

# INCIDENCE OF OPEN INNOVATION AND CORPORATE SOCIAL RESPONSIBILITY ON THE CIRCULAR ECONOMY AND LOGISTICS PROCESSES AS GENERATORS OF CORPORATE PERFORMANCE<sup>1</sup>

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# **INCIDENCE OF OPEN INNOVATION AND CORPORATE SOCIAL RESPONSIBILITY ON THE CIRCULAR ECONOMY AND LOGISTICS PROCESSES AS GENERATORS OF CORPORATE PERFORMANCE**

## **Abstract**

Sustainability is given by a set of complementary actions that will make organizations introduce sustainable strategies, capable of optimizing their resources, generating social, economic and environmental value. This will be possible with the execution of strategies such as Corporate Social Responsibility, Circular Economy, and the introduction of Open Innovation operations, while observing logistics processes. The aim is to test a causal model capable of determining the significance of the relationships between the variables. Respect the methodology, the research design was quantitative predictive and focused on a population of small companies located in the Northwest region of Mexico (Sonora, Baja California and Sinaloa). 684 companies were evaluated and the estimation of relationships was tested by variance-based in the Structural Equation System statistical method with the PLS technique. This paper contributes to the Open Innovation-Corporate Performance link literature, by the intervention of Corporate Social Responsibility, Circular Economy and Logistic Processes.

## **Introduction**

Society's demands for sustainable development have grown considerably in recent years and the topic has acquired increasing relevance. Organizations develop their strategies based on sustainable values, seeking greater competitiveness and integration in a dynamic and global market, with very diverse capacities (Unruh et al., 2016). There is not much research on the analysis of Sustainable Operations Management (SOM) decision-making at strategic functional levels (Gunasekaran & Irani, 2014), which is important for the implementation of SOM decisions (Machado, Lima, Costa, Angelis, & Mattioda, 2017). Initially, SOM is a set of skills and concepts that seeks to create and/or modify daily practices and decision-making models based on the triple bottom line (Kleindorfer, Singhal, & Van Wassenhove, 2005). From our point of view, this SOM decision-making process can be improved with the inclusion of more and various variables (Corporate Social Responsibility (CSR), Circular Economy (CE), Open Innovation (OINN), Logistic Processes (LP) and Corporate Performance (CP)), as we do in this research, in order to contribute to a more complete decision-making and, finally, achieve CP, thus helping to extend the existing research in this line so far.

At the same time, in a context where it is common to observe an over exploitation of resources and an excessive generation of waste, causing a great impact on the environment and critical factors of human well-being (Raworth, 2017; United Nations Environment Program, 2016), new strategies are necessary to be promoted in organizations in order to achieve sustainability (Wasioleski, Waddock, Fort, & Guimarães-Costa, 2021). Natural Sciences, Management Theory, and System Transformation. It is also expected from the sustainability and innovative communities to conceive sustainable development, that will also ensure sufficient natural resources for future generations (Istudor & Suciu, 2020). In the current context, companies observed that the closed innovation model has been challenged by the environment and are unsustainable (Hsieh, Huang, & Lee, 2016). In this sense, companies' innovation strategies have begun shifting and, in this paper, we adopt the concept of OINN in order to reflect the changes that the innovation environment has undergone in the last decade

(Abussa & Llach, 2018; Rasche, Morsing, & Wetter, 2021). OINN is a distributed process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms. Literature distinguishes two important types of OINN, depending on the directions of knowledge flows across the boundary of the firm: outside-in (or inbound) and inside-out (or outbound) (Da Silva, 2019). Also, a third type of OINN could be distinguished, the so-called coupled open innovation, which links inbound and outbound, combining inflowing and outflowing of knowledge between firms (Gassmann & Enkel, 2004). Finally, other authors talk about the dimensions of inbound versus outbound OINN activities and pecuniary versus non-pecuniary interactions (Dahlander & Gann, 2010). This paper has adopted the perspective from Gassmann and Enkel (2004), considering the two dimensions for OINN (inbound and outbound) in the definition of the measurement construct. We can affirm that the introduction of OINN is a plus in the model, dominated by greater technological development, forcing the innovation life cycles to be shortened, increasing the complexity of the products and consequently their costs. All this determines that the OINN explains the changes in current innovation in companies (Roszkowska-Menkes, 2018) and accelerates internal innovation and uses external innovation to expand the market (Hsieh et al., 2016).

Also, we will focus on CSR, as expression of the three voluntary classical dimensions (economic, social and environmental) based on Triple Bottom Line (Elkington, 2004). CSR can be understood as a business contribution towards sustainable development (Roszkowska-Menkes, 2018; Van Marrewijk, 2003). The European Commission (2001) defined CSR as a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on the voluntary basis. Later, the Commission presented a modified definition (EC, 2011), considering CSR as a concept whereby companies voluntarily integrate social, ethical and environmental concerns into their business operations and core strategy in close cooperation with their stakeholders, with the aim of: maximizing the creation of shared value for their owners/shareholders and for other stakeholders and society at large, and identifying, preventing and mitigating their possible adverse impacts. CSR becomes a strategic element in organizations, capable of contributing to shared value creation (Porter & Kramer, 2011). An important element to achieve this strategic character of CSR is an open approach to innovation oriented on constant collaboration between different external parties (Osburg, 2013).

With a holistic focus on the conservation of resources and oriented towards obtaining CP, this study addresses the CE, which has the potential to bring economic activities back within environmental boundaries while strengthening social foundations (Velenturf, Jensen, Purnell, Jopson, & Ebner, 2019). This CE concept has emerged as an important way in which society could be more sustainable (Brown & Bajada, 2018; Cui & Zhang, 2018). CE optimizes CSR premises to transform society towards more sustainability (Dey, Malesios, De, Budhwar, Chowdhury, & Cheffi, 2020). It is based on three principles: (i) Design out waste and pollution, (ii) Keep products and materials in use, and (iii) Regenerate natural systems (Fortunati, Martiniello, & Morea, 2020). Circular design means being able to design durable products from the start, whose packaging is also easily reusable, recyclable and easily removable, which would produce maximum economic and social value. Some authors consider that what is missing in the literature are the synergistic effects between CSR and CE (Yang, Chen, Jia, & Xu, 2019), and hence our interest in including a hypothesis that links both concepts in this work. We think that both topics are complementary, due to that CE practices can help companies make better use of resources by optimizing the economic, social and environmental cost and benefits of products (Velenturf et al. 2019), so our interest of linking CSR and CE strategies. CE is receiving increasing attention, aimed at integrating economic activity and environmental well-being in a sustainable way (Yang et al., 2019; Scarpellini,

Portillo-Tarragona, Aranda-Usón, & Llena-Macarulla, 2019). This way, CE facilitates sustainable development through its implementation at the micro (products, enterprises and consumers), meso (economic agents integrated in symbiosis) and macro (city, regions and governments) levels (Geissdoerfer, Savaget, Bocken, & Hultink, 2017; Van Wijk, Zietsma, Dorado, de Bakker, & Martí, 2019).

The model also includes the variable LP due to the importance of the management of supply chain activities for the achievement of sustainability (Kumar, Sezersan, Garza-Reyes, Gonzalez, & Al-Shboul, 2019), hence the need to deepen the study of the processes involved through the value chain based on proper management of resources. Decision system technologies have long since been a strong support to model and solve planning complexities in the supply chain in a collaborative context and need to transform into sustainability steady states (Kannegiesser & Günther, 2014).

And finally, we have integrated CP, a variable traditionally considered in the research, with which we finally link the CE and LP. Obviously, in our context, dominated for OINN, collaborations make sense if they pay off and act as drivers for CP (Rauter, Globocnik, Perl-Vorbach, & Baumgartner, 2018). When measuring the CP of activities, it is possible to evaluate the growth margin, customer satisfaction, increase in profits, increase in sales, market share, image of the company...., defining a broad measurement of CP, as it is done in this study. However, in a context of sustainability, it is necessary today to consider other aspects that are increasingly in demand (social, resource efficiency, reduction of environmental pollution, ...) and being decisive for future generations.

Related to the theoretical framework, the contribution of this paper is related to a combination of resource-based view and stakeholders theories. On one hand, companies are seen as an integrated set of resources and capabilities, relevant to strategy success (Wernerfelt, 1984; Barney, 1991; Hayes & Upton, 1998; Lewis, 2003; Mills, Platts, & Bourne, 2003). On the other hand, companies are able to support the integration and engagement of sustainability through their supply chain in particular and their stakeholders in general, realizing a business strategy that provides CP through efficiency resources. In this paper we follow a modern approach to stakeholder management, consider their interaction (Scarpellini, Marín-Vinuesa, Aranda-Usón, & Portillo-Tarragona, 2020). In this sense, stakeholder engagement is an essential element of CSR, and is considered as OINN (Dahlsrud, 2008; Van Marrewijk & Were, 2003), being defined as practices the organization undertakes to involve stakeholders in a positive manner in organizational activities (Greenwood, 2007).

In this context, the aim of the paper is: First, to analyze the effects that OINN has on CSR, CE and LP of SMEs; Second, to examine the relationship and effect that CSR and CE have on LP and in CP, and third, to verify the effect generated by the CE in the CP of SMEs.

This paper clearly identifies various issues that need to be focused for successful strategy formulation of companies today, defining a holistic approach to analyze a current state of practices undertake on sustainability. In this sense, this paper contributes to the literature in several ways. Firstly, since we observed that there was little research on the analysis of SOM decision-making (Gunasekaran & Irani, 2014), we have carried out the inclusion of more variables, contributing to a more complete decision-making and finally to achieving the CP, extending the existing research to date in this line. Second, the paper contributes to the literature on resource-based view and stakeholders theories. Third, this paper identifies four very current topics (CSR, CE, OINN and LP) describing their relationships with the more classical CP. This analysis conducts the formulation of a holistic model for creation value in companies and for their stakeholders.

The rest of the paper is organized as follows. Section 2 defines the theoretical framework from which the hypothesis are derived. Section 3 describes the materials, data and methodology. Section 4 pronounces the results. Section 5 displays the discussion. Finally, section 6 summarizes the conclusions, offering the main finding remarks, limitations and futures lines of research.

## **Background and Hypothesis Development**

### *Open Innovation and Corporate Social Responsibility*

Some authors state that the key to achieve a strategic corporate sustainability is innovation (Osburg, 2013; Visser, 2012), and, as Osburg (2013) points out, this requires open approach to innovation processes driving constant collaboration between all sectors. Access to knowledge, derived from innovation, has traditionally been focused on for-profit sectors, generating benefits from such innovation (Chesbrough & Di Minin, 2014). More recently, not-for-profit organizations (NGOs, universities and research centers) observed social benefits derived from OINN, which represents an extension towards CSR. In this sense, some research analyzes the role of the OINN as a social innovation process (Roszkowska-Menkes, 2018) and, therefore, as a CSR tool in organizations. Thus, the adoption of OINN paradigm supposes the commitment to socially innovative processes as CSR projects (Chalmers, 2011), requiring the acceptance of stakeholders and their cooperation (Herrera, 2015). Moreover, in CSR actions oriented to communities as stakeholder, OINN is considered as an enabler for strengthening the participation. That is to say, when CSR is operating in social projects and innovators, OINN characterized by a porous organizational structure and committed investment in developing absorptive capacity (Chesbrough & Di Minin, 2014). OINN is a must for social innovation, once CSR strategy has been defined (Osburg, 2013). In this context, a growing number of companies has considered OINN high potential for enhancing their socially innovative efforts, having shifted previously their CSR activities to a strategic character (Mirvis, Herrera, Googins, & Albareda, 2016). OINN broadens and deepens a firm's knowledge search activity and allows to better address stakeholder's expectations, and thus supports socially responsible innovation and shared value creation (Roszkowska-Menkes, 2018). Cooperation with external stakeholders (outside-in OINN) contributes to the welfare of the social and natural environment (Ayuso, Rodríguez, García-Castro, & Ariño, 2011; Holmes & Smart, 2009), and through this partnering, the company could access to knowledge resources generating a stimulation for innovativeness (Laursen & Salter, 2006). Also, inside-out OINN influences CSR strategy implementation in organizations, sharing knowledge and generating trust-relationships with external partners (Dahlsrud, 2008; Van Marrewijk & Were, 2003). OINN is the necessary starting point to achieve a strategic CSR that culminates in a shared value creation, so it can be affirmed that OINN and CSR are intimately linked and they form a virtuous circle. This linkage of practices between OINN and CSR, scarcely discussed in the literature (Roszkowska-Menkes, 2018), will be carried out in a framework of combination of resource-based view and stakeholders theories, working together to achieve sustainability capable of generating the proposed global model. Accordingly, the following hypothesis is presented:

**Hypothesis 1 (H1):** *Open Innovation is positively correlated to Corporate Social Responsibility contributing to the sustainability.*

### *Open Innovation and Circular Economy*

OINN is necessary to explore and implement CE strategies (Brown, Bocken, & Balkenende, 2020), a field of research that is still little explored. The value relationships created through collaboration, as a result of OINN, through interaction between stakeholders, will generate and facilitate the capture of opportunities, while exploring new processes based on CE (Geissdoerfer, 2019; Urbinati, Chiaroni, & Chiesa, 2017; Ünal, Urbinati, & Chiaroni, 2019). However, the management of OINN is an important challenge before the CE, having to observe the appropriate organizational structures, the optimal exchange of knowledge, risk management ..., that optimize the implementation cycles of the processes (Korhonen, Honkasalo, & Seppälä, 2018). The ever increasing pressures towards global sustainability, in a context of transition to Industry 4.0, makes essential the presence of OINN. It is observed that the performance of the company in an autonomous way does not determine value, but that this is achieved through collaboration with external parties that contribute as providers of capacities (Lardo, Mancini, Paoloni, & Russo, 2020), while managing a circular model of operations and ultimately leads to the satisfaction of the stakeholders. OINN will facilitate the achievement of the CE philosophy, through proper knowledge management, finally involving the transformation of a linear economic model into a circular one and reducing dependence of raw materials and energy, mitigating the environmental impact of production and consumption (Scarpellini et al., 2020). In relation to the transmission of knowledge that OINN assumes related to environmental accounting processes by companies (Wilmshurst & Frost, 2001), no progress has been made beyond financial, social and environmental practices, without truly entering in CE principles (Scarpellini et al., 2020), so we assume that there is still a long way to go. Accordingly, the following hypothesis is raised:

**Hypothesis 2 (H2):** *Open Innovation is positively correlated to Circular Economy contributing to the sustainability.*

#### *Open Innovation and Logistic Processes*

In the context of OINN, the complexity of inbound and outbound supply chain transportation activities has given a new dimension to the economic and environmental concerns, conducting a link in the logistic processes to take into account and the framework is flexible to incorporate alternative sustainability optimization strategies (Machado et al. 2017; Lagoudis & Shakri, 2015). Moreover, cooperation and collaboration of the multiple-stakeholders in circular supply networks is fundamental and necessary for change in sustainable practices to occur at both the organization and network levels (Brown & Bajada, 2018), generating a flow of OINN and facilitating the LP. Accordingly, the following hypothesis is raised:

**Hypothesis 3 (H3):** *Open Innovation is positively correlated to Logistic Processes contributing to the sustainability.*

#### *Corporate Social Responsibility and Circular Economy*

CSR and CE are interconnected concepts (Fortunati et al., 2020; Leandro & Paixao, 2018). CSR is seen as a set of practices that better frames sustainability (Leandro & Paixao, 2018), while CE is the guide for the design and development of good CSR strategies (Turón & Czech, 2016), and it is based in the purest values of CSR for putting them to practice. The predisposition of the company towards some CSR practices determines its inclination towards CE. Thus, the choice of ecological and sustainable designs for the reduction of environmental impact (White, Sarpong, & Ndrecaj, 2015), at the same time that supposes a concern towards the employees and the community, as proclaimed by the stakeholder theory (Murphy & Ng'ombe, 2009). For example, in the case of the cosmetic industry, these aspects are very present, observing the great variety

of certifications that collect eco-compatible solutions that reflect strict quality and environmental standards, for the adoption of eco-designs of packaging (Bary et al., 2012), based on the resource-based view, leading to an adequate management of CE. Daú, Scavarda, Scavarda, & Portugal (2019) analyze the sustainable supply chain 4.0, using industry 4.0 tools in order to close the material and energy cycles. Also, these authors propose the CE transition conceptual framework. As a consequence of that, CE becomes evident, helping the information flow and turning the operations more efficient, intelligent, precise and quicker. The authors conclude that the union among the triple bottom line, industry 4.0 and CSR allows the transition from a linear model to a circular one, and can improve the sustainable healthcare supply chain 4.0. Accordingly, the following hypothesis is introduced:

**Hypothesis 4 (H4):** *Corporate Social Responsibility is positively correlated to Circular Economy contributing to the sustainability.*

#### *Corporate Social Responsibility and Logistic Processes*

Research on CSR and, more exactly, sustainability in product life cycles, is extended to LP (Das & Chowdhury, 2012; Özceylan & Paksoy, 2013). This has generated a growing interest for companies to include social and environmental issues while considering them in their LP, obtaining competitive advantages (Chen, Olhager, & Tang, 2014). In this relationship, the economic dimension plays an important role (Govindan, Garg, Gupta, & Jha, 2016). When evaluating the LP, the authors differ on the factors. Thus, for example, the greenhouse gas emissions and water consumption and the importance of resource availability in location decisions (Lee, 2008), the facility location selection problem with respect to offshore outsourcing (Dou & Sarkis, 2010; Amin & Zhang, 2013) are considered. From an environmental point of view, and in order to minimize emission costs, companies introduce actions in their transport LP (Hoen, Tan, Fransoo, & Houtum, 2012). Previously, Piecyk and McKinnon (2010) examined the CO<sub>2</sub> emissions footprint for road transportation, where fuel and distance were used in the calculation of LP. This way, some CSR activities have repercussion on LP in companies, from the perspective of the theories under study and focused on achieving the sustainability. Accordingly, the following hypothesis is presented:

**Hypothesis 5 (H5):** *Corporate Social Responsibility is positively correlated to Logistic Processes contributing to the sustainability.*

#### *Circular Economy and Corporate Performance*

The study of the different stages of a CE process leads to the scope of CP. “Take” actions include materials and source selection, inbound storage and transportation (Dey et al., 2020). The adoption of suppliers today is guided by social and environmental criteria, in order to achieve sustainable performance (Dey, Bhattacharya, Ho, & Clegg, 2015; Scott, Ho, Dey, & Talluri, 2015). “Make” actions include eco-design, lean practices, energy consumption, use of renewable energy and social well-being and equality (Dey et al., 2020). All these actions constitute CE practices in the company, capable of achieving an improvement in environmental performance (Liu, Zhu, & Seuring, 2017; Tseng, Tan, Geng, & Govindan, 2016), although not always in economic performance (De, Chowdhury, Dey, & Ghosh, 2018). “Distribute” actions include outbound storage and transportation (Dey et al., 2020). These practices contribute to CP through customer’s satisfaction (e.g., on-time delivery; Kumar et al., 2019) and efficiency (e.g., consolidating capacity; Perotti, Zorzini, Cagno, & Micheli, 2012). Research of Jumadi and Zailani (2010) state that green innovation in logistics services enhances environmental performance. Definitively, Dey et al. (2020) affirm that distribution actions are positively correlated to CP. “Use” actions include after sales service, repair, reuse and carbon

offsetting/CSR (Dey et al., 2020), helping to extend products' life enhancing overall sustainability. These initiatives could achieve environmental performance and competitiveness (Laari, Töyli, Solakivi, & Ojala, 2016). "Recover" actions include recycle and reverse logistics (Dey et al., 2020), closing the loop (Zhang, Lee, Chan, Choy, & Wu, 2015). Bernon, Tjahjono, and Ripanti's (2018) study in the industry supply chain relates reverse logistics and CE performance. Some studies express how waste management through CE process enhance environmental performance (Eltayeb, Zailani, & Ramayah, 2011; Zhu & Sarkis, 2004). Also, waste management could enhance social and economic performance (Gyan, 2017). As we can deduce, these practices related to CE and with an impact on CP, meet the vision of the resource-based view every time that an adequate management of resources is carried out throughout the production process, and this is in order to ensure the best possible management for the interest groups in the organization, as proclaimed by the stakeholder theory. Finally, the above action will have an impact on the sustainability, an initial premise that the proposed conceptual model seeks to achieve. Accordingly, the following hypothesis is presented:

**Hypothesis 6 (H6):** *Circular Economy is positively correlated to Corporate Performance contributing to the sustainability.*

#### *Logistic Processes and Corporate Performance*

The definition of an adequate LP, within an efficient and effective management supply chain activities, has always been critical for the overall CP of an organization (Shokravi & Kurnia, 2014). Some authors explain the relationship between the role of sourcing and inbound logistics in achieving sustainability (Lee, 2008; Blome, Hollos, & Paulraj, 2014; Testa, Annunziata, Iraldo, & Frey, 2016), conducting to a CP (Dey et al., 2020). Different logistic and distribution operations, such warehousing and transportations, determine CP (Dey et al., 2020; Perotti et al., 2012). We would be talking about a sustainable management of the value chain, what the literature names as Sustainable Supply Chain Management (SSCM), defined as the management of a material/product and information flows across supply chain participants, taking into account the economic, environmental and social impacts (Shokravi & Kurnia, 2014). This new concept broadens the vision of value chain management, introducing sustainable LP that will allow achieving CP, taking into account that the activities of supply chain parties affect the overall performance of the entire supply chain (Shokravi & Kurnia, 2014), contribute to an adequate management of resources and satisfy the needs of all interest groups, so that the two theoretical frameworks of the study are adequately covered. In a global view, concerted actions of all logistic processes participants are required to achieve a sustainable supply chain and performance (Carter and Rogers 2008). In the food products sector, adequate logistic processes can be implemented into the supply chain to decrease food waste and losses (Kazancoglu, Ekinci, Mangla, Sezer, & Kayikci, 2020), and besides, these activities provide quality and safe to consumers while considering the environment, searching the desired CP. However, just as the analysis of the environmental impact of a company's activities can give an idea of its performance (Capece, Di Pillo, Gastaldi, Leviardi, & Miliacca, 2017), up to now there is little literature that reveals the impact of the decisions of the LP on CP. All these practices related to LP and its incidence with CP will finally affect the sustainability, an initial basic premise that we intended to achieve with the proposed conceptual model. Accordingly, the following hypothesis is raised:

**Hypothesis 7 (H7):** *Logistic Processes are positively correlated to Corporate Performance contributing to the sustainability.*

## **Materials and Methods**

## *Sample*

The research design is quantitative and predictive and focused on a population of small companies located in the Northwest region of Mexico (Sonora, Baja California and Sinaloa). The selection of the population has been following the principles of the stratified method. Companies in the trade and services sector were studied. To determine the size of the company, the number of employees was taken as a reference, the participating companies have from 10 to 50 employees. The information on the total number of these companies was provided by the National Directory of Economic Units (DENUE) (2018). The sample size was determined so that the maximum margin of error for estimating a proportion (relative frequency of response in a specific item of a question) was less than 0.03 points with a confidence level of 95%. The technique for collecting the data was carried out through the application of a questionnaire in the form of a personal interview directed to the owner and/or manager of the companies that participated in the research. The field work was carried out during the months of November to March of the year 2019. Finally, a total of 684 companies were collected. Some of the demographic characteristics of these companies are as follows: the total number of companies in the trade sector is 426, of which 44% are run by women and 56% by men. As for the service sector, there are 258 companies, which are managed 35% by women and 65% by men. Regarding the level of school training, 46% of the directors and/or managers who manage these companies have basic studies and 54% have university studies.

## *Design of the Data Collection Instrument*

The questionnaire used in this research was oriented to the managers and/or directors of the small enterprises that participated in the study. It is divided into two phases, the first one includes the general data of the investigation such as: the sector in which the company operates, the size, number of employees, the geographical location, gender of the company's director and manager, training/or education level. On the other hand, the second section of the questionnaire is made up of the study variables: CSR, CE, OINN, LP and CP. To validate the instrument a pilot test was initially applied with 5% of the sample in order to correct some type of anomaly related to question's design.

## *Common Method Variance (CMV) Test*

In order to avoid non-response bias, the analysis of the single Harman factor was carried out first as a tool that helps to diagnose the presence of bias through the analysis of the Common Method Variance (CMV). Therefore, we have performed a Confirmatory Factor Analysis-CFA, using the SPSS software version 23, and subsequently the reliability of each of the model constructs was examined through the Structural Equation System (SEM) based on the variance with support from the Partial Least Square (PLS). There are two important indicators when making these calculations and which can lead to the presence of CMV. One of them is when performing the CFA, the results are grouped into a single factor, and the other is when a single factor explains most of the variance of the model variables (Podsakoff et al., 2003; Malhotra, Kim, & Patil, 2006). The results show that the Kaiser-Meyer-Olkin (KMO) is 0.930\*\*\*, and a Chi-square value of 15,370,335. On the other hand, the CFA reports that our model is adjusted and grouped into 9 variables, the total of these factors have a total value of the explained variance of 61.39%, and the first factor has a value of 26.65%, with this it is shown that non-response bias is unlikely to exist in the proposed research model.

## *Measurement of Variables*

The variables used in the research were measured through first-order reflective one-dimensional variables and second-order multidimensional constructs in mode A. The technique used to analyze the proposed model is through the two-step approach, which consists of: 1) draw the model with the first order dimensions and their respective indicators, then these dimensions are connected to the main construct and the corresponding analysis is made to obtain the latent variables scores, and 2) the scores values are used to analyze the dimensions of first order and are connected with the second order construct to later be executed in the SmartPLS version 3.3.2 program (Wright, Campbell, Bennett Thatcher, Roberts, & Bennett, 2012; Henseler, 2017). The SEM-PLS method was chosen for this research due to the following factors: 1) due to the nature of the items of a reflective type, 2) it adapts to the design of the quantitative-predictive type of research, and 3) due to the size of the sample and the robustness of the model with first and second order constructs (Chin & Dibbern, 2010; Hair Jr., Sarstedt, Ringle, & Gudergan, 2017).

#### *Open Innovation (OINN)*

To measure this multidimensional construct, the recent literature on OINN business practices has been taken as a reference, which is related to the areas of sustainability and business competitiveness. The construct is made up of two dimensions: 1) Inbound, which includes two questions and 2) Outbound, is made up of three questions. This variable was measured with a 5-point Likert-type scale (1 “completely disagree” and 5 “completely agree”). The questions of this dimension were adapted from several studies (Chesbrough, 2006; Gassmann & Enkel, 2004; West, Salter, Vanhaverbeke, & Chesbrough, 2014). The construct meets the minimum requirements for reliability and validity, the factor loads range from 0.780 to 0.875, the cronbach's alpha 0.866 and a value of 0.875 for composite reliability. In addition, the mean variance extracted is 0.601.

#### *Corporate Social Responsibility (CSR)*

This multidimensional construct has been measured based on the stakeholders theory, considering its connection with innovation and the CE. This variable was divided into three dimensions: 1) CSR-Social, 2) CSR-Economic and 3) CSR-Environmental, measured with 4 questions each one. This variable was measured with a 5-point Likert-type scale (1 “completely disagree” and 5 “completely agree”). The questions of this dimension were adapted from different authors (McWilliams, Siegel, & Wright, 2006; Gallardo-Vázquez & Sánchez-Hernández, 2014; Aranda-Usón et al., 2019). The construct meets the minimum requirements of reliability and validity, the factor loads range from 0.710 to 0.855, the cronbach's alpha 0.845 and a value of 0.876 for composite reliability. In addition, the mean variance extracted is 0.501.

#### *Circular Economy (CE)*

According to a review of the literature on the CE, this construct has been measured as a multidimensional variable. In general, it's related to CSR practices and LP of companies. For this purpose, the CE has been divided into the following dimensions: 1) Reduce and 2) Recycle, measured through 5 questions each one, and 3) Reuse, measured through 4 questions. This variable was measured with a 5-point Likert-type scale (1 “completely disagree” and 5 “completely agree”). The questions of this dimension were adapted from previous studies (Aranda-Usón et al., 2019; Prieto-Sandoval, Jaca, Santos, Baumgartner, & Ormazabal, 2019; Demirel & Danisman, 2019). The construct meets the minimum reliability and validity requirements, the factor loads range from 0.764 to 0.868, the cronbach's alpha 0.928 and a composite reliability value of 0.938. In addition, the mean variance extracted is 0.519.

### *Logistics Processes (LP)*

This construct is generally associated with activities in the supply chain, the CE and innovation activities that lead companies to increase CP. So, this construct was measured in a unidimensional way considering the basic actions that commercial and service companies develop in their processes. For its measurement, 6 questions were structured, which were exposed on a 5-point likert scale (1 “completely disagree” and 5 “completely agree”). These questions were adapted from previous studies (Hervani, Helms, & Sarkis, 2005; Ciliberti, Pontrandolfo, & Scozzi, 2008). The construct meets the minimum requirements of reliability and validity, the factor loads range from 0.672 to 0.738, the cronbach's alpha 0.810 and a value of 0.863 for composite reliability. In addition, the mean variance extracted is 0.513.

### *Corporate Performance (CP)*

This construct was measured in a unidimensional way considering the opinion of the directors and/or managers of the SMEs, on the behavior of their financial and economic benefits in the last two years, which have been derived by the implementation of innovative actions and sustainable. For its measurement, 4 questions were structured, which were exposed on a 5-point likert scale (1 “completely disagree” and 5 “completely agree”). These questions were adapted from previous studies (Prieto-Sandoval et al., 2019; Pislaru, Herghiligiu, & Robu, 2019). The construct meets the minimum requirements of reliability and validity, the factor loads range from 0.672 to 0.738, the cronbach's alpha 0.810 and a value of 0.863 for composite reliability. In addition, the mean variance extracted is 0.513.

## **Results**

### *Measurement Model*

In addition to the individual reliability of the items, which were presented in the previous section and which showed to be very close to or above the value of 0.707 (Chin, 1998a; Hair, Ringle, & Sarstedt, 2011). This section shows the internal consistency of the model through the reliability of the constructs, the Cronbach's alpha values, the composite reliability and the value of rho\_ A, values that are above of 0.7 according to what is recommended (Chin, 1998a; Henseler, Ringle, & Sarstedt, 2015) (Table 1).

**Table 1.** Reliability and validity by construct

Construct	Cronbach's Alpha		rho_ A	Composite Reliability
Open Innovation (OINN)	0.866	5	0.87	0.900
Outbound	0.811	1	0.81	0.888
Inbound	0.787	2	0.80	0.875
Corporate Social Responsibility (CSR)	0.845	8	0.84	0.876
CSR (Social)	0.733	3	0.73	0.833
CSR (Economic)	0.783	4	0.78	0.860
CSR (Environmental)	0.863	3	0.86	0.907
Circular Economy (CE)	0.928	0	0.93	0.938

Recycle	0.872	5	0.87	0.908
Reduce	0.860	4	0.86	0.899
Reuse	0.859	2	0.86	0.905
Logistic Processes (LP)	0.810	1	0.81	0.863
Corporate Performance (CP)	0.750	0	0.75	0.842

Source: Own elaboration

The convergent and discriminant validity are shown in the following tables. The data indicate that the mean variance extracted (AVE) explains at least 50% of the variance of the indicators analyzed in the model. In the same way the discriminant validity indicates that the square root of the AVE (values in the diagonal) is greater than the values of the correlations of the constructs (Henseler et al., 2015) (Table 2).

**Table 2.** Discriminant validity

Construct	AVE	OINN	CSR	CE	LP	CP
OINN	0.601	<b>0.776</b>				
CSR	0.501	0.431	<b>0.710</b>			
CE	0.519	0.612	0.549	<b>0.720</b>		
LP	0.513	0.257	0.542	0.292	<b>0.716</b>	
CP	0.571	0.219	0.295	0.186	0.542	<b>0.756</b>

Source: Own elaboration. OINN: Open Innovation; CSR: Corporate Social Responsibility; CE: Circular Economy; LP: Logistics Processes; CP: Corporate Performance.

### Structural Model

At first, the evaluation of the algebraic sign (+, -), the magnitude (value of the coefficient and value t) and the statistical significance of the path coefficients are shown. This analysis is carried out through the bootstrapping technique with 5000 samples. It was performed under a 1-tailed Student's t distribution with n-1 degrees of freedom (Table 3).

**Table 3.** Hypothesis test results.

	Hypothesis	Beta Value	SD	T Value	P Value	Result
H 1	OINN -> CSR	0.431	0.033	13.030	0.000	Supported
H 2	OINN -> Circular Economy	0.461	0.032	14.502	0.000	Supported
H 3	OINN -> Logistic Processes	0.029	0.040	0.720	0.236	Unsupporte d

H 4	CSR -> Circular Economy	0.350	0.03 3	10.737	0.000	Supported
H 5	CSR -> Logistic Processes	0.529	0.03 8	13.990	0.000	Supported
H 6	CE -> Corporate Performance	0.086	0.03 8	2.276	0.011	Supported
H 7	LP -> Corporate Performance	0.344	0.04 1	8.324	0.000	Supported

Source: Own elaboration, \*:  $p < 0.05$ , \*\*:  $p < 0.01$ \*\*\*:  $p < 0.001$

Tables 3 and 4 inform us about the results of the hypothesis test of which only H3, has not found empirical support. On the other hand, H1, H2, H4, H5 and H7 show a strong positive and significant relationship at 99%, and H6 shows a weak positive and significant relationship at 95%. In addition to the beta value, algebraic sign and significance, we show the value of t, which is above the value of 2. This test corroborates the results of the relationships that have empirical support in our model. In addition, the bootstrapping test with 5000 samples includes the results of the confidence intervals of the percentiles (CI) and the corrected biases (CI), in the confidence intervals the value of zero is not presented, thereby demonstrating the strength and the magnitude of the relationships of the constructs of the model.

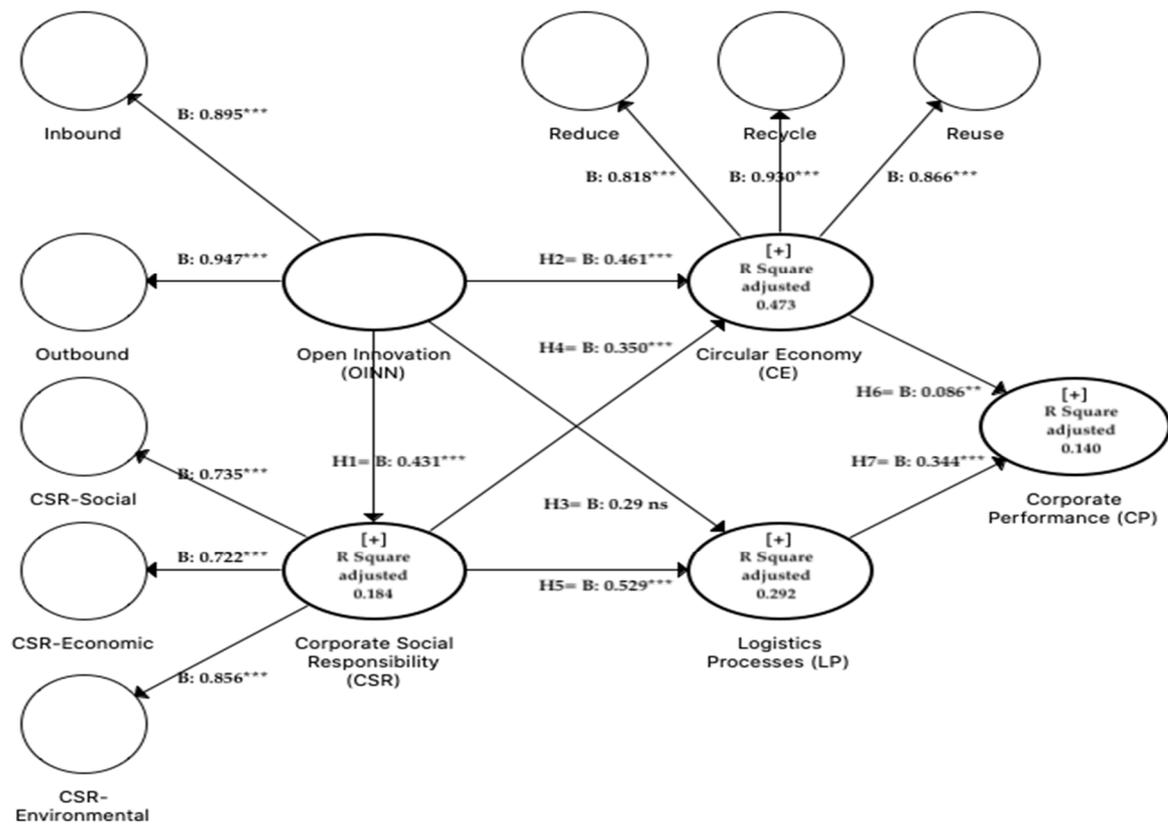
**Table 4.** Percentile CI and Bias Corrected.

	Hypothesis	Beta Value	Percentil CI 5%	Percentil CI 95%	Bias Corrected 5%	Bias Corrected 95%
H1	OINN -> CSR	0.431	0.374	0.484	0.373	0.485
H2	OINN -> Circular Economy	0.461	0.408	0.512	0.407	0.514
H3	OINN -> Logistic Processes	0.029	-0.041	0.091	-0.039	0.091
H4	CSR -> Circular Economy	0.350	0.297	0.404	0.293	0.404
H5	CSR -> Logistic Processes	0.529	0.466	0.592	0.465	0.590
H6	CE -> Corporate Performance	0.086	0.022	0.148	0.023	0.148
H7	LP -> Corporate Performance	0.344	0.277	0.412	0.274	0.411

Source: Own elaboration,  $n = 5000$  subsamples,  $t(0.05; 4999) = 1,645$  ;  $t(0.01; 4999) = 2,327$  ;  $t(0.001; 4999) = 3,092$

#### *Indicators of the Predictive Analysis of the Model*

To evaluate the predictive power of the model, the values of the coefficients of determination (adjusted  $R^2$ ) of the endogenous constructs were analyzed. The results of our model indicate: CSR = 0.184, CE = 0.473, LP = 0.292, and CP = 0.140. According to Chin (1998a) the values are moderate. However, Falk and Miller (1992) recommends that a value 0.10 meets the requirements to achieve a minimum level of predictive power (Figure 1). On the other hand, we analyze the effect size through the value of  $f^2$ . This analysis shows the effect and/or value that the construct contributes exogenous to endogenous. The results of the key relationships with the greatest strength are: OINN-CE = 0.328 (big effect), CSR-LP = 0.323 (big effect), OINN-CSR = 0.228 (moderate effect), CSR-EC = 0.190 (moderate effect) and LP-CP = 0.126 (moderate effect). These values have been taken considering the recommendation of Cohen (1988).



**Figure 1.** Nomogram of the study. Source: The authors.

### *Measuring the Predictive Relevance of the Model*

To evaluate the predictive relevance of the model, the Stone-Geisser test was carried out through the *blindfolding* technique to determine the value of  $Q^2$ . The values of the reflective type variables that are above the value of (0) are considered to have adequate predictive relevance. Our model results show the following values: CSR = 0.182, CE = 0.469, LP = 0.289 and CP = 0.133 (Chin, 1998b). In addition, another measure of goodness of fit has been incorporated to measure the global model, for this, the Standardized Root Mean Residual sack (SRMR) has been considered, a value that must be below 1 (Williams, Vandenberg, & Edwards, 2009). Our value is .092, which shows that the proposed model has a good fit.

## Discussion

Starting from the resources and stakeholders theories, which support our research, the results are discussed in a business context in which the small business is in a developing economy, on the way to adopting a sustainable innovative model that will lead it to be more competitive at both a regional and global level. These efforts are aimed at the adoption and strengthening of strategies focused on the management of sustainable operations through innovative models based on the tripple botton line (social, economic and environmental) (Kleindorfer et al., 2005; Siegel, Antony, Garza-Reyes, Cherrafi, & Lameijer, 2019; Gunasekaran & Irani, 2014). In addition to the analysis of business sustainability, our model incorporates OINN as one of the most efficient strategies and as one of the key players of recent times that contribute to improving the efficiency, productivity and performance of an organization (West et al., 2014). Therefore, in this section the main findings of the study are discussed, analyzing the connection that OINN practices have with sustainable actions (CSR, CE, LP) of small companies and their results with CP.

In a first scenario, we analyze the results that come to light on the relationship between OINN practices and the sustainable actions of small companies. The findings inform that the OINN exerts a strong influence both for the activities developed in the field of CSR, as well as for the actions of CE that the small company executes. These findings are in congruence with the theory based on business resources and capabilities (Chesbrough, 2006; Mirvis et al., 2016; West et al., 2014). However, on the other hand, the findings have shown that OINN has no significant effect on small business logistics processes. This finding suggests that the adoption of innovative models focused on sustainability are not being fully effective in the context of small businesses. In general, OINN directly impacts the LP of manufacturing and larger companies, therefore in smaller companies and other sectors of activity (commercial and services), they still need to focus and deploy greater resources and capacities in logistics activities (Scuotto, García-Pérez, Cillo, & Giacosa, 2019).

In a second scenario, we analyze the findings provided by our proposed model on the effects that CSR practices have generated on the CE and LP, being these strategies the ones that determine the impact of the sustainability in stakeholders and the level of sustainability of an organization (McWilliams, Parhankangas, Coupet, Welch, & Barnum, 2016). Our findings are in the same direction as the sustainability literature, which has proven that these constructs are highly connected (Fortunati et al., 2020; Prieto-Sandoval, Jaca, & Ormazabal, 2018). In addition, the results report that CSR practices are crucial to increase the CE activities and the actions of the logistics processes of the small company (Murphy & Ng'ombe, 2009; Wu, 2017; Valdez-Juárez, Gallardo-Vázquez, & Ramos-Escobar, 2018). The findings provide relevant data on the main CSR actions (social, economic, environmental) that small businesses in this region are developing, with CSR-Environmental being the activities that have a greater specific weight, therefore, this has come to contribute to a certain extent in responsible and sustainable behavior (Tang & Zhou, 2012; Chen & Andresen, 2014). On the other hand, these CSR practices have strongly contributed to the adoption and solidification of CE activities (reduce, recycle and reuse), and this has come to improve sustainable behavior, adopting responsible practices in the elaboration of ecological products, reduction of polluting materials, reduction in energy costs, the use of clean energies and the implementation of recycling programs, among others more important and significant for environmental and financial performance (Fortunati et al., 2020; Bassi & Dias, 2020).

In the third scenario, we analyze the results related to the impact that CE practices and LP have on the CP of small businesses. The findings have shown that companies that adopt innovative and sustainable models have better competitiveness and

profitability results (Teece, 2010; Näyhä, 2019). Despite the deployment of resources and capacities that SMEs are exercising, the strategy focused on sustainability (balance between social, economic and environmental actions) (Elkington, 1994; Carroll, 2016) and in particular CE practices, are still incipient to achieve significant organizational and economic results. This behavior is reflected in the results of our model, although there is a significant and positive effect on the CP. These manifestations are still very poor, therefore an important gap opens on the link of the CE practices towards the economic and financial performance of small businesses (De et al., 2018; Dey et al., 2018). Some factors that may intervene in these results are due to multiple actions that are not carried out in their entirety within the small company, which range from lack of knowledge of the management of CE activities and, to the limitations related to the scarcity of technological resources, organizational regulations and the high costs of sustainability programs (Prieto-Sandoval et al., 2018; Dey et al., 2020). On the other hand, the results show that the small companies in this region are channeling their resources and capacities in the LP to generate a greater benefit from CP. Therefore, the responsible practices that these companies have been developing are inclined towards an inside-out approach, that is, they are busy and focused on choosing socially responsible suppliers, on meeting customer demands and orders with products and services with minimum quality standards (European Commission, 2011; Quarshie, Salmi, & Leuschner, 2016). All this has allowed these companies to increase their participation in the sector in which they compete and have been competing strongly to achieve higher sales.

## **Conclusions**

According to the previous context and based on the literature related to the theory of resources and stakeholders, SMEs are on the right path towards the adoption of innovative and sustainable models. In the research, it has been visualized that the issue of business sustainability is one of the strategies most approached by experts, with this, companies have managed to achieve greater competitiveness and performance. The empirical evidence has shown that businesses that implement CSR practices, and sustainable actions such as some CE practices in their LP, manage to raise CP. However, the relationship between OINN and sustainability practices is not yet fully developed and is unclear in the small business arena. Therefore, the objectives of this research were: 1) Analyze the effects that OINN has on CSR, CE and LP of SMEs, 2) Examine the relationship and effect that CSR and CE have on LP and in CP, and 3) Verify the effect generated by the CE in the CP of SMEs. To respond them, a sample of 684 small companies from the trade and services sector, located in the Northwest region of Mexico, was analyzed. The managers expressed their opinions through personal interviews (questionnaire) regarding the questions corresponding to the constructs of the research model. The opinion of these entrepreneurs allowed us to argue in a more detailed and accurate way our findings in the context of small business.

First of all, we can say that SMEs are in constant search of competing with large companies in a more aggressive and efficient way. Thus, the research reports that SMEs by incorporating OINN practices (CSR-CE and LP), there's a better performance of the company. Therefore, it is concluded that OINN has a strong and direct influence on CSR and CE practices, but not for logistics processes. However, OINN can be a strong alternative for companies to be more competitive and improve their CP.

Consequently, in this first block we give response to the first objective of the research, where a series of implications for the managers of small companies in the Northwest region of Mexico come to light, highlighting the following: 1) the most dominant OINN practices in these companies are the called outgoing innovation practices, being the knowledge applied to new ventures and the sale of tangible elements such as know-how, 2) outgoing innovation practices are also being adopted by SMEs, however, it is

observed that they still require to work more on it, in order to transfer them to the actions of CSR, CE, but more in LP. In order to be an innovative and sustainable company, it is important to establish a balance between the practices of CSR, CE and LP. We have verified that OINN had significant effects on LP, therefore, it is recommended that managers of SMEs direct their efforts not only to actions related to CSR and CE practices, but also to incorporate internal and external knowledge for the innovation of LP as part of their integration into supply chains sustainable.

The second block involves objective two of our research. Therefore, the research concludes that small companies are moving towards sustainable models through CSR and CE practices and all efforts are moving them towards LP and CP results. However, it also comes to light that CSR practices are more directed towards LP, therefore, the relationship between LP and CP has a greater effect and influence. Thus, SME managers are recommended to continue developing and improving logistics practices in all their processes through the correct choice of their socially responsible suppliers, quality assurance and full customer satisfaction. In addition, it is convenient for SMEs to adopt certifications with regional and global quality standards. As well as certification in ISO standards in the environmental context to improve the sustainability of its logistics processes and its supply chain. Despite the resources and capabilities that these companies are exercising, because they are more competitive and sustainable, the issue of the CE continues to be a challenge that requires a strong commitment and responsibility. The results have shown that the relationship between the CE and CP is not very significant, so a series of actions must be developed within the small company. Some actions that SME managers could incorporate are: 1) the adoption of permanent programs in the short and medium term on efficient practices of the CE, 2) it is also convenient to adopt and formalize clear policies on management and internal practices on sustainability, 3) change paradigms in the actions of stakeholders (internal and external) through training and environmental education, 4) establish environmental and CSR programs based on goals and periodic evaluations. Furthermore, it is important to adopt a complete comprehensive sustainability model (use, recover, take, make and distribute). In summary, we can conclude that SMEs that consolidate an integration and a perfect balance between innovation and sustainability, achieve a series of benefits which are translated into improvement of product designs, products called eco-innovators, development of sustainable processes, ecological and/or green, increasing reputation and financial returns, in addition to making a firm contribution to caring for the environment.

Research contributions are important to the development of the small business innovation and sustainability literature in the context of an underdeveloped economy and turbulent socio-political environments. On the other hand, the SEM-PLS method has proven that it is an efficient statistical technique to analyze the constructs under study. With this, it is clear that resources and capabilities such as OINN play a determining role in the development of sustainable businesses from the point of view of stakeholder theory, in its three dimensions (social, economic and environmental). From a practical context, the model developed in this research corroborates that SMEs should adopt innovative and sustainable models to continue in this competitive fight. At the same time, OINN and sustainability are complementary strategies that help to bring together and integrate the benefits of the companies' stakeholders.

Regarding the limitations of the study, this research is not free of them: 1) the results are derived from the subjective opinions of the leaders of these companies on innovative, sustainable actions and CP, which can sometimes lead to bias in the information provided, 2) another limitation is the measurement of each of the model variables, which were adapted from other investigations and which in some cases are found under development, such is the case of OINN and CE. In the latter we only contemplate three

essential actions carried out by SMEs, reduce, recycle and reuse, 3) in general, the measurement of innovative and sustainable models is focused on large companies in the manufacturing sector and high technology, so this could generate a low level of these practices in small businesses and in the trade and service sectors. Finally, as part of future lines of research, it is important to continue with the analysis of innovative and sustainable models in SMEs, but it is also convenient to incorporate some mediating and / or moderating variables (intellectual capital, size of the company, etc.) in order to verify the level of the total variance explained and its impact on the CP of these organizations for the improvement of higher value business strategies and proposals.

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