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Sustainable and Traditional Product Innovation without Scale and Experience, but Only for KIBS!

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Abstract: This study analyzes the ideal strategic trajectory for sustainable and traditional product innovation. Using a sample of 74 Costa Rican high-performance businesses for 2016, we employ fuzzy set analysis (qualitative comparative analysis) to evaluate how the development of sustainable and traditional product innovation strategies is conditioned by the business' learning capabilities and entrepreneurial orientation in knowledge-intensive (KIBS) and non-knowledge-intensive businesses. The results indicate two ideal strategic configurations of product innovation. The first strategic configuration to reach maximum product innovation requires the presence of KIBS firms that have both an entrepreneurial and learning orientation, while the second configuration is specific to non-KIBS firms with greater firm size and age along with entrepreneurial and learning orientation. KIBS firms are found to leverage the knowledge-based and customer orientations that characterize their business model in order to compensate for the shortage of important organizational characteristics—which we link to liabilities or smallness and newness—required to achieve optimal sustainable and traditional product innovation.

1. Introduction

Product innovation has increasingly been recognized as a primary means for organizational renewal via the exploitation and exploration of different resources and capabilities [1,2]. The debate on the relevance of product innovation as an engine of change and driver of sustainable competitive advantage has expanded beyond academic circles, and pressures from different stakeholders (e.g., public administrations, customers, society) have progressively swayed organizations—spanning from manufacturing to knowledge-intensive industries—to deploy significant resources to develop product innovation strategies [3,4]. Additionally, the growing awareness of the importance of sustainable product innovation as a key pillar for the consolidation of environmentally sustainable economic growth has led many companies to adopt specific strategic actions aimed at stimulating the development and commercialization of more sustainable products [5,6].

Sustainable innovations are defined as the creation of new market space, products and services, or processes driven by social, environmental, or sustainability issues [7]. Most firms have abandoned the long-held belief that sustainable innovations will disadvantage their competitiveness [8].

Sustainability has become the main driver of business innovation in the current period of economic recuperation that follows close to a decade of slowdown. A recent international survey on corporate sustainability policies—conducted by McKinsey & Company [9] on a sample of 2422 executives during 2017—reveals that 70% of the surveyed companies have some form of sustainability governance in place. The main factors explaining businesses' engagement in sustainability actions were found to be aspects related to the organization (alignment with corporate goals), the target market (reputation and meeting customers' expectations), and business operations (development of business growth opportunities and increased operational efficiency) [9].

Sustainability oriented innovation, from either organizational or technological origins, has been found to be increasingly responsible for both bottom- and top-line returns. From input efficiency to greater value-added products, sustainable product innovation is allowing many firms to create new and stronger sources of competitive advantage [4,8].

Since Schumpeter's [10] classic work, the need for organizational renewal has been recognized. However, whereas the traditional product innovation that characterized the greater part of the twentieth century was found to be enthused by a plethora of resources and capabilities whose effect amplify with business size and market experience [1], the performance of product innovation in the knowledge-based economy of the last thirty years has largely been associated with the entrepreneurial and learning orientation adopted by the firms that promote these innovations [4,11–13]. In the case of sustainable product innovation, it is not yet clear how the size of the firm or its market experience (business age), nor how a firm's learning capabilities or entrepreneurial orientation may influence the ultimate performance of such innovation strategies.

Organizations do not realize the outcomes of their sustainable or traditional product innovation strategies at the same intensity. A common presumption found in the strategic management literature is that product innovation is evidence of the business' ability to alter its resource configuration by creating, reconfiguring, and shedding different (heterogeneous) resources (see, e.g., Danneels [1], Slater et al. [2], Eisenhardt and Martin [14]). As a result, new product development reflects the business' trajectory of renewal. Additionally, the strategic path followed by organizations to achieve their product innovation plans may be affected by resource allocation policies and by strategic choices linked to various organizational characteristics [1,2].

However, organizations have different resource endowments, and in this paper, we argue that diverse resources, abilities, and internal processes are necessary to generate product innovation outcomes. In this sense, we focus on the potentially differentiating (sustainable and traditional) product innovation patterns of businesses that are characteristic of knowledge-based economies, namely knowledge-intensive business service firms (KIBS), relative to those observed in organizations operating in other, more traditional industries.

KIBS firms are primarily concerned with providing knowledge-intensive inputs to the business processes of other organizations or offering solutions to meet customer needs [15–17]. Because of their role as knowledge brokers that facilitate the accumulation and transmission of knowledge across the economy, at the base of competitiveness within knowledge-based economies, knowledge-intensive business services (KIBS) firms is a type of organization that has increasingly drawn the attention of scholars, policy makers, and practitioners [17–20].

Different from the case of businesses in other, maybe more traditional industries, KIBS firms are organizations whose primary source of competitive advantage relies in their capacity to create, accumulate, and exploit technical knowledge for the generation of customized services [15–17]. Therefore, product innovation performance is critical for KIBS businesses.

The analysis of the product innovation patterns in KIBS and non-KIBS businesses has been sidelined in previous studies [18,19]. This is the focus of this study. More concretely, by employing fuzzy set qualitative comparative analysis, we analyze the strategic trajectory for sustainable and traditional product innovation performance in different organizational contexts. Our analysis pays special attention to the potentially differentiating effect of organizational learning capabilities and

entrepreneurial orientation on the configuration of sustainable and traditional product innovation strategies of knowledge-intensive business service (KIBS) firms, as well as of businesses operating in traditional (non-knowledge-intensive) industries.

Notwithstanding the increased relevance of product innovation, the overwhelming majority of studies analyzed this strategy in large corporations operating in developed economies (see, e.g., the recent survey on sustainable product innovation by de Medeiros, et al. [4]), while few studies have specifically dealt with sustainable and traditional product innovation practices in developing economies or in small- and medium-sized businesses (see, e.g., the recent work by Sánchez-Medina et al. [21] and Lin et al. [22]). Small- and medium-sized enterprises (SMEs) are key economic players that make diverse contributions to the economy, in terms of employment, value-added innovations, and sustainability [23]. In this sense, the proposed analysis of the strategic trajectories for sustainable product innovation in different types of SMEs—i.e., distinguishing knowledge-intensive (KIBS) from non-knowledge-intensive firms—contributes to enrich the literature on sustainable product innovation. However, as opposed to KIBS firms, non-KIBS SMEs often lack complementary knowledge-based assets and organizational capabilities which limit their innovation potential. Additionally, by connecting sustainable product innovation to critical organizational elements (i.e., organizational learning capabilities and entrepreneurial orientation) via fuzzy set qualitative comparative analysis, this study extends the literature on how businesses orchestrate different business features—that we relate to size, market experience, organizational learning, and entrepreneurial orientation—to successfully achieve product innovation strategies, and on how the configuration of these features vary across industries.

The empirical application uses a unique sample of 74 high-performance Costa Rican businesses for the year 2016. The sample includes businesses operating in knowledge-intensive business services (KIBS), as well as firms in more traditional (manufacturing, retail, construction, and consumer services) industries. The Costa Rican setting is attractive for various reasons. First, Costa Rica's successful economic performance—e.g., growth in GDP per head at PPP (1991 = 7787 US\$, 2016 = 14,374 US\$), employment (employment rate in 2016 = 59% and long-term unemployment in 2016 = 1.6%)—and social achievements—e.g., long life expectancy (79.6 years), high level of human capital among the economically active population (adults' tertiary educational attainment in 2016 = 40%)—realized over the last three decades, have been acknowledged [24]. The positive evolution of Costa Rica's economic and social indicators positions the country atop the Latin American region (together with Chile) [25], and opened the doors of the OECD, who approved and set out the roadmap for Costa Rica's accession to the Organization on 8 July 2015 [26]. Second, manufacturers and KIBS firms play an important role in Costa Rica's economy. The country's economic strategy has favored the diversification of the productive basket reflected in the increased importance of manufacturing activities (manufacturing exports grew from 29.80% of total exports in 1980 to 57% in 2015), high-tech electronic products (semi-conductors by Intel) and, more recently, manufacturing goods linked to the medical industry (medical devices and instruments) [27]. Additionally, this trend towards a greater alignment with global value chains has also led to the rise of exports of business services, in particular, knowledge-based informatics and information services [27].

Third, the country has strong sustainability credentials. Costa Rica has built a world-renowned green trademark based on a strong culture-driven ecological tradition, as well as on state-led policies that protects workers' rights and encourage the adoption of corporate social responsibility practices [28]. Efforts in this direction focus not only on the efficient management of natural resources (the country powered itself with 100% renewable electricity for 250 days in 2016, is the world leader in wildlife protection, and aims to be carbon neutral by 2021), but also on the promotion of more environmentally sustainable production processes [29].

The remainder of the paper is organized as follows. Section 2 presents the theoretical underpinning. Section 3 describes the data and the methodological approach. The empirical findings

are presented in Section 4. Section 5 offers the discussion, and Section 6 provides the concluding remarks, implications, and future research lines.

2. Background Theory and Hypotheses Development

Pressures from different stakeholders have increasingly swayed organizations spanning from manufacturing to knowledge-intensive industries to engage in sustainable and traditional product innovation processes [3,4]. Within the organization, product innovation—either in the form of sustainable or more traditional developments—is the outcome of the exploitation of existing or new knowledge [1,2,4,22]. Thus, successful product innovation—understood as a process that comprises the technical design, R&D, manufacturing, management, and commercial activities involved in the marketing of a new (or improved) product—is highly dependent on critical organizational elements.

In line with these arguments, this section presents an overview of research dealing with organizational learning capabilities, entrepreneurial orientation, and product innovation in knowledge-intensive business contexts.

2.1. Organizational Learning Capabilities and Product Innovation

Organizational learning capabilities (OLC) have been conceptualized as the set of organizational and managerial factors that facilitate learning processes within the organization, that is, the ability of the business to create or acquire, transfer, and integrate knowledge in its day-to-day operations and routines [30–32]. The creation or development of OLC leads to promote knowledge exploitation processes that potentially constitute a source of competitive advantage which, in turn, may yield to superior performance and better organizational strategy making [3,30,32].

The mechanisms through which OLC is generated within the organization can be grouped in five dimensions [32,33]: (1) experimentation, that is, tests for the generation of new ideas or projects, which leads to the search for innovative solutions to possible problems; (2) risk taking, linked to new learning processes that require a tolerant organization that recognizes the possibility of failure; (3) interaction with the external environment to facilitate the integration of new market developments into the organization; (4) dialogue between team members, which increases the capacity to generate ideas and promote communication; and (5) participatory decision-making, which allows workers better access to information and achieve higher levels of involvement and commitment.

Literature portrays OLC as one of the firm elements that functions as an antecedent to innovation [34]. Also, Calantone et al. [35] offered empirical evidence that OLC influences innovation, and proposed that innovation is a broad process of learning that enables the implementation of new ideas and products. This argument is in line with Nonaka and Takeuchi [36], who define the innovation process, in part, as a process of learning and creation of new knowledge. In this study, product innovation is operationalized as the capacity of organizations to create an interaction between internal knowledge and the demands of external agents (market) [13]. These innovation-driven efforts will materialize in significant modifications of the business offering, and in the development of sustainable—environmentally friendly—products.

The link between OLC and product innovation has been found to originate from the observation and action of the context, efforts in the development of products or services and the results of practices and skills that drive innovation [32,33,35,37–40]. OLC and product innovation are connected by how knowledge is created, acquired, used, and shared, which may impact subsequent competitive advantage [33]. Therefore, we hypothesize:

Hypothesis 1 (H1). *Organizational learning capabilities have a positive impact on product innovation.*

2.2. Entrepreneurial Orientation and Product Innovation

Entrepreneurial orientation (EO) and its dimensions have its roots in the integration of the strategy-making and entrepreneurship literatures [41–43]. In this sense, Miller [42] (p. 771) proposes

that "an entrepreneurial firm is one that engages in product–market innovation, undertakes somewhat risky ventures and is first to come up with 'proactive' innovations, beating competitors to the punch". Drawing on the conceptualization of Miller [42], these three dimensions of EO—i.e., innovativeness, risk taking, and proactiveness—are at the core of EO and have been consistently used in prior studies [12,44–46].

Innovativeness refers to the predisposition to introduce new products/services by engaging in creativity and experimentation processes, as well as to promote technological and R&D investments that are conducive to process innovation. Risk taking is related to bold actions that result from venturing into the unknown, borrowing heavily, and/or committing significant resources to ventures in uncertain environments. Proactiveness is an opportunity-seeking, forward-looking perspective where the introduction of new products/services ahead of competitors and the anticipation to market changes are critical aspects of this EO dimension [47]. EO is a multi-dimensional construct connected to the strategy-making of the business that reflects the firm's proclivity towards entrepreneurship [48]. These theoretical arguments tend to support the notion that businesses benefit from increased levels of newness, boldness, and responsiveness [47]. Zahra et al. [49] argue that EO improves the business' learning and knowledge creation capacity. In competitive environments with shortened product and business model lifecycles, future profits originating from existing operations are uncertain, and businesses are challenged to constantly search for new opportunities. Thus, businesses may benefit from adopting and developing entrepreneurial orientation at all organizational levels.

Businesses with a solid EO frequently innovate while taking calculated risks in their product–market strategies [12,47,48]. Additionally, prior research shows that efforts to position new product/service offerings—innovativeness—and to anticipate demand—proactiveness—often result in superior performance [12,50,51]. This theory and evidence suggest that EO is conducive to greater product innovation levels and, consequently, we hypothesize:

Hypothesis 2 (H2). *Entrepreneurial orientation has a positive impact on product innovation.*

2.3. Product Innovation in Knowledge-Intensive Business Service (KIBS) Firms

With these two hypotheses as the starting point of our study, we now turn our attention to the analysis of the product innovation patterns in knowledge-intensive business service (KIBS) firms.

For many organizations, knowledge is a key resource that contributes to determine the capabilities and scope of the firm. But, once we distinguish KIBS from non-KIBS businesses, can we expect similar product innovation performance levels between these two types of business? From a management perspective, certain differences emerge when analyzing the product innovation patterns of KIBS and non-KIBS businesses.

First, in the specific case of KIBS firms, their competitive advantage primarily relies on the development, adaptation, and commercialization of knowledge-based services. Therefore, product innovation constitutes a crucial aspect of KIBS' operational processes [17,52,53]. This argument has been supported by prior studies highlighting the superior innovativeness of businesses operating in KIBS industries [13,19,34].

Second, Cho et al. [54] argue that the distinctive features of KIBS' organizational culture are conducive to high innovation levels. This culture includes innovation within its conceptualization, where the members of an organization are open-minded, flexible, and oriented towards obtaining specialized knowledge, are not afraid to face new challenges or to adapt and make transitions of their line of services to respond or anticipate market demands with quality.

Third, the strategy making of KIBS businesses is primarily driven by the efficient selection of customers and to the identification of knowledge development opportunities [55]. While the former dimension is linked to the maximization of successful value co-creation processes with customers [56], the latter emphasizes the need to enhance the knowledge-based resources of the business. Because of its relevance for developing a solid knowledge base that ensures adaptability and successful product

innovation processes in the long term, we focus on the knowledge dimension of KIBS' strategy making. The knowledge dimension—which is strongly linked to innovativeness defined as the pursuit of creative or novel solutions [34]—is more strategic and has a greater long-term impact on KIBS performance. In this sense, successful product innovation would become evident if the efforts by managers and employees for creating valuable knowledge with economic potential are efficiently channeled by KIBS across the market in co-production processes.

Finally, the specific operational characteristics of KIBS businesses—i.e., emphasis on knowledge exploitation, the provision of value-adding customized services, and frequent interaction with customers [17]—encourage the adoption of innovative initiatives to generate new knowledge necessary to create/expand their customer base and, consequently, develop a competitive advantage in the long run [13,17,19]. We argue that the organizational and operational characteristics of KIBS businesses create strong incentives to generate and implement sustainable and traditional product/service innovation processes.

The previous analysis suggests that contexts characterized by high levels of knowledge exploitation incentivize the development of strategies that yield superior sustainable and traditional product innovation levels. Therefore, the third hypothesis emerges:

Hypothesis 3 (H3). *Product innovation is greater in knowledge-intensive (KIBS) organizations.*

3. Data, Variable Definition, and Method

3.1. Data

The unit of analysis of this study is the high-performing business. In any economy, high-performing businesses constitute a dynamic proportion of the stock of businesses [57]. Although small in number, the operational and organizational characteristics of high-performing businesses have the capacity to generate a potentially disproportionate positive impact on the local economy, in terms of net employment, productivity, and innovation [57,58], which further justifies the proposed analysis of product innovation patterns in this type of organization.

According to official records made available by the Costa Rican Central Bank, 355 high-performance businesses (in terms of productivity, sales, or employment) operated in the country in 2015. The questionnaire employed in this work was designed specifically for the purposes of this study by a research team at the Costa Rican Institute of Technology. Entrepreneurs or managers of high-performing businesses are the potential respondents, and they were approached by telephone with a request to participate in the study. Participants received confirmation on confidentiality and the research team leading the investigation offered a feedback report on the survey results to the participating businesses in order to encourage firms to answer. Data collection was achieved through self-administrated, structured interviews, where the entrepreneur or the manager was asked to answer the mostly closed questions of the questionnaire. The questionnaire for the survey was applied by a professional market research consulting firm. It should be kept in mind that, following the practice recommended in the literature [59], the questionnaire was also subject to a pre-test in order to correct potentially misleading or confusing questions.

The information was collected between August and November 2016. After two follow-up reminders, the final dataset includes information for 74 high-performance businesses operating in Costa Rica, which represents a response rate of 20.85%. We ran a series of Kruskal–Wallis test on the key variables of the study to verify for potential non-response bias between early respondents and the rest of respondents [60]. The only statistically significant result was found for the variable business size (chi2 value = 5.0090, *p*-value = 0.0252), which only indicates that smaller firms responded earlier the questionnaire.

Looking at the geographic distribution of the sampled businesses, we note that 48.65% of the surveyed organizations are located in the capital (San José), 17.57% are headquartered in the province of

Alajuela, while 8.11% of businesses are located in the provinces of Heredia, Guanacaste, and Puntarenas (Figure 1). The provinces with the lowest proportion of businesses in the final sample used in this study are Cartago (5.41%) and Limon (4.05%) (Figure 1).
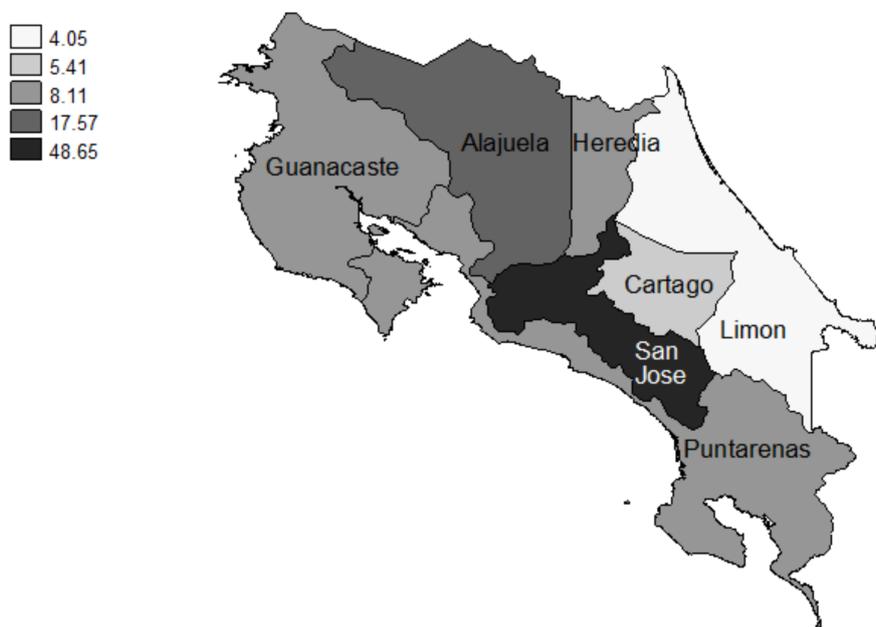

Figure 1. Geographic distribution of the sampled businesses (values in %).

Also, the final sample includes 25 (33.78%) firms in knowledge-intensive business services sectors (KIBS), 20 (27.03%) retailing firms, 15 (20.27%) firms in consumer service sectors, 10 (13.51%) manufacturers, and 4 (5.41%) businesses operating in the construction industry. Concerning firm size, 68.92% of the sampled firms have fewer than 50 employees, 26.03% fall in the medium-size category (between 51 and 250 employees), and 5.05% are large firms with more than 250 employees.

3.2. Convening Knowledge-Intensive Business Services (KIBS)

Knowledge-intensive business services firms are innovation bridges that interplay with other economic agents acting as purchaser, provider, or partner [17], which implies a deep interaction between KIBS businesses and the end customer [16]. One example of services provided by KIBS is the management of large samples of digital information, namely big data. Opresnik and Taisch [61] show that this service adds significant value to manufacturers' offerings, especially in B2B relationships, by providing customers with tools that can be used to enhance cost saving policies and develop more informed strategic decision-making processes. KIBS businesses show a distinctive way to access, create, and integrate knowledge in their processes [17,52,53].

According to the European Commission [62], KIBS encompasses a wide range of activities including those related to computing, information, and communication technologies (NACE Rev-2: 62); architectural and engineering technical services (NACE Rev-2: 71); research and development (NACE Rev-2: 72); as well as organizational-oriented services (NACE Rev-2: 69, 70, 73 and 78)—i.e., legal and accounting and auditing services, management consultancy, advertising and market research—and other knowledge-oriented services (NACE Rev-2: 74). To identify KIBSs and non-KIBSs firms in our sample, interviewees were asked to detail the main activity of their firm, according to the previous classification. The descriptive statistics in Table 1 show that 33.78% of the sampled high-performance businesses operate in KIBS sectors. As we indicated above, the rest of businesses operate in retailing sectors (27.03%), consumer-oriented services (20.27%), manufacturing sectors (13.51%), and the construction industry (5.41%).

3.3. Variable Definition

3.3.1. Sustainable and Traditional Product Innovation

In this study, and following the commonly used scale proposed in the Oslo Manual for evaluating product/service innovations [63], we employ two dependent variables to measure different dimensions of product innovation, namely sustainable product innovation and traditional product innovation. Concerning the first dimension, sustainable product innovation, entrepreneurs or managers were asked to value the extent to which the business is engaged in the development of environment-friendly products by using a seven-point Likert scale (1 = very low and 7 = very high).

In the case of the second dependent variables, four variables coded on a seven-point Likert scale (1 = very low and 7 = very high) were used to operationalize traditional product innovation: (1) replacement of products being phased out; (2) extension of product range within main product field through technologically new products; (3) extension of product range within main product field through technologically improved products; and (4) extension of product range outside main product field. Note that the proposed approach to measure product innovation performance has been used in previous studies [3,13]. Factor analysis was employed to verify the capacity of the four observed variables to reflect the (latent) product innovation construct. The results indicate that the four variables fall into one factor that captures product innovation (eigenvalue: 3.2926, proportion of variance explained: 0.8231). As for the goodness of fit statistics, the result of the Kaiser–Meyer–Olkin (KMO) index of sampling adequacy is above the recommended cut-off point of 0.50 (0.7961), corroborating that the sample is factorable. The results of the reliability test (Cronbach's alpha) for the factor obtained is 0.9271, confirming that the construct extracted from the factor analysis is internally consistent across items to measure the underlying concept under evaluation (traditional product innovation). These results confirm that our approach to factor analysis is robust [64].

Table 1. Descriptive statistics and bivariate correlation matrix [1].

	Variables	Mean	Std. Dev.	1	2	3	4	5	6
1	Sustainable product innovation	4.72	1.55	1.00					
2	Traditional product innovation	0.00	1.00	0.71	1.00				
3	Organization learning capability	0.00	1.00	0.49	0.46	1.00			
4	Entrepreneurial orientation	0.00	1.00	0.54	0.45	0.85	1.00		
5	Knowledge intensive business service (KIBS) firm	0.34	0.48	0.32	0.25	0.29	0.33	1.00	
6	Business size (employees)	80.79	263.01	−0.04	−0.04	−0.19	−0.10	−0.13	1.00
7	Business age (years)	16.36	15.27	−0.09	−0.18	0.02	−0.03	−0.26	−0.12

[1] Correlations between |0.24| and |0.31| are significant at 5% level, while correlations higher than |0.31| are significant at 1% level.

3.3.2. Organizational Learning Capability (OLC)

To operationalize OLC, we use the scale developed by Chiva et al. [32]. The proposed construct measures OLC via 14 items that, on a seven-point Likert scale (1 = strongly disagree and 7 = strongly agree), measure organizational learning capability: (1) people here receive support and encouragement when presenting new ideas; (2) initiative often receives a favorable response here, so people feel encouraged to generate new ideas; (3) people are encouraged to take risks in this organization; (4) people here often venture into unknown territory; (5) it is part of the work of all staff to collect, bring back, and report information about what is going on outside the company; (6) there are systems and procedures for receiving, collaborating, and sharing information from outside the company; (7) people are encouraged to interact with the environment: competitors, customers, technological institutes, universities, suppliers etc.; (8) employees are encouraged to communicate; (9) there is

a free and open communication within my work group; (10) managers facilitate communication; (11) cross-functional teamwork is a common practice here; (12) managers in this organization frequently involve employees in important decisions; (13) policies are significantly influenced by the view of employees; and (14) people feel involved in main company decisions.

As in the case of the traditional product innovation variable, we used factor analysis to compute the factor scores of the latent variable linked to organizational learning capability. In our sample, the 14 variables are grouped into one factor with an eigenvalue greater than unity (eigenvalue: 11.0362, proportion of variance explained: 0.7883). In this case, the value of the Kaiser–Meyer–Olkin (KMO) statistic is 0.8395, while the result of the Cronbach's alpha is 0.9629. These results confirm both the internal consistency of the extracted construct across the 14 items linked to organizational learning capability and the validity of the proposed factor analysis.

3.3.3. Entrepreneurial Orientation (EO)

The variable used to measure the business' entrepreneurial orientation is based on the scale developed by Walter et al. [51]. Six items are employed to measure the construct capturing the key features of business' EO: proactiveness, innovation, and risk-taking [47]. The variables used to operationalize the organization's EO are coded on a seven-point Likert scale (1 = statement does not apply at all, 7 = statement applies completely) [51] (p 562): (1) in this organization, entrepreneurial behavior is a central principle; (2) in this organization, people are very dynamic; (3) in this organization, innovation is emphasized above all; (4) in this organization, people are willing to take risks; (5) in this organization, willingness to continuous progress is the joint foundation; and (6) in this organization, people are eager at being always first to market. This EO scale has been used by, among others, Rauch et al. [47], Engelen et al. [65], and Saeed et al. [66].

In our sample, the six variables are grouped into one factor with an eigenvalue greater than unity (eigenvalue: 4.8594, proportion of variance explained: 0.8099). In this case, the value of the Kaiser–Meyer–Olkin (KMO) statistic is 0.8376, while the result of the Cronbach's alpha is 0.9524. Once more, the results confirm both the internal consistency of the extracted construct across the six items linked to entrepreneurial orientation and the validity of the proposed factor analysis.

3.3.4. Control Variables

We control for business size and business age in our model estimation. Business size is measured through the number of employees, while business age is expressed in years of market experience. In our sample, businesses report, on average, 80.79 employees, while average market experience is 16.36 years. Note that in our model specification, the variables business size and firm age are logged to reduce skewness.

3.4. Method: Fuzzy Set Analysis

The empirical analysis uses fuzzy set qualitative comparative analysis to understand if the combinations of a set of causal variables (in our case, organizational learning capability, entrepreneurial orientation, KIBS, business size, and market experience) are linked to outcome variables (sustainable product innovation and traditional product innovation). The fuzzy set qualitative analysis has been used in recent studies dealing with optimal configurations in business-to-business relationships (see, e.g., Rönnberg Sjödin et al. [67] and Böhm et al. [68]).

The software STATA© was used to analyze the data. Through Boolean algebra, fuzzy set comparative analysis identifies causal variable conditions to achieve an outcome, allowing testing if different combinations of causal variables lead to the same outcome.

This technique requires the calibration of causal and outcome variables. In doing so, the software transforms the interval of causal or outcome variables into a fuzzy set score related to the degree of membership of the variable to this set. The values of the interval for causal or outcome variables are specified following three conditions: (a) threshold for full membership condition (fuzzy

score value = 0.95); (b) threshold for full non-membership condition (fuzzy score value = 0.05); and (c) threshold for cross-over point condition (fuzzy score value = 0.05) that establishes present and absent condition for the same variable [69]. Through this calibration, the set of variables are related to specific outcome levels (25th, 50th, and 75th percentile).

The fuzzy set analysis differs from conventional statistical methods in various ways, and because of these differences, the method is appropriate for our analysis [70]. First, and contrary to the multiple regression/correlation analysis, the fuzzy set analysis is asymmetric. Correlation analysis is symmetric by nature, that is, if a model relates some variables to high performance, the inverse of high performance will only change the sign of the coefficients [70]. The fuzzy set analysis is causally asymmetric: a set of causal conditions are specifically related to an outcome level, while the opposite conditions do not necessarily imply the absence of the outcome because it can be related to a different outcome level. Second, fuzzy sets are used to model the concept of conjunctural causation. This property allows that, instead of one predetermined condition, combinations of various causal conditions are linked to the outcome variable. Third, and contrary to linear regression models or structural equation models, fuzzy set analysis captures the idea of equifinality [71]. That is, multiple causal paths are detected by fuzzy set models and more than one combination of causal conditions may be found to be linked to the same outcome variable. Therefore, fuzzy set analysis allows to uncover the specific combinations needed to reach the highest specific outcome value.

Fourth, fuzzy set analysis expresses the connections between the combinations of causal conditions and the outcome variable as necessary and sufficient conditions. Necessary conditions are fulfilled if the consistency score is over the threshold value of 0.90 [71]. The next step analyzes the sufficient conditions to obtain causal configurations, establishing a threshold value of 0.80 to permit at least one case in the sample to be empirically relevant [68]. Unique coverage results detail the subset of firms that reach the focal analyzed outcome. In other words, unique coverage shows the percentage of firms in the sample that achieve the highest level of sustainable or traditional product innovation.

In summary, fuzzy set analysis exploratively uncovers which causal conditions are necessary, and which are sufficient. Because of its comparative, non-deterministic approach, fuzzy set analysis is especially suitable to analyze complex configurational patterns, equifinality, and multiple optimal conditions in small-sample designs, such as situations where the number of cases is large for traditional qualitative analysis, and relatively small for many canonical statistical analyses that require degrees of freedom to yield reliable results [71]. Also, rather than modeling predetermined linear relationships and compute the importance (impact) of specific and strictly independent effects across businesses, fuzzy set analysis allows to better identify the strategic configurations that make sense in different types of businesses. Thus, results from fuzzy set analyses offer clearer implications than those generated from marginal effects of regression analyses [71] (p. 1194).

4. Results

Table 2 is the "Truth Table Algorithm" presenting the results of the fuzzy set analysis and shows the efficient configurations to achieve high product innovation levels using the notation introduced by Ragin and Fiss [72]. In this notation, large circles indicate core conditions and small circles point to peripheral (or contributing) conditions. Full circles denote conditions that must be present in the configuration, while crossed-out circles represent conditions that must be absent.

The Table provides coverage scores, a measure of the importance of a configuration that indicates how many cases take this path to the outcome. Regarding overall coverage, the intermediate solution accounts for 52.2% of membership in the sustainable product innovation outcome (51.6% for traditional product innovation) and, thus, presents acceptable fit. Furthermore, each intermediate solution consists of two configurations, and all configurations show high consistency values between 0.941 and 0.954, with the overall solution consistency at 0.949 for sustainable product innovation and 0.941 for traditional product innovation.

Table 2. Fuzzy set analysis: Configurations for achieving high product innovation [1].

	Sustainable Product Innovation		Traditional Product Innovation	
	(1)	**(2)**	**(1)**	**(2)**
Organization learning capability	●	●	●	●
Entrepreneurial orientation	●	●	●	●
Knowledge intensive business service (KIBS) firms	●	⊗	●	•
Business size (ln employees)	⊗	●	⊗	●
Business age (ln years)	•	●	•	●
Goodness of fit statistics				
Consistency	0.954	0.941	0.941	0.942
Raw consistency	0.246	0.388	0.248	0.268
Unique coverage	0.173	0.275	0.248	0.263
Overall solution consistency	0.949		0.941	
Overall solution coverage	0.522		0.516	

[1] Full circles refer to conditions that must be present in the configuration: large circles are core conditions and small circles peripheral conditions. Crossed-out circles denote conditions that must be absent.

The findings of the research indicate two ideal configurations in order for firms to reach optimal sustainable and traditional product innovation performance. Organizational learning capabilities (OLC) and entrepreneurial orientation (EO) are essential elements of all estimated strategic paths to optimal product innovation. These results suggest that OLC positively influences (sustainable and traditional) product innovation by promoting the exploitation of knowledge, skills, and practices necessary to efficiently develop new products or services [33,37–40]. This is consistent with the first hypothesis (**H1**) that states that organizational learning capabilities have a positive impact on product innovation. Additionally, the results indicate that EO is a prerequisite of product innovation via the endorsement of—often risky—strategies within the organization linked to the development of new products/services that seek to anticipate changes in demand [12,50,51]. This finding gives support to the study's hypothesis **H2**, which proposes that entrepreneurial orientation has a positive impact on product innovation.

Concerning sustainable product innovation, the results reveal two optimal strategic configurations. As we indicated above, these configurations include the adoption of organizational learning capabilities and entrepreneurial orientation but differ as to the importance of firm size and market experience (firm age). Whereas one of the configurations to reach maximum sustainable product innovation performance requires the presence of KIBS businesses that have both an entrepreneurial and learning orientation, the second configuration is specific to non-KIBS firms with strong firm size and age along with entrepreneurial and learning orientation. Of the two optimal configurations for sustainable product innovation, the one including KIBS does not depend on firm size, with market experience only having a very minor (peripheral) influence. That is, large and experienced SMEs operating in non-knowledge-intensive industries with organizational learning capabilities and entrepreneurial orientation can achieve optimal levels of sustainable product innovation, comparable to those obtained by KIBS firms (regardless of their size and market experience). These results give partial support to the study's third hypothesis (**H3**) that states that (sustainable and traditional) product innovation is greater in knowledge-intensive (KIBS) firms.

Finally, we find very similar results if we move from the sustainability product innovation strategies to analyze the configuration that optimizes the performance of traditional product innovations. But surprisingly in this case, KIBS are present in both optimal configurations reached through the fuzzy set analysis. Similar to the case of the sustainable product innovation strategies, the difference comes from the importance of the KIBS within the optimal configurations. When KIBS

are less important, greater weight must be given to firm size and market experience to compensate if maximum product innovation performance is to be achieved.

5. Discussion

At the organizational level, change is difficult but necessary. In the wake of the economic downturn that hit most economies, product innovation—and in particular, sustainability-driven product innovation—have become one of the most representative outcomes of the innovation efforts carried out by organizations [5,6].

Product innovation has been traditionally linked to the business' pathway of renewal [1,14]. Nevertheless, organizational change entails inherent risks [73,74] which, jointly with the heterogeneous distribution of resources and talent among competing firms, contribute to explaining why businesses do not materialize their (sustainable and traditional) product innovation efforts at the same intensity. Therefore, the analysis of the processes underlying the implementation of sustainable and traditional production innovation actions is critical to understand the trade-offs between resource allocation and strategic actions, and the subsequent change in the organization's output portfolio. Our result that high-performance organizations follow different paths to implement their sustainable and traditional product innovation strategies confirms these arguments.

Additionally, both similarities and differences were found when analyzing the strategic configurations employed to achieve optimal sustainable and traditional product innovation performance by KIBS firms, as compared to businesses operating in non-knowledge-intensive industries. Concerning the similarities, the results indicate that organizational learning capabilities (OLC) and entrepreneurial orientation (EO) play a decisive role in the equation of both sustainable and traditional product innovation. Both OLC and EO are found to be essential prerequisites of any optimal product innovation strategic configuration. Learning capabilities, as a set of organizational and managerial intangible assets, is an antecedent to organizational learning and knowledge-creation processes that facilitate innovation within businesses [31,32,34]. The result for the variable linked to organizational learning capabilities is in line with this intuition. Regardless of their technological orientation (KIBS or non-KIBS), organizations with solid learning capabilities (OLC) are in a better position to enhance their performance level and competitive advantage in the long term by stimulating and, ultimately, commercializing new products or services [31,37,49].

The results of the fuzzy set analysis also suggest that businesses can capitalize on their entrepreneurial orientation (EO) to reconfigure their resources more efficiently, and to improve the outcomes of their innovation activity by proactively engaging in the development of novel projects [44–46]. Entrepreneurial orientation (EO) encourages the adoption of innovating behaviors that enable the creation of new knowledge necessary to achieve novel solutions [42]. Following the tenor of our results, these attributes seem to be especially relevant for SMEs that enjoy greater levels of organizational flexibility and adaptability [12].

As for the differences found in the strategic configuration employed to achieve optimal sustainable and traditional product innovation by KIBS firms relative to non-knowledge-intensive industry firms, the differentiating impact of business size and market experience in the strategic configurations of product innovation constitutes an important contribution of this study to the literature. Among non-KIBS businesses, the findings pointing to a positive link between business size and market experience on the two analyzed dimensions of product innovation is consistent with prior work by Tsai [75] and Artz et al. [76]. Although experienced businesses (in terms of age) tend to become more conservative in their innovation initiatives [76,77], our results suggest that is the presence of both learning capabilities and entrepreneurial orientation in the strategic configuration of product innovation what contributes to explain the product innovation patterns of non-KIBS businesses with more market experience.

Underlying the positive effect of size on product innovation in non-KIBS firms is the presumption of the advantages of scale in innovation [78]. This economic argument proposes that, owing

to their size, large firms have access to a greater number of resources and, therefore, are more likely to engage in pioneering, innovating, and risk-taking innovation initiatives than their small counterparts [79]. The results suggest that relatively large non-KIBS firms enjoy risk reduction benefits across a product portfolio that enables managers to pursue multiple product innovation projects. This risk-spreading strategy increases the probability to commercialize new products, and helps compensate the investments made in other, maybe less commercially attractive, innovation projects [77].

This type of strategy is unavailable to small businesses [78], but not for KIBS businesses. According to Danneels [1], product innovation requires bringing together technology competences (e.g., material and immaterial technological know-how as well as quality assurance tools) and customer competences (e.g., knowledge of customer needs, efficient communication channels). Additionally, Markides and Williamson [80] (p 164) state that "simply exploiting existing strategic assets will not create long-term competitive advantage. In a dynamic world, only firms who are able to continually build new strategic assets faster and cheaper than their competitors will earn superior returns over the long term".

The finding for the relevance of KIBS firms in the optimal configuration of sustainable and traditional product innovation strategies is consistent with these arguments. Both the technological orientation and operational characteristics of KIBS firms provide an explanation for their greater capacity to engage in product innovation actions, irrespective of their size and market experience.

Because the competitive advantage of KIBS firms primarily relies on the development, adaptation, and commercialization of knowledge-based services, product innovation plays a crucial role in KIBS' operations [17,34,52,53]. Additionally, the specific operational characteristics of KIBS firms—i.e., emphasis on knowledge exploitation, the provision of value-adding customized services, and high interaction with customers [17]—promote innovative initiatives that will likely translate in the development of sustainable and traditional product innovation projects [17,19].

Therefore, the specific organizational and operational characteristics as well as the adaptive capacity of KIBS businesses might usefully be made more central to the implementation of sustainable and traditional product innovation strategies. In our interpretation, the result for the decisive role of KIBS firms in the strategic configuration of sustainable and traditional product innovation constitutes a valid case that corroborates the product innovation model proposed by Danneels [1]. Our analysis shows how the strong connection between immaterial technological competences that characterize KIBS businesses—in this case, design and product engineering know-how and knowledge orientation—and the active interplay with end customers—which we link to customer competences—yields superior product innovation outcomes.

6. Conclusions, Implications, and Directions for Future Research

6.1. Concluding Remarks

What is the contribution of this study relative to the results found in prior work on product innovation? Differently from previous research efforts [4,21,22], in this study, we analyzed the strategic configurations that shape sustainable and traditional product innovation in a developing economy, as well as in different organizational contexts, namely knowledge-intensive and non-knowledge-intensive firms. Furthermore, we argue that relevant organizational elements—i.e., organizational learning capabilities and entrepreneurial orientation—along with differences in business size and market experience, have implications for the sustainable and traditional product innovation plans of high-performance organizations. Our approach offers a compelling vision of how businesses can employ different resources to delineate their trajectory of sustainable and traditional product innovation, and of how optimal product innovation strategies are conditioned by the intensity with which knowledge is used within business operations.

Overall, the findings of the fuzzy set analysis are consistent with prior studies that emphasize that organizational learning capabilities (OLC) and entrepreneurial orientation (EO) are conducive

to product innovation [3,34,35,37,49]. Additionally, results corroborate the strong product innovation proclivity of KIBS businesses [17,52,53]. More concretely, the findings indicate that the interconnectedness between knowledge-based processes and the strong contact with customers that characterizes KIBS' operations contribute to compensate for the shortage of certain important characteristics—i.e., firm size and market experience—required to achieve optimal sustainable and traditional product innovation [74–76].

6.2. Implications

The findings of this study have important scholarly and managerial implications. From an academic perspective, prior work on the determinants of product innovation has traditionally focused on specific industries in developed contexts [1,3,13,19,76]. The proposed analysis of the strategic configurations of product innovation in Costa Rican high-performance businesses extends the rich literature on product innovation, as well as the growing research work on product innovation in SMEs operating in developing economies (see, e.g., the recent work by Sánchez-Medina et al. [21] and Lin et al. [22]). Additionally, by employing fuzzy set analysis to scrutinize the strategic configurations of sustainable and traditional product innovation in businesses operating in multiple industries (knowledge-intensive and non-knowledge-intensive), this study shows not only that the potential strategic configurations of product innovation are heterogeneous across firms, but also that operational characteristics linked to the creation and exploitation of knowledge-based resources as well as relevant organizational features—i.e., business size and market experience—are critical aspects that shape product innovation strategies across industries. Finally, our result that KIBS businesses with learning capabilities and entrepreneurial orientation can optimize their sustainable and traditional product innovation performance fuels the academic debate on how businesses can compensate their liabilities of smallness or newness by leveraging other—more knowledge-based—resources [1,76].

For strategy makers, the results that—regardless their size and market experience—KIBS firms achieve superior production innovation levels suggest that the ability of these businesses for creating a connection between knowledge-based processes and the end customer via strong communication channels is a key component of their product innovation equation. This finding provides empirical support to the product innovation model proposed by Danneels [1]. In this sense, we suggest that managers need to turn their attention to the characteristics of both operational processes and the business' degree of interaction with customers when considering the development of product innovations. In line with our results, the development of these elements may prove itself important for successful product innovation performance, in particular, for relatively small or new organizations.

Product innovation is increasingly becoming a means for organizational renewal [1,2]. Nevertheless, and in line with Markides and Williamson [80], our results confirm that product innovation is not exclusive domain of large businesses with the capacity to allocate large amounts of resources to product innovation projects. Thus, managers will be well advised to consider the potential benefits of developing different aspects and strategic behaviors within the organization. Any attempt to prioritize product innovation actions should be coupled with the development of learning capabilities, as well as an entrepreneurial orientation that facilitates the creation of new products or services with market attractiveness and economic potential.

6.3. Directions for Future Research

It must, however, be mentioned a series of limitations to the present study that, in turn, represent avenues for future research. First, like other studies on product innovation [3,19,35,76], the data do not permit the direct analysis of the strategic decision-making process underlying the decision to engage in product innovation actions. We present various interpretations of how product innovation is driven by different variables (the business' knowledge orientation, organizational learning capabilities, entrepreneurial orientation, size, and market experience); however, we do not evaluate how the strategic configuration of product innovation evolves at different stages of the knowledge generation

process that precedes the development of new products, nor do we assess the processes through which managers and employees generate—individually or collectively—new knowledge and channel it to the product innovation process. Further research on this issue would be valuable. For example, future studies should evaluate the response to incentives created by organization, and determine both the conditions under which managers and employees engage in product innovation projects and how learning capabilities, entrepreneurial orientation, and business operations affect these processes. Second, and in line with our previous comment, differences in sustainable and traditional product innovation performance across businesses and across industries may well result from strategic alliances and acquisitions that facilitate the access to knowledge and competences necessary for new product development. From a strategic management perspective, specifically designed future research can address this point by evaluating the potential effect of strategic alliances or acquisitions on product innovation performance in businesses operating in the same industry (intra-industry) as well as in firms operating in different industries (inter-industry).

Finally, the findings in this study are based on the analysis of Costa Rican high-performance businesses. Obviously, we cannot establish that the findings are generalizable to all high-performance SMEs, or whether they generalize to KIBS and non-KIBS businesses. The sampled businesses could have idiosyncratic characteristics that impacted their patterns of sustainable and traditional product innovation. Nevertheless, the findings presented in this study have a strong intuitive and conceptual appeal, and are open to future verification. In this sense, future work should evaluate our arguments on the determinants of the strategic configurations of sustainable and traditional product innovation in KIBS and non-KIBS firms using data for a wider array of industries operating in different geographic contexts.

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