

Perspectives of circular value networks in Ecuador

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Abstract

The circular value network is based on the cyclic integration of the flows of materials, information, finances, knowledge and innovation of the actors that compose it. The purpose of this work is to analyze the perspectives of circular value networks in Ecuador, from their principles and limitations. In addition, measures are proposed to increase the application of this concept in the country. A three-stage methodology was developed to map, diagnose and analyze the circular economy approach in the network through three checklists. As a result, limitations were identified for good practices; which focus on traditional business models, lack of ecological culture and few incentives in public policies. In addition, due to the high volume and variety of raw materials handled by the chains studied, its participants do not consider reuse or recycling to be an imperative necessity. The theoretical contribution of this research is the contextualization of the trend of the circular economy in the country; and from the methodological point of view; the definition of tools for its application in current contexts.

Keywords

value chain, circular economy, residues usage and sustainability.

1. Introduction

Ecuador's producers, faces a structural deficiency in the insertion of local biodiversity resources in value networks. The productive sector depends on basic products (cocoa, cane, African palm, cattle) and unfriendly practices with the environment like deforestation and expansion of the agricultural frontier. Although Ecuador is one of the seventeen countries considered "mega-diverse", biodiversity does not yet express its role as an important competitive advantage and it represents a minimal portion of the regional productive landscape (Sablón Cossio, Radice et al. 2016). In addition, the productive transformation of the country is incipient and exports depend on raw materials, with a prevalence of non-renewable natural resources (crude oil). This implies the need to apply good and friendly practices, as circular economy, to bring environmental and economic benefits to the region.

Therefore, the country is an emerging market in the area of bio-commerce despite the sustainable business opportunities that exist with the focus of innovation products, the promotion of circular value networks, along with the need for a culture with shareholders. The application of this philosophy implies a change in thinking (Zwiers, Jaeger-Erben et al. 2020), in this case in the actors of the value network, and evolve into a circular approach. This promotes the new business models, with particular characteristics (De Angelis, Howard et al. 2018). Where waste is used for the elaboration of new products with added value (Scarpellini, Portillo-Tarragona et al. 2019). At the same time, reduce the consumption of products and services. Together with the development of a recycling system that guarantees the best use of resources (Korhonen, Nuur et al. 2018). These elements are part of the need in business practice in Ecuador, and are part of the challenge. Therefore, the objective of this work is to analyze the perspectives of circular value networks in Ecuador, from their principles and limitations.

Current trends in the circular economy

At present, the circular economy focuses on products, components and resources maintaining their usefulness and value at all times; with a continuous cycle of positive development that conserves and improves natural capital, it optimizes the use of resources and minimizes the risks of the system by managing a finite amount of stocks and renewable flows (Korhonen, Nuur et al. 2018, Leising, Quist et al. 2018, Whicher, Harris et al. 2018). In definition, the circular economy is restorative and regenerative, and aims to ensure that products, components and resources in general maintain their usefulness and value at all times (Batista, Bourlakis et al. 2018). This concept distinguishes between technical and biological cycles. As its creators imagine, the economy consists of a continuous cycle of positive development that conserves and improves natural capital, optimizes the use of resources and minimizes the risks of the system by managing a finite amount of stocks and renewable flows (Moktadir, Rahman et al. 2018). In addition, it works effectively on all types of scales (MacArthur 2017).

The basic objectives of the circular economy are preserve and improve natural capital, optimize the use of resources and promote the efficiency of the system (Leising, Quist et al. 2018). The principles that from our perspective are manifested: a design to "end waste" (system thinking), the energy required for this cycle should be renewable by nature and introduces a strict difference between the consumable and durable components of a product (cascade thinking), (De Angelis, Howard et al. 2018, Whicher, Harris et al. 2018).

Requirements that are proposed from the circular economy to the value networks are needed for the extension of this philosophy, result in: inputs and outputs (materials need to be designed and managed in direct and reverse flows from product conception), certification (monitoring of vendor certifications and material standards is necessary to increase security and standardization), data exchange (all information must be exchanged between network businesses), product life cycle (information on products and their life cycles must be managed end-to-end and shared among all members) and impact (it is necessary to measure the economic and environmental impact of the supply chain in real time and make decisions based on these analysis).

For this achievement, a group of challenges are unleashed that they face in the management of circular value networks: the internet of things and advanced analytics make it possible to improve collaboration and communication, which is a possibility and a challenge for the emergence of new collaborative business models; the possible loss of "possession" due to the change in the customer consumption system; go from buying products to consuming services; Logistic service providers must reassess joint work to create a better product flow and lower cost; relations become more complex and manual tracking of the parts is impractical, technologies must be applied to make this philosophy viable.

For this research, the circular value network is defined as: integrated processes from suppliers to suppliers, where innovation and knowledge development are coordinated to promote added value to the customer, reuse, recycling and reduction of waste from products and materials throughout their life cycle (Acevedo Urquiaga 2018). Despite this, there is a need to develop the elements that favor the implementation of this good practice.

2. Methodologies and method

A proposed procedure is used to achieve the objective. It consists of three phases: characterization of the value network, diagnosis of the circular value network, and the prospects of the circular value network in Ecuador.

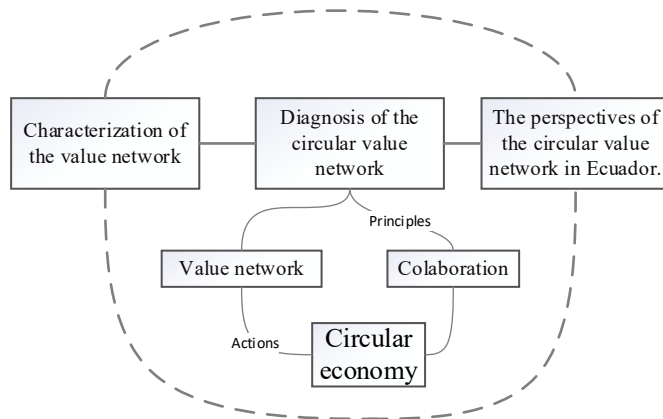


Figure 1: Procedure for the analysis of the prospects of circular value networks in Ecuador.

A proposed procedure is used to achieve the objective. It consists of three phases: characterization of the value network, diagnosis of the circular value network and the perspectives of the circular value network in Ecuador. In the first, the characterization of the circular value network is included. Where the links and actors of the same were identified, which in turn allow establishing the limits of analysis and the relationship of the network with the environment. The basic sector where the study network is framed is described. In the second, it is diagnosed in a triangulated way: the value network with the checklist of Acevedo Suárez, Gómez Acosta et al. (2010); the collaboration with the checklist of Sablón Cossío, Pérez Quintana et al. (2018) and the circular economy with Dieguez's tool, 2020 (Figure 2). In addition, the principles and actions of (MacArthur 2017) are analyzed. In the third, the prospects for the application of this trend in the country are defined.

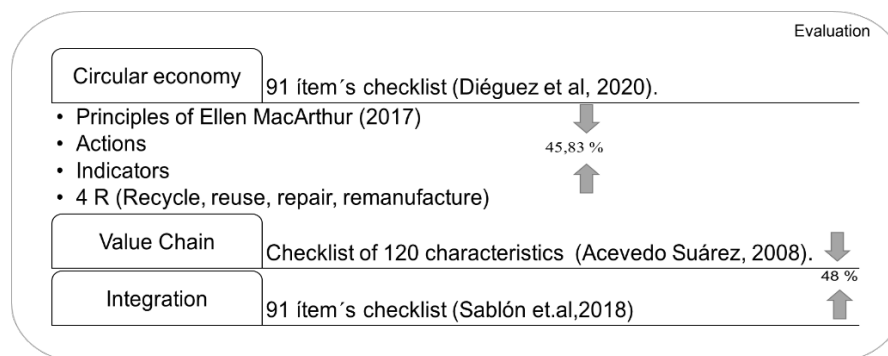


Figure 2: Diagnostic tools for the circular value network.

3. Results

Currently in Ecuador, there are different regulations and regulations that affect the development of circular value networks among which are: Organic certification issued by the Institute for the ethical and environmental certification of Ecuador and the Environmental Management Law issued by Ministry of Environment The first refers to the requirements that allow for the obtaining, distribution and management of organic products. The second, establishes the requirements to control and prevent environmental pollution of water, air and soil resources in entities and companies (environmental manager for the final disposal of waste and is not a financial incentive). A prize that affects this trend is added, Green Latin America Award, from the Ministry of Foreign Trade and Investments that promotes the reduction of carbon dioxide emissions and raise awareness in civil and productive society of the reduction, reuse, repair and recycling. In spite of this, good practices aimed at caring for and improving the environment does not have a financial incentive for companies and institutions, but rather an expense.

At the same time, some public regulations are developed to guide the circular economy as: the Technical Standard based on Circular Economy regulated by the Ecuadorian Standardization Service (INEN 2020); the signing of the Circular Economy Pact will promoting productive initiatives based on recycling (Ministerio del Medio Ambiente 2019). Also, seven public initiatives are registered in relation to the circular economy in the country (Table 1); however, these rules have not yet been implemented.

Table 1: Public initiatives of circular economy in Ecuador

Regulatory body	Actions	Description
Ministry of Environment	National Program for Management Waste Integral Solids-PNGIDS, 2010	The program aims to boost solid waste management in the municipalities of Ecuador, with a comprehensive and sustainable approach; in order to reduce environmental pollution, improving the quality of life of citizens and promoting the conservation of ecosystems
Ministry of Foreign Trade and Investments	Eco-Sustainable Brand Circular Economy of Ecuador, 2018	The process to obtain the Circular Economy of Ecuador "brand is free and represents an opportunity for producers and exporters to promote themselves and reach new markets in the world. Companies that are interested in obtaining the seal of sustainable products can be contacted to the Ministry of Foreign Trade and Investments
Ministry of Environment	Cleaning Plan Coastal, 2019	Coastal Cleaning is an initiative led by the Ministry of Environment, in a joint effort with the Galapagos National Park, International Conservation and the Coca Cola Foundation, it will be executed in seven coastal marine protected areas of Ecuador, to mitigate and reduce environmental damage that produces garbage in the oceans
Ecuadorian Service of Normalization (INEN)	Technical rules Economy based Circular, 2019	The Ecuadorian Standardization Service (INEN) is working on the creation of the Ecuadorian technical normative document "Principles of Circular Economy", based on BSI 8001. Then the draft standard on the "Principles of Circular Economy in organizations" will be formulated, to give way to the creation of a Technical Committee and Public Consultation and finally to formalize it.
Foreign, Investment and Fishing; Vice Presidency of the Republic; Governing Council of the Special Regime of Galapagos; Ministry of Environment and Ministry of Production and Commerce	Pact for the Circular Economy, 2019	Waste utilization and industrialization; carry out life cycle analysis of products that are easily recoverable and that at the end of their life cycle generate usable waste; promote research and development of technologies with low environmental impact, clean production; sustainable and resilient infrastructure; citizen education, sustainable business, progressive replacement of single-use plastics and develop economic, social and environmental indicators.
European Union and Ministry of Environment	White Paper of Circular Economy for Ecuador, 2019	It will contain the conceptual framework and guidelines for developing a public policy that encourages the initiation of Circular Economy projects in the country, will also contain other studies to capture a baseline on the state of the country around the circular economy and the opportunities identified, as well as the main barriers to overcome.

Ministry of Environment	Ministerial agreement 042 to recycle the 100% lubricants used, 2019	Ministerial Agreement 042 issues an instruction for the application of extended responsibility in the integral management of used lubricating oils and empty containers. The document establishes technical requirements and guidelines for the environmentally sound management of these products.
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Source: Taken from Adenauer-Stiftung (2019).

Figure 3 shows the contributions of different Latin American countries in the theme of circular economy in the Web of Science. As shown, Ecuadorian researchers are not very prolific in this area, added to the increase in regulations and incentives in the country; It demonstrates the need to investigate these issues in the country, both from a theoretical and practical point of view.

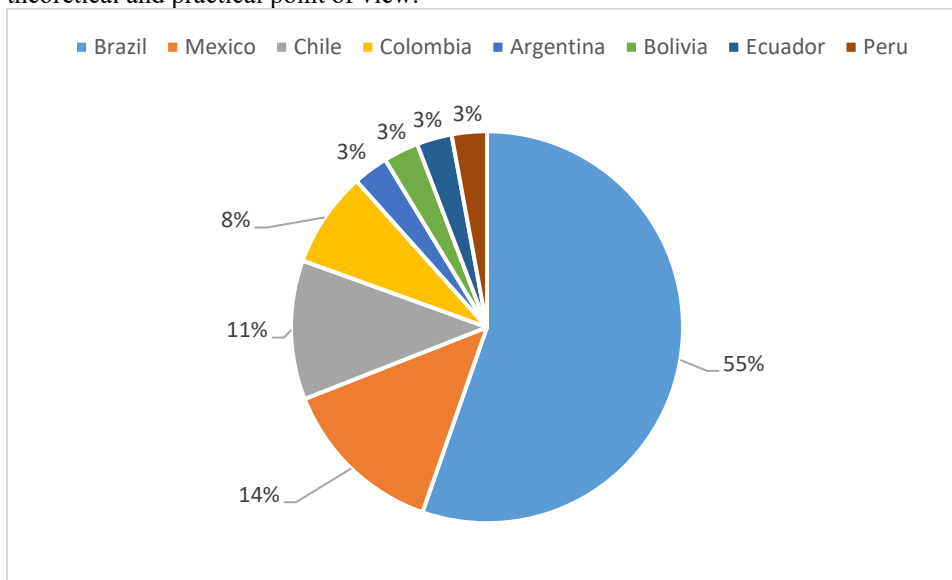


Figure 3: Participation of Latin American countries in scientific production of circular economy
 Source: Made from Adenauer-Stiftung (2019).

Based on these analyzes and business needs, the development of a project of circular value networks begins. This project develops specific tools for the diagnosis of circular economy and joins other existing techniques, all adjusted to the Ecuadorian reality.

Application of diagnostic tools

The diagnosis is made in agro-food chains, which present a high number of weaknesses and opportunities for the application of circular economy philosophy; the Figure 5 shows the result of the evaluated tools.

Circular economy

The first applied checklist is the circular economy level. The resultant value of the indicator on the agro-food chain is located at a medium level with a metric of 2.98. On the other hand, the variables of greatest weakness are identified as the design (with an average of 2.25), followed by the source or materials supply (with an average of 2.54), the re-manufacture and manufacturing (with an average of 2.8), the collection (average of 2.94). While consumption and use (average of 3.22), distribution and sales (average of 3.23), and sustainability and economic circle (average of 3.50), locates average values.

Integration

The integration evaluation in the study object is low, with a value of 1.71; this confirms that the chain is in a low integration level, in the Negotiation Stage. The variables are stated in ascending order: the information (average of 1.01), the indicators (average of 1.02), the suppliers (average of 1.17), the contracting (average of 1.28), the formulation of scenarios (average of 1.69), inventory management (average of 1.72), merchandise distribution (average of 1.77), chain strategy (average of 1.89), purchases (average of 2) and strategic objectives (average of 2.16).

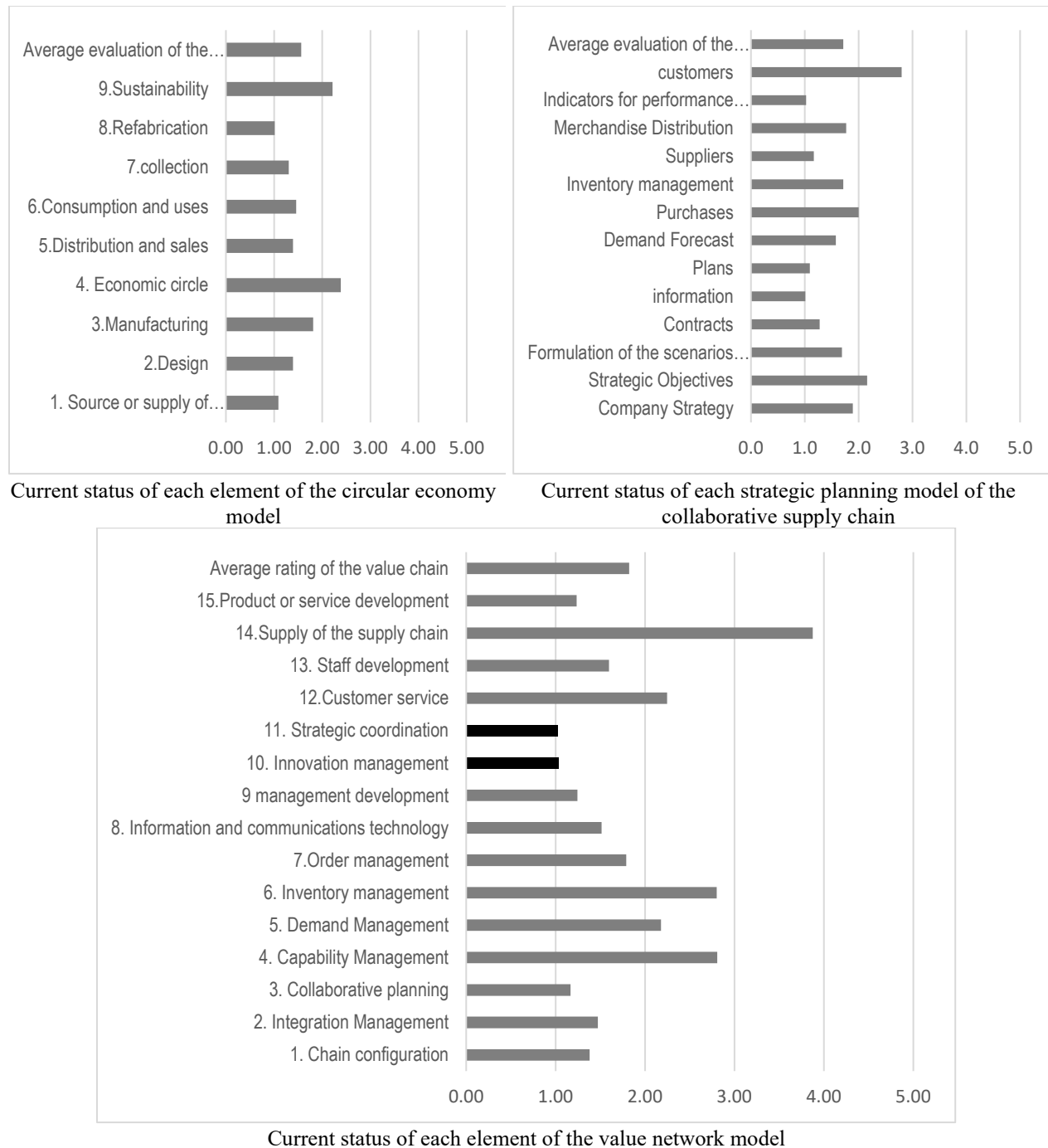


Figure 4: Comparison between diagnostic tools.
 Source: Data collected by Romero Delgado and Rosado Zambrano (2019).

Value network

The result of the evaluation of the network under study is low, with a value of 1.82. This affirms that the chain is located at a low development level. The variables are stated in ascending order: coordination and management of innovation (average of 1.03), collaborative planning (average of 1.17), product and service development (average of 1.23), management development (average of 1.24), configuration of the chain (average of 1.38), integration management (average of 1.47), personal development (average of 1.60), order management (average of 1.79),

customer service (average of 2.25), inventory and capacity management (average of 2.88), chain performance (average of 3.88).

The three integral indicators that are evaluated in the value network have low values (Figure 6). The most affected variables focus on innovation, information management and product design. In addition, the need to focus on knowledge development is highlighted; this due to the low education and training in these matters.

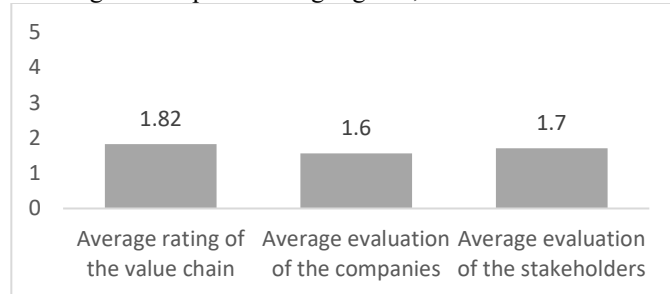


Figure 5: Comparison of the three general indicators.

Some of the actions that would contribute to the development of the circular economy in Ecuador in general:

- ✓ Develop public policies that favor tax incentives for investment and decrease taxes for the use of good practices in the circular economy.
- ✓ Design products that, due to their recycling nature, have some benefit for the consumer, and the stakeholders that use them.
- ✓ Define information campaigns to raise consumer awareness of the need to recycle, reuse and reduce the consumption of products and services.
- ✓ Develop circular cities with the determination of their integral public processes and their coordinated flows that guarantee the principles of the circular economy.
- ✓ Establish in the curricula of undergraduate and postgraduate careers the circular approach.
- ✓ Plan together, at all levels involved the necessary actions for the migration of a linear economy to a circular one.
- ✓ Design products and services with added value for the new business models.
- ✓ Promote the application of circular value networks for the change of the productive matrix and greater social benefits.
- ✓ Promote technological transfer to enterprises and communities where raw material is available.

4. Conclusions

At present, philosophies aimed at the circular economy and its management in the value network is a key factor when it comes to improving the competitiveness of any chain and the actors that compose it. In this investigation the practical presence of this approach in Ecuador was analyzed; through a holistic study with three diagnostic tools in an agro-food chain. The adoption of the best practices to the agro-food sector will be a key factor that will contribute to increasing the levels of innovation, information management and design of value-added products. This change should present as a basis the training of personnel in basic skills for the execution of this philosophy in business practice. In future research, we propose to continue the study of the circular economy and promote the development of a tool that evaluates the network of circular value through comprehensive indicators.

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