.9% in 2015 to 9.3% in 2017. This growth was also reflected in the workforce, which grew from 0.8 million to 0.9 million during the same period (Ministry of Production [PRODUCE], 2020). As a result, Peru's Ministry of Production has prioritized this sector in public policy.

This research aims to deepen the understanding of Peruvian KIBS performance by examining the role of different knowledge sources and the implementation of technological and non-technological innovations. Accordingly, this work addresses three research questions:

RQ1. Are there positive relationships between knowledge sources and technological or non-technological innovation in Peruvian KIBS?

RQ2. Are technological and non-technological innovations positively linked to market and environmental performance in Peruvian KIBS?

RQ3. Are there differences between P-KIBS and T-KIBS in these relationships?

The findings show a positive association between knowledge sources and innovation in Peruvian KIBS. However, the innovations studied do not show a statistically significant positive association with market and environmental performance. This study makes three main contributions to the existing literature. First, it provides empirical data on the factors (knowledge sources) that drive innovation in KIBS firms within an emerging economy, an area that is not well explored. Second, it differentiates between technological and non-technological innovation, allowing for a more detailed understanding of how KIBS firms innovate. Third, it examines the impact of various knowledge sources—such as customers, suppliers, competitors, and universities—on innovation, thus enriching research on open innovation and interactive learning in KIBS. Specifically, the study offers evidence on the innovation patterns of small KIBS firms, emphasizing their reliance on knowledge sources.

The remainder of the paper is organized as follows: Section 2 presents the literature review and hypotheses. Section 3 explains and justifies the research method. Section 4 reports and discusses the results. The final section outlines the study's conclusions, implications, and limitations.

2. Theoretical Framework and Hypotheses

This research builds on the concepts of the Knowledge-Based View (KBV) and absorptive capacity to explore how knowledge flows influence innovation and firm performance in knowledge-intensive business services (KIBS). The KBV views knowledge as the firm's most valuable resource, emphasizing that achieving a competitive advantage depends on the ability to generate, integrate, and apply knowledge effectively (Grant, 1996). In sectors like KIBS, firms rely heavily on specialized knowledge and expertise to develop new solutions and services for clients. However, knowledge creation rarely happens in isolation (Chesbrough, 2003). Firms increasingly collaborate with external actors such as suppliers, clients, competitors, and universities to access additional knowledge (Laursen & Salter, 2006). These external sources offer valuable insights into technological opportunities, market demands, and emerging trends, which foster innovation (Cassiman & Valentini, 2016).

The concept of absorptive capacity improves this perspective by explaining how firms identify, absorb, and apply external knowledge to drive innovation (Cohen & Levinthal, 1990). Firms with higher absorptive capacity are more skilled at leveraging external knowledge and transforming it into both technological and non-technological innovations.

Building on these theoretical perspectives, this study indicates that knowledge sources facilitate innovation activities in KIBS firms, thereby affecting firm outcomes. In fact, many KIBS firms engage in what can be called a "doing, using, and interacting" mode of innovation, enabled by network interactions, learning-by-doing, and experience (Jensen et al., 2007). Thus, innovations can boost a firm's competitiveness and support the adoption of more efficient and sustainable practices, potentially enhancing market and environmental performance. However, it is important to recognize that firms with different knowledge bases may achieve diverse outcomes.

2.1 KIBS and Innovation Process

Research on innovation in KIBS firms has grown, primarily because they are among the most dynamic segments within the service sector, not only in developed countries, but also in developing countries (Crespi et al., 2018). Thus, there has been a growing interest in the study of KIBS due to the important role they play in their clients' business processes (Miles, 2005), especially to compensate for, or complement, their innovation capabilities (Ciriaci et al., 2015; Seclen-Luna et al., 2024a).

Innovations can be classified in numerous ways; the classical typology distinguishes between technological and non-technological innovations. Technological innovation refers to product and process innovation (Chichkanov et al., 2021), i.e., introducing a new product (or service) or a new production process into the firm, whilst non-technological innovation is related to organizational and marketing innovations (Amara et al., 2016).

From the technological perspective, despite literature recognizing that technological innovation affects the firm's sales and productivity positively (Grazzi et al., 2016), in some cases, in developing countries, product and process innovation does not affect the firm's sales (Feng et al., 2021). However, it is important to note that KIBS' innovations can be informal and highly iterative. Recent studies showed that product and process innovation reduce a firm's environmental impact, especially when they are part of business models for sustainability (Schaltegger et al., 2015). Unfortunately, there is less evidence for Latin American countries (Moya-Fernández & Seclen-Luna, 2024).

From a non-technological innovation perspective, evidence indicates that organizational innovation positively affects firm performance (Cheng & Shiu, 2015). Despite this, some studies further proved the negative impact of organizational and marketing innovation on stock returns (Szutowski, 2021). Marketing innovation refers to a firm's responsibility to use innovative or significantly improved marketing methods to allocate resources efficiently, satisfy customer demand, and deliver superior value to customers. For example, Gotteland et al. (2020) found that being a market pioneer has a positive and substantial effect on sales per employee and on a firm's growth rate. In addition, empirical evidence shows that marketing communication affects green labeling, which is increasingly important in sustainable consumption (Kumar-Kar & Harichandan, 2022).

The literature on innovation emphasizes that introducing new products, processes, or services can bring benefits such as increased production efficiency, differentiation from competitors, and greater ability to meet customer needs (Rodríguez et al., 2017). However, various studies show that the effect of innovation on business performance is not always immediate or direct. Often, the advantages of innovation may take years to become evident, especially for organizational or service innovations (Grazzi et al., 2016). Additionally, innovations tend to be incremental and closely tied to customer relationships, which can make it difficult to realize the economic benefits, particularly for small businesses with limited resources and organizational capacities (Lafuente & Vaillant, 2023). Thus, based on these arguments, we propose the following hypotheses:

H1a. Technological innovation in KIBS firms is positively associated with their market and environmental performance.

H1b. Non-technological innovation in KIBS firms is positively associated with their market and environmental performance.

2.2 Knowledge Sources, Innovation, and Performance in KIBS

Research on open innovation shows that combining internal and external knowledge is essential for fostering innovation (Chesbrough, 2003; Doloreux & Frigon, 2020). Several theories suggest that innovation is an ongoing, interactive learning process involving a firm and its external environment. Successfully launching innovations often depends on the firm's ability to build and maintain strong external collaborations (Bogers et al., 2018). External knowledge is frequently gathered from stakeholders such as customers, suppliers, and strategic partners. As a result, innovation is viewed as a collaborative effort where value is co-created through continuous engagement between the firm and its stakeholders (Schaltegger et al., 2015).

Research on KIBS innovation highlights the important role of customers and the involvement of suppliers and competitors in improving KIBS processes and services (Rodríguez et al., 2017). Suppliers, in particular, possess essential knowledge about products, environmental risks, and opportunities for eco-innovations (Saghiri & Mirzabeiki, 2021). However, Littunen et al. (2021) found that customers, suppliers, and competitors were not associated with the adoption of innovation in Finland's KIBS sector. Similarly, studies in Latin America show that supply chain knowledge sources are not correlated with innovation among KIBS firms in Chile, Colombia, and Uruguay (Crespi & Vargas, 2015). This pattern is especially pronounced for Peruvian KIBS (Seclen-Luna et al., 2024b).

External organizations, such as universities, are often seen as valuable sources of new knowledge (Pinto et al., 2015). However, some research suggests that universities may negatively affect innovation in KIBS (Crespi & Vargas, 2015; Littunen et al., 2021). Additionally, specialized conferences and journals are considered key sources of knowledge for driving innovation in KIBS (Chichkanov et al., 2021). Conversely, other studies have found no supporting evidence for this role (Crespi & Vargas, 2015).

In summary, the literature on innovation emphasizes the importance of external knowledge sources in fostering innovation. Relationships with customers, suppliers, competitors, and universities can offer access to valuable information about new technologies, market demands, and business opportunities (Laursen & Salter, 2006). For KIBS, these interactions are particularly significant given the knowledge-intensive nature of their activities (Djellal & Gallouj, 2018). Therefore, we propose the following hypotheses:

H2a. The knowledge sources are positively associated with KIBS' technological innovation.

H2b. The knowledge sources are positively associated with KIBS' non-technological innovation.

In addition to their impact on innovation, knowledge sources can directly affect business performance. Interactions with customers, suppliers, competitors, and universities offer strategic insights into market conditions, technological trends, and

business opportunities, which can help enhance firms' competitive positioning (Saghiri & Mirzabeiki, 2021) and even aid in spreading sustainable practices and developing innovative solutions to reduce environmental impact (Horbach, 2008). In this way, knowledge sources play a crucial role in boosting both market and environmental performance. Therefore, the following hypothesis is proposed:

H2c. The knowledge sources are positively associated with KIBS' market and environmental performance.

2.3 Heterogeneity in KIBS

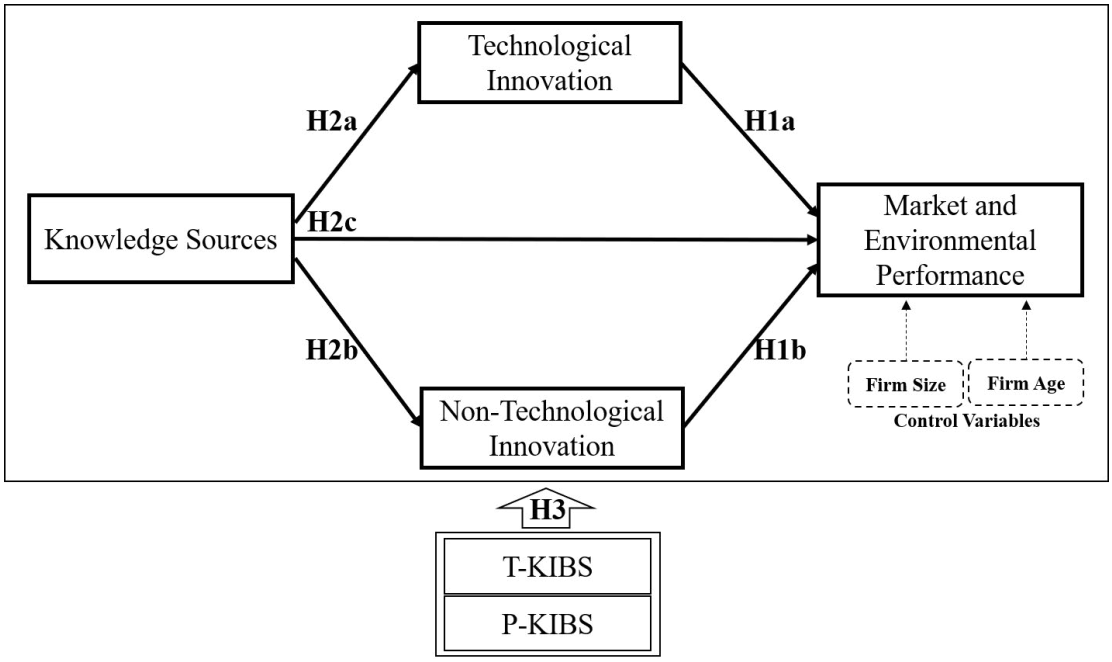
While current literature considers KIBS to be innovative (Chichkanov et al., 2021), evidence shows that not all KIBS share the same level of innovation, and the differences among KIBS sub-sectors remain underexplored (Rodríguez et al., 2017). The main categories identified are professional-based KIBS (P-KIBS) and technology-based KIBS (T-KIBS). The role and significance of KIBS may vary depending on the type of knowledge-intensive service provided. P-KIBS services often heavily utilize technology and include legal, accounting, management, and consulting services. They depend on personal experience and are less likely to transfer knowledge to other local firms (Doloreux & Frigon, 2020). Consequently, P-KIBS are associated with non-technological innovation (Seclen-Luna et al., 2022).

The T-KIBS are grounded in scientific and technological expertise, including engineering consulting, computer services, technical testing, and R&D activities. Some researchers note that T-KIBS tend to align more closely with manufacturers' processes and operations (Ciriaci et al., 2015). Furthermore, T-KIBS mainly focus on technological innovation, emphasizing its significance over that of P-KIBS (Seclen-Luna et al., 2022). Therefore, given the differences among KIBS categories, one should not generalize, as these services involve diverse processes and knowledge bases (Pina & Tether, 2016). Based on this, we propose the following hypotheses:

H3. The positive relationship among knowledge sources, innovation, and market and environmental performance is stronger in T-KIBS than in P-KIBS.

Figure 1 presents the set of hypotheses formulated within the conceptual model.

Figure 1: Relationships Model



Source: Author's own elaboration

3. Methodology

3.1 Data description and sample

This study uses data from Peru's National Innovation Survey in Manufacturing Industries and KIBS. Conducted every three years by the Peruvian Institute of Statistics and Informatics, the survey follows the Oslo Manual methodology to enable international comparisons. It employs stratified random sampling by location, industry, and firm size to collect data from 2015 to 2017. Officially trained interviewers conduct face-to-face interviews with business managers or firm owners and record the data on forms.

The survey dataset has been used in prior research on innovation and has been published in relevant international journals; for example, see Seclen-Luna et al. (2024a). Our study focuses solely on KIBS that have employed external knowledge sources and achieved innovation in product, process, service, organizational, and marketing aspects, with subsequent relationships on market and environmental performance. Based on these criteria, we examined 587 KIBS, categorized into P-KIBS (213 firms) and T-KIBS (374 firms).

3.2 Description of variables

3.2.1 Dependent variable

The primary dependent variable in our study is market and environmental performance. Li and Vermeulen (2021) suggest that product innovation boosts market share. Additionally, Szutowski (2021) points out that process innovation helps firms achieve greater efficiency and higher productivity; consequently, Park et al. (2017) argue that productivity improvements from innovation lead to decreased use of materials, water, and energy. Therefore, the market and environmental performance construct comprises three factors: (1) expanding the firms' market share; (2) enhancing worker productivity; (3) minimizing negative environmental impacts.

To evaluate these factors, three questions from the survey were considered, in which respondents were asked, for example, 1) "From the innovation that your firm has implemented during the period 2015-2017, what level of importance was assigned to increased market share in terms of sales?" Each factor within the construct "market and environmental performance" is measured on a four-point scale (1-4), where 1 indicates "none," 2 "low," 3 "medium, and 4 "high." A similar approach to measuring these factors has been used in previous studies on eco-innovation; for example, see Wugan and Guangpei (2018). This measurement method is useful for demonstrating how managerial experience influences perceptions of innovation effects (Kunc & Morecroft, 2010).

3.2.2 Independent variables

This study examines two constructs: first, innovation (both technological and non-technological), and second, knowledge sources. To analyze the innovation construct, five survey questions are considered. For example, "During the 2015–2017 period, did your firm improve or introduce a new product into the market?" These questions are measured on a dichotomous scale, as in previous studies (e.g., Rodríguez et al., 2017; Moya-Fernández & Seclen-Luna, 2024). Therefore, a value of 1 indicates that the innovation was implemented, whereas 0 indicates it was not.

The knowledge sources construct assumes that KIBS have utilized different knowledge sources to achieve innovation. To assess each one, the following survey question was used: "What was the degree of importance of the following knowledge sources that your firm used for developing innovations during 2015-2017?" For these variables, ordinal scales were employed, representing the degree of importance (1 = none, 2 = low, 3 = medium, 4 = high) of the following knowledge sources: (1)

within the firm or group of firms; (2) suppliers of equipment, materials, components, software; (3) clients; (4) competitors or other firms in their sector; (5) universities; (6) technical and commercial magazines. This measurement approach has been used in previous studies on KIBS, such as those by Amara et al. (2016) and Rodríguez et al. (2017).

3.2.3 Control variables

As in previous studies, this research includes firm size and age variables, which can influence a firm's market and environmental performance. The size variable is measured as the logarithm of the number of employees, and the firm age is the number of years since its founding year through 2018, expressed in logarithms (Amara et al., 2016).

3.3 Method and data analysis

The AMOS software was used to estimate a structural equation model in two steps. First, we estimated the measurement model by using confirmatory factor analysis (CFA). Second, the structural model was estimated using the coefficients and their levels of statistical significance.

4. Results

4.1 Descriptive Statistics

Table 1 presents descriptive statistics for the firms included in the subsamples. They are classified by age and size. Following Coad (2018), which defines a young firm as one with fewer than 10 years of operation, firms are classified by age into 10-year groups, with the last category being 30 years or more. Regarding firm size, we follow the European Union criteria, which specify that a small firm has fewer than 50 employees, a medium-sized firm fewer than 250, and a large company more than 250.

Table 1: KIBS Firms regarding Age and Size

Firm Age	P-KIBS	T-KIBS
< 10 years	33	69
10 to 19 years	99	174
20 to 29 years	61	110
30 or more years	20	21
Total	**213**	**374**
Firm Size		
Small (50 employees)	130	227
Medium (Between 51 and 250 employees)	58	100
Large (≥250 employees)	25	47
Total	**213**	**374**

P-KIBS: firms related to legal services, accounting services, management services, and other consulting services.
T-KIBS: firms related to engineering services, computer services, technical testing services, R&D services, and other scientific and technical services.
Source: Author's own elaboration

4.2 Factorial Analysis

The knowledge sources, innovation, and eco-innovation performance constructs were analyzed using SPSS software. An Exploratory Factor Analysis (EFA) was conducted to identify which items measure each factor. According to Everitt and Rabe-Hesketh (2001), a KMO value greater than 0.5 indicates adequate factorability of the item set, as does Bartlett's sphericity test. Therefore, the factorial structure is established to facilitate clearer and more meaningful interpretation (Rossoni et al., 2016). The results are presented in Table 2.

Table 2: Factor Loading Variables

Variable	Indicator	P-KIBS			T-KIBS		
		Factorial Loadings	Explained Variance	Goodness of Fit	Factorial Loadings	Explained Variance	Goodness of Fit
Knowledge Sources	Within the Firm	0.588	69.88%	KMO: 0.756 Barlett: 35.196 (p=0.001)	0.516	65.76%	KMO: 0.861 Barlett: 1438.6 (p=0.001)
	Suppliers	0.769			0.830		
	Clients	0.832			0.819		
	Competitors	0.932			0.890		
	Universities	0.929			0.896		
	Journals & Magazines	0.912			0.851		
Technological Innovation	Product innovation	0.768	49.12%	KMO: 0.576 Barlett: 35.196 (p=0.001)	0.525	47.11%	KMO: 0.545 Barlett: 52.040 (p=0.001)
	Service innovation	0.600			0.724		
	Process innovation	0.723			0.783		
Non-Technological Innovation	Organizational innovation	0.747	55.83%	KMO: 0.500 Barlett: 2.880 (p=0.090)	0.758	57.51%	KMO: 0.500 Barlett: 8.473 (p=0.004)
	Marketing innovation	0.747			0.758		
Market and Environmental Performance	Increased Market Share	0.892	83.78%	KMO: 0.736 Barlett: 938.784 (p=0.001)	0.843	78.95%	KMO: 0.712 Barlett: 573.925 (p=0.001)
	Increased Productivity	0.910			0.906		
	Reduction of Environmental Impact	0.934			0.915		

Source: Author's own elaboration

The percentage of the total variance explained in P-KIBS and T-KIBS must be consistent to verify reliability and validity. A varimax rotation was also considered to obtain a clearer factorial structure, which redistributes the explained variance among all rotated components to enhance interpretation (Acal et al., 2020).

4.3 Measurement Model

According to Peterson and Kim (2013), composite reliability is a more accurate measure compared to Cronbach's Alpha. Regarding emerging validity, the indicators align with established values. The multicollinearity analysis is valid for all variables, with the variance inflation factor not exceeding 5. For discriminant validity, the Fornell and Larcker (1981) criterion is used, which states that the square root of the extracted variance (AVE), shown in the diagonals and in bold in Table 3, should be greater than the correlations between the latent variables. In this study, the model meets the criterion of discriminant validity for both P-KIBS and T-KIBS.

Table 3: Discriminant Validity (Fornell-Larcker Criterion).

Categories	Variables	Knowledge Sources	Technological Innovation	Non-Technological Innovation	Market & Environmental Performance
P-KIBS	Knowledge Sources	**0.836**			
	Technological Innovation	0.304	**0.701**		
	Non-Technological Innovation	0.471	0.209	**0.747**	
	M & E Performance	0.805	0.306	0.498	**0.912**
T-KIBS	Knowledge Sources	**0.811**			
	Technological Innovation	0.473	**0.686**		
	Non-Technological Innovation	0.539	0.405	**0.758**	
	M & E Performance	0.801	0.460	0.467	**0.889**

Note: Values in bold on the diagonal are the square root of AVE, and the other values show correlations between the constructs in the model.
Source: Author's own elaboration

4.4 Structural Model

Table 4 shows that knowledge sources are positively associated with both technological and non-technological innovation, whereas the other factors are not. This indicates that different knowledge sources may relate to different types of innovation (Rodríguez et al., 2017), with a more pronounced positive association with non-technological innovation.

Table 4: Structural Model Results

Categories	Hypothesis	Coefficient	P-value
P-KIBS	H1a: TI → MEP	-0.136	0.125
	H1b: NTI → MEP	-0.017	0.980
	H2a: KS → TI	0.380**	0.019
	H2b: KS → NTI	0.943***	0.001
	H2c: KS → MEP	1.002	0.116
T-KIBS	H1a: TI → MEP	-0.064	0.301
	H1b: NTI → MEP	5.091	0.958
	H2a: KS → TI	0.593**	0.002
	H2b: KS → NTI	1.008***	0.001
	H2c: KS → MEP	-4.238	0.996

*Note: TI: Technological Innovation; NTI: Non-technological Innovation; MEP: Market and Environmental Performance; KS: Knowledge Sources. P-value: *p≤0.1; **p≤0.05; ***p≤0.001.*
Source: Author's own elaboration

The model also meets the fit indices based on the following measures: Minimum Discrepancy Function divided by Degrees of Freedom (CMIN/DF), Comparative Fit Index (CFI), Normed Fit Index (NFI), Relative Fit Index (RFI), Incremental Fit Index (IFI), Tucker Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). The resulting values suggest an adequate fit of the research model. Therefore, the structural models are deemed acceptable (Table 5) and demonstrate a good fit (Hair et al., 2010) for P-KIBS and T-KIBS, respectively.

Table 5: Model's Goodness of Fit

Indices	Structural Model P-KIBS	Structural Model T-KIBS	Acceptable Fit Level
CMIN/DF	1.928	2.347	<1;5>
NFI	0.910	0.925	0.90 a 1
CFI	0.954	0.955	0.95 a 1
RFI	0.900	0.902	0.90 a 1
IFI	0.954	0.955	0.95 a 1
RMSEA	0.066	0.060	<0.08

Source: Author's own elaboration

Finally, Table 6 displays the coefficients of the control variables for P-KIBS and T-KIBS, respectively. In the P-KIBS model, the firm age variable is negative, and the firm size variable is positive; however, neither is statistically significant. Likewise, in T-KIBS, both firm age and size are positive but not statistically significant. This indicates that, regardless of size or age, KIBS use knowledge sources and can implement innovations. This finding aligns with other studies, such as Doloreux et al. (2019) and Seclen-Luna et al. (2022).

Table 6: Control Variable Coefficients

	P-KIBS		T-KIBS	
Control Variable	Coefficient	P-value	Coefficient	P-value
Firm Age	-0.025	0.514	0.012	0.733
Firm Size	0.006	0.877	0.002	0.966

*Note: *p<=0.1; **p<=0.05; ***p<=0.001.*
Source: Author's own elaboration

5. Discussion

Table 4 shows the model results. The three constructs are examined across the two KIBS categories: P-KIBS and T-KIBS. We find that knowledge sources are associated with KIBS innovations; however, these innovations are not related to market and environmental performance.

First, the analysis of the link between knowledge sources and innovation reveals that many studies emphasize how success in innovation depends on a firm's ability to build and maintain strong external relationships with stakeholders (Bogers et al., 2018). Firms connected to various actors within the innovation ecosystem can effectively absorb knowledge, thereby strengthening their innovation capabilities (Doloreux et al., 2019). Our research reveals that Peruvian KIBS aim to connect with multiple knowledge sources to enhance their innovation capability. For P-KIBS, competitors are the main source of knowledge, while for T-KIBS, it is universities. Additionally, technological innovations are more prominent for both groups, especially in T-KIBS, where process innovation plays a significant role. Moreover, knowledge sources are positively associated with technological innovation (coefficient = 0.380**, p < 0.019) and non-technological innovation (coefficient = 0.943***, p < 0.001) in P-KIBS. Similarly, for T-KIBS, the positive relationships include technological innovation (coefficient = 0.593**, p<0.002) and non-technological innovation (coefficient = 1.008***, p<0.001). These findings support hypotheses H2a and H2b and align with previous research emphasizing that KIBS knowledge comes from diverse sources (e.g., Rodríguez et al., 2017; Doloreux & Frigon, 2020; Seclen-Luna et al., 2024b).

These findings offer important insights into the factors that influence innovation in KIBS in emerging economies. Specifically, they demonstrate that external knowledge sources—such as customers, suppliers, competitors, and universities—are crucial for fostering both technological and non-technological innovations. This supports the open innovation and interactive learning literature, which emphasizes the role of knowledge networks in developing innovations in knowledge-intensive sectors (Chesbrough, 2003; Laursen & Salter, 2006). Additionally, these results are consistent with earlier research on KIBS, highlighting the interactive nature of innovation in these services. In such firms, innovation frequently results from collaboration with customers and other external actors, making external relationships essential in the innovation process, particularly for small KIBS firms (Muller & Doloreux, 2009).

Second, in addition to their impact on innovation, knowledge sources can directly influence business performance. Interactions with customers, suppliers, competitors, and universities provide strategic insights into market trends, technological developments, and business opportunities, which can help improve firms' competitive positioning (Saghiri & Mirzabeiki, 2021). Even the literature acknowledges that firms' use of external knowledge can lead them to engage in eco-innovation (Wugan & Guangpei, 2018). However, our results did not find evidence of a relationship between knowledge sources and market and environmental performance. Therefore, this result does not support hypothesis H2c. One possible argument is that Peruvian KIBS are focused on bringing solutions to market because they are widely accepted, and their clients seek short-term results (Seclen-Luna et al., 2024a). That is to say, external sources are inputs in their innovation processes and are not automatically translated into performance. Also, since small firms dominate the sample (about 60%), their ability to capture the economic benefits may be limited (Lafuente & Vaillant, 2023).

Third, research on innovation in service firms shows that KIBS firms that develop both technological and non-technological innovations tend to improve their performance (Doloreux et al., 2019). For example, Grazzi et al. (2016) observed that technological innovation affects a firm's sales and productivity; however, in developing countries, product and process innovations do not always result in increased sales (Feng et al., 2021). Recent studies also reveal that product and process innovations can reduce a firm's environmental impact; however, in some cases, they are negatively associated with firm value (Yao et al., 2019). Similarly, Szutowski (2021) emphasizes the negative impact of process innovation on stock returns. Therefore, the links between technological and non-technological innovation and market and environmental performance remain uncertain.

Our study contributes to this debate and shows that Peruvian KIBS' technological and non-technological innovation is not significantly linked to market and environmental performance. As a result, this does not support hypotheses H1a and H1b. This indicates that innovation alone does not automatically lead to better performance, particularly in contexts dominated by small businesses and highly competitive informal markets. This does not mean that innovation is unimportant for business performance; rather, its relationship may be more complex than traditional linear models of innovation suggest. One possible explanation concerns the time lag between the introduction of innovations and the achievement of economic or environmental outcomes. In particular, innovations in services often require organizational adaptation and customer acceptance, which can delay the realization of their benefits (Djellal & Gallouj, 2018). Furthermore, the fact that a significant proportion of the sample consists of small KIBS may influence these results. Small businesses often face greater difficulties in scaling and commercializing their innovations, which can limit their ability to capture the economic benefits of these activities fully (Lafuente & Vaillant, 2023).

Fourth, in response to calls in the KIBS literature to compare KIBS subsectors (e.g., Rodríguez et al., 2017), this study provides an empirical comparative analysis of T-KIBS and P-KIBS. As shown earlier, there are slight differences between the two KIBS groups. For example, T-KIBS show the strongest positive association between knowledge sources and innovations (technological and non-technological) compared with P-KIBS. This result aligns with previous studies in Latin America (e.g., Seclen-Luna & Moya-Fernández, 2020), which found that T-KIBS are more likely to achieve innovation than

P-KIBS. However, the analysis of the relationship between innovation and performance reveals no statistically significant association in either KIBS group. Therefore, these results only partially support hypothesis H3.

Lastly, regarding the control variables, our results show that the coefficients are very small and not significant for both variables. Therefore, the age and size of Peruvian KIBS do not influence these relationships, especially between knowledge sources and innovations, as Amara et al. (2016) also found.

6. Conclusions, Implications, and Limitations

The goal of this research was to examine how different sources of knowledge contribute to both technological and non-technological innovation. It also aimed to explore the relationship between these types of innovation and the market and environmental performance of Peruvian KIBS firms. The results indicate that, in Peruvian KIBS, external knowledge sources are the main drivers of innovation. However, innovation does not automatically lead to improved business performance (Djellal & Gallouj, 2018); they face greater challenges in realizing the economic benefits of innovation. Additionally, in relative terms, P-KIBS rely more on knowledge sources than T-KIBS.

6.1 Theoretical Implications

This work's primary contribution is demonstrating that when KIBS access multiple knowledge sources, they expand their knowledge base, enabling the development of both technological and non-technological innovations. This aligns with earlier research showing that KIBS connected to various actors within the innovation ecosystem can assimilate knowledge to boost their innovative capacity (e.g., Doloreux et al., 2019; Rodríguez et al., 2017). Nevertheless, external knowledge sources can have heterogeneous effects on performance (Moya-Fernández & Seclen-Luna, 2024). Our findings add to this discussion by not revealing a significant relationship between knowledge sources and performance (Feng et al., 2021). Similar outcomes have been noted in previous studies, indicating that collaboration in eco-innovation does not always yield positive outcomes (Yao et al., 2019).

The lack of a significant link between innovation and firm performance can be attributed to several factors. Firstly, the cross-sectional data do not account for the time lag between implementing innovations and their influence on performance. Secondly, many innovations in KIBS are incremental, improving operational efficiency but not providing immediate competitive advantages. Thirdly, intense competition in service markets may diminish the effect of innovation on performance. Lastly, since small firms dominate the sample (about 60%), their ability to capture the economic benefits of innovation may be limited (Lafuente & Vaillant, 2023).

Secondly, our study helps to deepen the understanding of the differences between the two KIBS groups. Literature acknowledges distinctions among KIBS subsectors, mainly based on their knowledge bases (e.g., Rodríguez et al., 2017; Pina & Tether, 2016) and modes of innovation (Jensen et al., 2007). P-KIBS are typically seen as heavy users of technology and are associated with non-technological innovation. At the same time, T-KIBS rely on scientific and technological knowledge and are primarily linked to technological innovation (Seclen-Luna et al., 2022). We observe slight differences between these groups. For instance, T-KIBS firms show stronger positive relationships between knowledge sources and both technological and non-technological innovations than P-KIBS firms. This aligns with earlier findings in the Latin American context (e.g., Seclen-Luna & Moya-Fernández, 2020), which suggest that T-KIBS are more likely to innovate than P-KIBS.

6.2 Managerial Implications

First, since various knowledge sources are linked to both technological and non-technological innovation, managers should focus on effectively managing external relationships to boost innovation capacity, improve value co-creation, and develop business models. Our research indicates that T-KIBS are more likely to source knowledge from universities, while P-KIBS depend more on competitors. That means T-KIBS seek scientific knowledge, while P-KIBS tend to seek incremental or existing knowledge. Therefore, innovation management should systematically plan, organize, coordinate, and control internal and external resources, especially concerning business model innovation and stakeholder roles (Schaltegger et al., 2015). Additionally, since Peruvian KIBS firms are mainly small, they tend to be market-oriented solution providers, so managers should enhance firm's absorptive capacity and integrate collaboration into their environmental strategies. This highlights the need for public policies aimed not only at stimulating innovation but also at strengthening firms' capacity to capture the economic benefits of these innovations.

Secondly, the findings can help policymakers strengthen knowledge networks, since external sources are crucial to the local ecosystem. Therefore, policies should promote collaboration among universities, businesses, innovation clusters, and cooperation platforms. Moreover, given the importance of universities, governments should enhance knowledge-transfer programs, including technology-transfer offices, collaborative projects, and applied research. Finally, because small businesses often face financial constraints and organizational challenges, policies could include subsidies for innovation and training initiatives. This aligns with the framework proposed by Acs et al. (2022) for Latin America, Szerb et al. (2019) for Europe, and Lafuente et al. (2024) at the global scale, which highlights that the success of the entrepreneurship and innovation policies depends on their ability to target the local ecosystem bottlenecks rather than using one-size-fits-all solutions.

6.3 Limitations

First, our findings are based on the experience of Peruvian KIBS, which may raise concerns about applicability in other sectoral, geographical, and cultural contexts. Future research should adopt a cross-country approach to consider the influence of different institutional environments and cultural differences. Second, since this study is cross-sectional, it does not capture the dynamic nature of innovation processes, which may involve more complex variables such as network structures and interaction intensity. For this reason, further longitudinal studies are recommended to examine the relationships between external knowledge sources, technological and non-technological innovation, and market and environmental performance over time. Third, although this study distinguishes between P-KIBS and T-KIBS, this categorization may not fully capture the heterogeneity within each subsector, potentially limiting the analysis. Future research could classify KIBS by industrial sector, following the International Standard Industrial Classification. Finally, the reliance on self-reported measures may introduce bias.

References

Acal, C., Aguilera, A. M., & Escabias, M. (2020). New modeling approaches based on varimax rotation of functional principal components. *Mathematics*, *8*(11), Article 2085. https://doi.org/10.3390/math8112085

Acs, Z. J., Lafuente, E., & Szerb, L. (2022). A note on the configuration of the digital ecosystem in Latin America. *TEC Empresarial*, *16*(1), 1-15. https://doi.org/10.18845/te.v16i1.5926

Amara, N., D´Este, P., Landry, R., & Doloreux, D. (2016). Impacts of obstacles on innovation patterns in KIBS firms. *Journal of Business Research*, *69*(10), 4065–4073. https://doi.org/10.1016/j.jbusres.2016.03.045

Bogers, M., Chesbrough, H., & Moedas, C. (2018). Open innovation: research, practices, and policies. *California Management Review*, *60*(2), 5–16. https://doi.org/10.1177/0008125617745086

Cassiman, B., & Valentini, G. (2016). Open innovation: Are inbound and outbound knowledge flows really complementary? *Strategic Management Journal*, *37*(6), 1034–1046. https://doi.org/10.1002/smj.2375

Cheng, C.C.J., & Shiu, E.C. (2015). The inconvenient truth of the relationship between open innovation activities and innovation performance. *Management Decision*, *53*(3), 625–647. https://doi.org/10.1108/MD-03-2014-0163

Chesbrough, H.W. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business Press.

Chichkanov, N., Miles, I., & Belousova, V. (2021). Drivers for innovation in KIBS: evidence from Russia. *The Service Industries Journal*, *41*(7-8), 489-511. https://doi.org/10.1080/02642069.2019.1570151

Ciriaci, D., Montresor, S. & Palma, D. (2015). Do KIBS make manufacturing more innovative? An empirical investigation of four European countries. *Technological Forecasting and Social Change*, *95*, 135–151. https://doi.org/10.1016/j.techfore.2015.02.008

Coad, A. (2018). Firm age: a survey. *Journal of Evolutionary Economics*, *28*(1), 13-43. https://doi.org/10.1007/s00191-016-0486-0

Cohen, W.M., & Levinthal, D.A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, *35*(1), 128-152. https://doi.org/10.2307/2393553

Corrocher, N., Cusmano, L., & Morrison, A. (2009). Modes of innovation in knowledge-intensive business services: evidence from Lombardy. *Journal of Evolutionary Economics*, *19*(2), 173–196. https://doi.org/10.1007/s00191-008-0128-2

Crespi, G., & Vargas, F. (2015). Innovación y productividad en las empresas de servicios en ALC. Evidencia a partir de encuestas sobre innovación. In D. Aboal, G. Crespi y L. Rubalcaba (eds.), *La innovación y la nueva economía de servicios en América Latina y el Caribe: Retos e implicaciones de política* (pp. 105-135). Centro de Investigaciones Económicas, Banco Interamericano de Desarrollo. https://doi.org/10.18235/0006495

Crespi, G., Katz, J. & Olivari, J. (2018). Innovation, natural resource-based activities, and growth in emerging economies: the formation and role of knowledge-intensive service firms. *Innovation and Development*, *8*(1), 79–101. https://doi.org/10.1080/2157930X.2017.1377387

Djellal, F., & Gallouj, F. (2018). Fifteen challenges for service innovation studies. In Djellal, F. & Gallouj, F. (Eds), *A Research Agenda for Service Innovation* (pp. 1-26). Edward Elgar Publishing. https://doi.org/10.4337/9781786433459.00005

Doloreux, D., Turkina, E., & Van Assche, A. (2019). Innovation type and external knowledge search strategies in KIBS: evidence from Canada. *Service Business*, *13*, 509-530. https://doi.org/10.1007/s11628-018-00393-y

Doloreux, D., & Frigon, A. (2020). Innovation in Knowledge Intensive Business Services (KIBS). *Canadian Journal of Administrative Sciences*, *37*(2), 122-134. https://doi.org/10.1002/cjas.1525

Everitt, B., & Rabe-Hesketh, S. (2001). Principal components and factor analysis. *In Analyzing Medical Data Using S-PLUS* (pp. 381-400). Springer. https://doi.org/10.1007/978-1-4757-3285-6

Feng, C., Ma, R., & Jiang, L. (2021). The impact of service innovation on firm performance: A meta-analysis. *Journal of Service Management*, *32*(3), 289–314. https://doi.org/10.1108/JOSM-03-2019-0089

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, *18*(3), 382–388. https://doi.org/10.1177/002224378101800313

Gotteland, D., Shock, J., & Sarin, S. (2020). Strategic orientations, marketing proactivity, and firm market performance. *Industrial Marketing Management*, *91*, 610-620. https://doi.org/10.1016/j.indmarman.2020.03.012

Grant, R.M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, *17*(S2), 109-122. https://doi.org/10.1002/smj.4250171110

Grazzi, M., Pietrobelli, C., & Szirmai, A. (2016). Determinants of enterprise performance in Latin America and the Caribbean: what does the micro-evidence tell us? In: M. Grazzi, C. Pietrobelli (Eds.), *Firm Innovation and Productivity in Latin America and the Caribbean: The Engine of Economic Development* (pp.1–36). World Bank. https://doi.org/10.1057/978-1-349-58151-1_1

Hair, J. F., Black, W.C., Babin, B. J., Anderson, R.E., & Tatham, R.L. (2010). *Multivariate data analysis*, 7th Edition, Pearson.

Horbach, J. (2008). Determinants of environmental innovation—New evidence from German panel data sources. *Research Policy*, *37*(1), 163-173. https://doi.org/10.1016/j.respol.2007.08.006

Jensen, M., Johnson, B., Lorenz, E., & Lundvall, B.A. (2007). Forms of knowledge and modes of innovation. *Research Policy*, *36*(5), 680–693. https://doi.org/10.1016/j.respol.2007.01.006

Kumar-Kar, S., & Harichandan, S. (2022). Green marketing innovation and sustainable consumption: A bibliometric analysis. *Journal of Cleaner Production*, *361*, Article 132290. https://doi.org/10.1016/j.jclepro.2022.132290

Kunc, M. & Morecroft, J. (2010). Managerial decision making and firm performance under a resource-based paradigm. *Strategic Management Journal*, *31*(11), 1164–1182. https://doi.org/10.1002/smj.858

Lafuente, E., Vaillant, Y., & Serarols, C. (2010). Location decisions of knowledge-based entrepreneurs: Why some Catalan KISAs choose to be rural? *Technovation*, *30*(11-12), 590-600. https://doi.org/10.1016/j.technovation.2010.07.004

Lafuente, E., Vaillant, Y., & Vendrell-Herrero, F. (2017). Territorial servitization: Exploring the virtuous circle connecting knowledge-intensive services and new manufacturing businesses. *International Journal of Production Economics*, *192*, 19-28. https://doi.org/10.1016/j.ijpe.2016.12.006

Lafuente, E. & Vaillant, Y. (2023). Greater co-innovation and innovation efficiency through greening. *Journal of Cleaner Production*, *428*, Article 139516. https://doi.org/10.1016/j.jclepro.2023.139516

Lafuente, E., Acs, Z. J., & Szerb, L. (2024). Analysis of the digital platform economy around the world: A network DEA model for identifying policy priorities. *Journal of Small Business Management*, *62*(2), 847-891. https://doi.org/10.1080/00472778.2022.2100895

Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal*, *27*(2), 131-150. https://doi.org/10.1002/smj.507

Li, X., & Vermeulen, F. (2021). High risk, low return (and vice versa): The effect of product innovation on firm performance in a transition economy. *Academy of Management Journal*, *64*(5), 1383–1418. https://doi.org/10.5465/amj.2017.1311

Littunen, H., Tohmo, T., & Storhammar, E. (2021). Innovation among SMEs in Finland: The impact of stakeholder engagement and firm-level characteristics. *Journal of Entrepreneurship, Management and Innovation*, *17*(4), 157-196. https://doi.org/10.7341/20211746

Miles, I. (2005). Knowledge-intensive business services: prospects and policies. *Foresight*, *7*(6), 39–63. https://doi.org/10.1108/14636680510630939

Ministry of Production [PRODUCE]. (2020). *Innovación en la Industria Manufacturera y en las Empresas de Servicios Intensivos en Conocimientos 2018*, p.36. Ministerio de la Producción, Lima, Perú.

Moya-Fernández, P.J., & Seclen-Luna, J.P. (2024). Evaluating the effects of information sources on innovation outcomes: Are there differences between KIBS and manufacturing firms from a Latin American country? *Journal of the Knowledge Economy*, *15*, 4024-4055. https://doi.org/10.1007/s13132-023-01305-w

Muller, E., & Doloreux, D. (2009). What we should know about knowledge-intensive business services. *Technology in Society*, *31*(1), 64–72. https://doi.org/10.1016/j.techsoc.2008.10.001

Park, M. S., Bleischwitz, R., Han, K. J., Jang, E. K., & Joo, J. H. (2017). Eco-innovation indices as tools for measuring eco-innovation. *Sustainability*, *9*(12), Article 2206. https://doi.org/10.3390/su9122206

Peterson, R.A., & Kim, Y. (2013). On the relationship between coefficient alpha and composite reliability. *Journal of Applied Psychology*, *98*(1), 194-198. https://doi.org/10.1037/a0030767

Pina, K., & Tether, B. (2016). Towards understanding variety in knowledge-intensive business services by distinguishing their knowledge bases. *Research Policy*, *45*(2), 401–413. https://doi.org/10.1016/j.respol.2015.10.005

Pinto, H., Fernández-Esquinas, M., & Uyarra, E. (2015). Universities and knowledge-intensive business services (KIBS) as sources of knowledge for innovative firms in peripheral regions. *Regional Studies*, *49*(11), 1873-1891. https://doi.org/10.1080/00343404.2013.857396

Rodríguez, M., & Camacho, J.A. (2010). Are knowledge-intensive business services so 'hard' innovators? Some insights using Spanish microdata. *Journal of Innovation Economics*, *5*(1), 41–65. https://doi.org/10.3917/jie.005.0041

Rodríguez, M., Doloreux, D., & Shearmur, R. (2017). Variety in external knowledge sourcing and innovation novelty: Evidence from the KIBS sector in Spain. *Technovation*, *68*, 35-43. https://doi.org/10.1016/j.technovation.2017.06.003

Rossoni, L., Engelbert, R., & Bellegard, N. L. (2016). Normal science and its tools: Reviewing the effects of exploratory factor analysis in management. *Revista de Administração*, *51*(2), 198-211. https://www.sciencedirect.com/science/article/pii/S0080210716300875

Saghiri, S. S. & Mirzabeiki, V. (2021). Buyer-led environmental supplier development: Can suppliers really help it? *International Journal of Production Economics*, Article 233. https://doi.org/10.1016/j.ijpe.2020.107969

Schaltegger, S., Hansen, E. G. & Lüdeke-Freund, F. (2015). Business models for sustainability: Origins, present research and future avenues. *Organization & Environment*, *29*(1), 3-10. https://doi.org/10.1177/1086026615599806

Seclen-Luna, J. P., & Moya-Fernández, P. (2020). Exploring the relationship between KIBS co-location and the innovativeness of the manufacturing firms in Latin America. *Journal of Regional Research*, *48*(3), 69-84. https://doi.org/10.38191/iirr-jorr.20.021

Seclen-Luna, J. P., Moya-Fernández, P., Barrutia, J. & Ferrucci, L. (2022). Innovation in micro firms builders that built machine tools: Effects of T-KIBS on technological and non-technological innovations. *Revista Brasileira de Gestão de Negócios*, *24*(1), 144-158. https://doi.org/10.7819/rbgn.v24i1.4163

Seclen-Luna, J. P., & Miles, I. (2023). *Policy Report on KIBS for the Basque Country*. (Report No. 2023/1). Basque Government Department of the Economy and the Treasury. https://doi.org/10.13140/RG.2.2.28319.12965

Seclen-Luna, J. P., Álvarez-Salazar, J., Cancino, C., & Schmitt, V.G.H. (2024a). The effects of innovations on Peruvian companies' sales: The mediating role of KIBS. *Technovation*, *129*, Article 102877. https://doi.org/10.1016/j.technovation.2023.102877

Seclen-Luna, J. P., Moya-Fernández, P., Del Carpio-Gallegos, J., & Aylas-Florez, E. (2024b). Innovation in KIBS firms: The effects of innovation activities, employees' level of education, and the sources in the supply chain. *International Journal of Business Environment*, *15*(3/4), 315-337. https://doi.org/10.1504/IJBE.2024.139727

Seclen-Luna, J. P., Castro-Vergara, R., Beingolea-Chávez, A.M., & Cándido, A.C. (2026). Differentiated effects of the acquisition of digital knowledge and digitalization on the Peruvian service firm's performance. *TEC Empresarial*, *20*(2), 10-29. https://doi.org/10.18845/te.v20i2.8629

Szerb, L., Lafuente, E., Horváth, K., & Páger, B. (2019). The relevance of quantity and quality entrepreneurship for regional performance: The moderating role of the entrepreneurial ecosystem. *Regional Studies*, *53*(9), 1308-1320. https://doi.org/10.1080/00343404.2018.1510481

Szutowski, D. (2021). The impact of eco-innovation on the stock returns of technology-based KIBS: Role of eco-innovation type and its degree of novelty. *Sustainability Accounting, Management and Policy Journal*, *12*(1), 130-155. https://doi.org/10.1108/SAMPJ-10-2019-0375

Wyrwich, M. (2019). New KIBS on the block: The role of local manufacturing for start-up activity in knowledge-intensive business services. *Regional Studies*, *53*(3), 320-329. https://doi.org/10.1080/00343404.2018.1478076

Wugan, C., & Guangpei, L. (2018). The drivers of eco-innovation and its impact on performance: Evidence from China. *Journal of Cleaner Production*, *176*, 110–118. https://doi.org/10.1016/j.jclepro.2017.12.109

Yao, Q., Liu, J., Sheng, S., & Fang, H. (2019). Does eco-innovation lift firm value? The contingent role of institutions in emerging markets. *Journal of Business and Industrial Marketing*, *34*(8), 1763-1778. https://doi.org/10.1108/JBIM-06-2018-0201