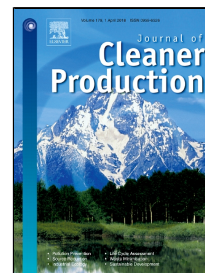


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Sustainable supply chain management: contributions of supplies markets

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collaboration
integration



Local Suppliers



Supplies market



Consumers

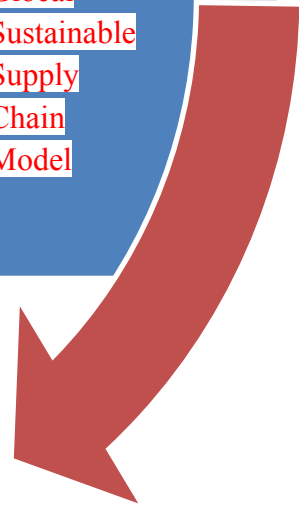
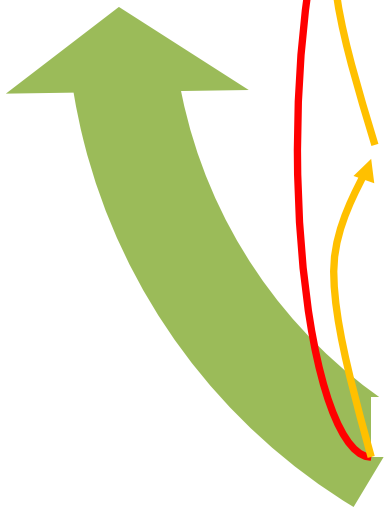
Sustainable
supply chain
indicators

Stakeholder
analysis

Glocal
Sustainable
Supply
Chain
Model

information
flow

green performance



1 **SUSTAINABLE SUPPLY CHAIN MANAGEMENT: CONTRIBUTIONS OF**
2 **SUPPLIES MARKETS**

3

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1 **Abstract**

2 The current sustainability concern is causing the food supply chain to extend their focus
3 beyond traditional economic goals to the triple bottom line approach. This paper argues
4 for the implementation of a glocal sustainable supply chain (GSSC) in developing
5 countries. The literature has identified antecedents and drivers for the adoption of
6 sustainable supply chain management. However, there is relatively little research on
7 methodological and empirical approaches that take into account the dynamic nature of
8 developing countries and bridge the existing global/local divide. To address this gap,
9 this paper first reviews the theoretical foundation and literature as well as the link
10 between the sustainability of the supply chain and glocalisation; second, the supply
11 chain is analysed and its performance according to sustainable indicators is outlined
12 with regards to the relevance for developing economies, which proposes the GSSC
13 model; third, the model is validated in the Dominican Republic supplies market chain
14 and finally it illustrates the contributions of the supplies market chain to GSSC. Results
15 show that the supplies market contributes to GSSC in multiple ways: i) with increasing
16 flow of information and food safety; ii) by improving the coordination among supply
17 chain members and eliminating intermediaries; and iii) by reducing food miles and
18 closing the supply loop. This study develops a GSSC model for the sustainable
19 management of the supply chain in developing countries and provides empirical
20 research on the contribution of Santo Domingo supply market to GSSC. The paper
21 contributes to a deeper theoretical and empirical research on the sustainable
22 management of the supply chain in developing countries through the lens of
23 glocalisation. This research encourages managers and policymakers to regulate the food
24 supply chain performance without harming the environment while meeting social
25 expectations. The paper concludes with limitations and further research directions
26 within practical and theoretical implications.

27

28 **Key words:** value chain analysis, sustainability indicators, integration, information
29 flows, fair consumption.

30 **Abbreviations:**

31 RQ Research Question

32 GSSC glocal sustainable supply chain

33 CAFTA DR Caribbean and America Free Trade Agreement Dominican Republic

34 **1. Introduction**

35 The current sustainability concern is causing food supply chains to extend their focus
36 beyond traditional economic goals to the triple bottom line approach that considers the
37 environmental, social and economic domains. The sustainable supply chain implies that
38 the activities from farm-to-fork (Weiss, 2012) meet the needs of the stakeholders in the
39 food chain while protecting, sustaining and enhancing the human and natural resources
40 that will be needed in the future (Erol et al., 2009; Ortiz-Miranda and Moragues-Faus,

1 2015; Passel, 2013; Reefke and Sundaram, 2017). Many authors indicate that
2 intermediary stakeholders' organisations in the supply chain play a key role in the
3 development of a sustainable supply chain (Dubey et al., 2016; Trauger, 2014).
4 Esfahbodi et al. (2016) emphasise the importance of inter-organisational links to
5 promote trust, reduce risk and in turn increase innovation and profitability. Moreover,
6 special attention is given to sustainable food supply chains in developing countries due
7 to the urgency for improvement (Ras and Vermeulen, 2009) and the need for further
8 research (Erol et al., 2009). While sustainable supply chain management has been
9 largely researched by scholars (Rimmington et al., 2006; Tseng and Chu, 2013; Zhu et
10 al., 2008), little empirical research has been found concerning the contribution of the
11 supplies market in developing countries to the sustainability of the value chain. In the
12 current framework, the sustainable supply chain in developing countries must meet
13 domestic expectations, and also permit competition in the global market (Esfahbodi et
14 al., 2016). In this sense, we found that there is a lack of research about the sustainable
15 development of the supplies market in developing countries from the theoretical lens of
16 glocalisation. Beck (1999) indicated that the market is a glocal example in which global
17 and local coexist. This theoretical lens was chosen for this study because Robertson
18 (2005) marked out that developing countries are lacking protection for their identity.

19 This paper proposes the following research question: (RQ) Does the supplies market
20 contribute to the sustainable development of the supply chain? To answer this proposed
21 research question, this paper develops a glocal sustainable supply chain (GSSC)
22 model. The proposed model was empirically approached in a developing country, the
23 Dominican Republic. The country has recently launched a European-style supplies
24 market, *Merca Santo Domingo*, and it is in transition to the recently entered into force
25 Caribbean and America Free Trade Agreement Dominican Republic (CAFTA DR).
26 This new social environment, similar to that of several developing countries, lacks
27 deeper conceptual, theoretical and empirical research for sustainable development. This
28 study contributes with a GSSC model for the sustainable management of the supply
29 chain in developing countries and provides an empirical research of the contribution of
30 the Santo Domingo supplies market to the sustainability of the glocal supply chain. The
31 paper contributes to a deeper theoretical and empirical research for the sustainable
32 management of the supply chain in developing countries, through the lens of
33 glocalisation.

34 The remainder of this paper is structured as follows. The theoretical foundation and
35 literature review is presented in the next section along with the linkage between the
36 sustainable supply chain and glocalisation. Next, a value chain analysis and its
37 performance according to sustainable indicators are outlined with respect to their
38 relevance to developing economies which propose the GSSC model. Thereafter, the
39 research methodology is presented in section 3. Section 4 reports the results of this
40 study and the discussion. Lastly, the conclusions of this research investigation are
41 addressed in section 5 along with the theoretical and managerial implications, and also
42 limitations and future directions.

1 2. Literature Review

2 A sustainable supply chain analysis allows for the diagnosis of misalignment between
3 resource allocation and consumer preference, as Soosay et al. (2012) examine through
4 product flows, information flows and the management and control of the Australian
5 wine value chain to the UK. The literature shows very little about sustainable food
6 supply chains management in developing countries. Some studies analyse foodstuff's
7 supply chains and focus on the sustainability of certain stages of the chain. In this sense,
8 Ortiz-Miranda and Moragues-Faus (2015) analyse the sustainability of producers'
9 organisations of fair-trade labeled coffee chains in Guatemala, and Ras and Vermeulen
10 (2009) research the sustainable production of South African table grape producers. Both
11 papers address the sustainability of the producers' stage in the exportation market, but
12 little was found about a local and global sustainable development approach. Some
13 consideration of the glocal was found in Vachon (2010) who analyses international
14 manufacturers' decisions in supply management from the perspective of national
15 culture. Vachon selects social and environmental sustainability practices and measures
16 their impact in 55 manufacturers' countries. The retailer stage is studied by Erol et al.
17 (2009) who reviews economic, social and environmental indicators in retailer industries
18 for sustainable performance. The consumer stage is the most studied in the literature
19 because many authors consider consumer decisions to move supply chain management
20 to sustainable domains. Ritzer (2002) remarks upon consumers' concerns regarding
21 health and the environment (Turner et al., 2007).

22 The literature expands upon the sustainable supply chain management. A more holistic
23 and relational standpoint is that of the sustainable supply chain from green performance
24 to a virtuous circle which addresses sustainability at all stages and interactions (Ashby
25 et al., 2012). Many authors have created supply chain management models with respect
26 to sustainable indicators engaging with empirical methods (Chin and Tat, 2015; Dam
27 and Petkova, 2014; Ding et al., 2016). Esfahbodi et al. (2016) proposes a model for
28 sustainable supply management in light of environmental and cost performance and
29 which includes sustainable procurement, distribution, designs and investment recovery.
30 Dubey et al. (2016) use a total interpretive structural modeling to extrapolate drivers of
31 sustainable supply chain management and their relationships. The qualitative approach
32 developed by Reefke and Sundaram (2017) shows a Delphi study to identify the
33 planning, execution, coordination and collaboration of key themes for a sustainable
34 supply chain management for future researches.

35 While globalisation is a general debate (Ras and Vermeulen, 2009; Vachon, 2010), the
36 glocal approach has received limited address in the literature beyond a marketing tool
37 used by multinational companies to enter into international markets (Chinomona and
38 Sibanda, 2013). Reuter et al. (2010) analyses the complexity of distribution because of
39 globalisation and the need to take advantage of the socio-economic conditions of the
40 respective regions. Hopwood et al. (2005) map out approaches for sustainable
41 development and argue that the economy should be run as if people mattered, with the
42 implication that small and local is more sustainable than large and global. Vachon

1 (2010) empirically studies international operations and national culture and
2 demonstrates that individualism and uncertainty avoidance can influence the degree of
3 corporate sustainable development practices. Passel (2013) compares the environmental
4 cost of apples from different procedures and supports the idea that the benefits
5 associated with local food systems are evident, although globalisation over the long
6 term will grow economic efficiency. Despite this, we are at an early stage of discovering
7 the benefits associated with food trade from developing countries.

8 We also find little literature pertaining to an analysis of the Dominican Republic's food
9 value chain and no signs about its sustainability. The United Nations has provided
10 recommendations for the ecological footprint for foodstuffs exportations from the
11 country (Frohman et al., 2012), while the First Lady's office has edited a guide for
12 consumers to increase the consumption of fruits and vegetables in Dominican Republic
13 (SESPAS, 2009). The Dominican agriculture ministry has developed a quantitative
14 study of key crop chains in the country, defining the traditional intermediaries (IICA,
15 2009). Despite these studies providing insight into the complexities of the Dominican
16 Republic's trade relations, they do not consider the Merca Santo Domingo supplies
17 market and the lack of a presence in CAFTA DR.

18 The literature review concludes that social, economical and environmental factors
19 should be considered in order to develop a GSSC model for developing countries. The
20 model needs to address sustainability at all stages and interactions (Ashby et al., 2012)
21 with respect to sustainable indicators and to further engage with empirical methods
22 (Chin and Tat, 2015; Dam and Petkova, 2014; Ding et al., 2016). Additionally, the
23 importance of empirical research is shown for the GSSC model in a developing country,
24 such the Merca Santo Domingo supplies market chain that operates in the context of the
25 CAFTA DR. This research aims to bridge the sustainability global/local gap in the
26 management of supply chains in developing countries.

27 **2.1. Sustainability Indicators and GSSC Model**

28 In order to create a GSSC model we compiled sustainable chain indicators from the
29 literature and organised them under the three pillars of sustainability (Table 1).

30 **Note to typesetter: Insert Table 1 here**

31 From a social standpoint, the social function of the supply chain is to serve food from a
32 point of origin to a point of consumption (Esfahbodi et al., 2016; Soosay et al., 2012). In
33 this sense, a social GSSC model needs to meet the internal and external customers'
34 expectations and satisfaction (Reefke and Sundaram, 2017). Nowadays, customers
35 expect increasingly safe and healthy products (Ras and Vermeulen, 2009) coming from
36 fair trading and for fair consumption. In this sense, the authors mark the importance of
37 the equity performance of a social GSSC (Chin and Tat, 2015). This social order
38 directly implies an upstream or downstream flow of information, products and services
39 (Dam and Petkova, 2014; Dubey et al., 2016; Vachon, 2010). Dubey et al. (2016)
40 remark on the need to consider working conditions and the health and well-being of the

1 chain workers. Rimmington et al. (2006) also indicate the social and ethical values that
2 stakeholders contribute to a social sustainability of the supply chain by successful
3 collaboration, ethical sourcing and purchasing. In this sense, Dubey et al. (2016)
4 reclaim the need for commitment and social responsibility of the supply chain's
5 stakeholders. Furthermore, Erol et al. (2009) emphasise the ability of a social GSSC to
6 participate in local activities and to support local communities with transparency.

7 To direct the research, the following hypothesis was tested:

8 H₁: The development of the supplies market can contribute to GSSC model increasing
9 food safety and flows of information.

10 Value chain firms are profit-driven in the pursuit of economic benefits which do not
11 always correlate with the economic GSSC, which means long-term profitability for the
12 chain without compromising resources for future generations. The literature enumerates
13 the need for managerial skills with respect to organising, planning ahead and leadership
14 (Ras and Vermeulen, 2009), as well as with respect to operational skills for
15 administrating, financing and the logistic streamlining of the stakeholders to ensure an
16 economically GSSC (Reefke and Sundaram, 2017). Nevertheless, the economic context
17 is not static since it is contingent on technology, consumer preferences, the structure of
18 production, logistics and distribution, and continuous improvement. Moreover,
19 innovativeness and diversity are needed to economically sustain the supply chain
20 (Dubey et al., 2016). Many authors highlight the importance of coordination and
21 cooperation among supply chain members to maintain long-term commercial benefits
22 (Ding et al., 2016). Dubey et al. (2016) argue that the collaboration of strategic
23 members is essential for the success of a sustainable supply chain. They maintain that
24 collaboration helps to commercialise and ensure easy access to innovative technologies
25 for the local and lower-tier members of the supply chain. In this line, Reefke and
26 Sundaram (2017) have pointed out that an increase in technical information will allow
27 the supply chain to adapt its performance to economic, social and environmental
28 challenges.

29 To direct the research, the following hypothesis was tested:

30 H₂: The development of the supplies market can contribute to the economic GSSC by
31 the integration of local producers and the elimination of intermediaries.

32 The environmental sustainability of the supply chain is the most present topic in the
33 literature. Ding et al. (2016) maintain that environmental GSSC is often motivated by
34 governments, customers or stakeholders, and a vertical order can improve
35 environmental performance (Erol et al., 2009). Reefke and Sundaram (2017) notice that
36 regulations, customer interests, reputation and public pressures from global warming,
37 resource limitations, emissions and health issues can press on the environmental
38 performance of the chain. Furthermore, Ding et al. (2016) settle that the environmental
39 carrying capacity of the chain depends on the conditions of technology, preferences, and
40 the structure of production and consumption. In this sense, Esfahbodi et al. (2016)

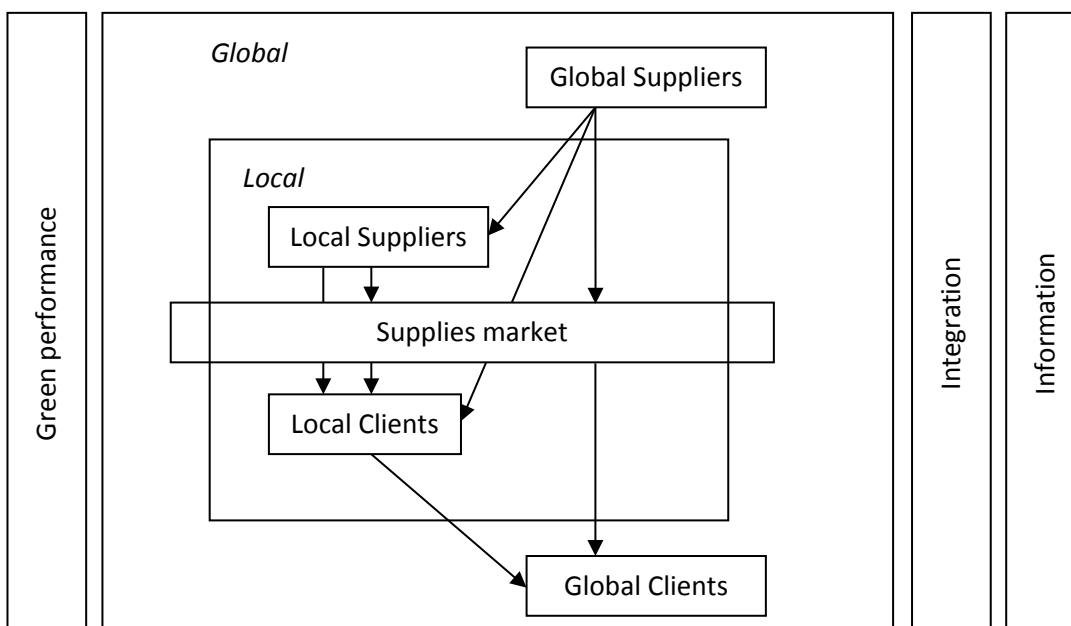
1 include in an environmental GSSC model, the sustainable procurement, production,
 2 ecodesign, manufacturing, warehousing, distribution, food miles (Passel, 2013), usage,
 3 recycling and disposal (Reefke and Sundaram, 2017). The eco-friendly design includes
 4 the elimination of waste (Zhu et al., 2008). Reefke and Sundaram (2017) propose the
 5 measure and control of greenhouse gas emission levels along the supply chain.
 6 Additionally, authors indicate that a general concern for environment conservation is
 7 also needed (Reefke and Sundaram, 2017) and a corporate commitment (Dubey et al.,
 8 2016) from stakeholders to an environmental GSSC. Moreover, many authors
 9 emphasise the importance of environmental cooperation in developing countries (Ding
 10 et al., 2016) where a potential lack of green resources, expertise and capabilities exists
 11 (Esfahbodi et al., 2016).

12 To direct the research, the following hypothesis was tested:

13 H₃: The development of the supplies market can contribute to an environmental GSSC
 14 model closing the supply loop and reducing food miles.

15 The revision reveals that sustainable indicators of GSSC (Dubey et al., 2016) are related
 16 to environmental management (Esfahbodi et al., 2016), information flows (Soosay et
 17 al., 2012), and inter-organisational links (Reefke and Sundaram, 2017; Esfahbodi et al.,
 18 2016) in developing countries. Then, the GSSC model considers the evaluation of the
 19 sustainability indicators using the whole-of-chain perspective of the value chain
 20 analysis (Esfahbodi et al., 2016; Soosay et al., 2012). Moreover, the model includes the
 21 domestic expectations (Reefke and Sundaram, 2017) while permits competition in the
 22 global market (Ras and Vermeulen, 2009), by considering the global/local layers
 23 feedback (Ding et al., 2016). The continuous control and feedback of the layers will
 24 approximate the model considering the constantly changing economic context and also
 25 allow the adjustment of the GSSC model according to global/local sustainability goals
 26 (Ras and Vermeulen, 2009).

27 Figure 1 represents the GSSC model, taking into consideration sustainability indicators
 28 and the perspective of global and local value chains.



1 Figure 1. GSSC Theoretical Model

2 **3. Material and Methods**

3 In order to test the GSSC model, we used the value chain methodology to assess the
4 Dominican value chain along the Santo Domingo food supplies market. A value chain
5 analysis means a whole-of-chain perspective (Soosay et al., 2012) by means of a
6 multidimensional assessment of the value chain's performance (Taylor, 2005).
7 Quantitative and qualitative analyses of the layers between producers and consumers in
8 the Santo Domingo supplies market were carried out. From primary production, we
9 selected the Barahona region producers due to it having households where 63.3% were
10 poor and 21% indigent. As a final point, we chose the Santo Domingo consumers
11 because of the location of the food supplies market. For each value chain layer, we
12 developed the most adequate market research method. We surveyed 234 Barahona
13 producers in light of the sustainable commercialisation to Merca Santo Domingo during
14 2015. The producers were contacted through the Barahona producers associations and
15 revealed the amount of products grown, rice (14.5%), sweet potatoes (14.5%), avocado
16 (4.3%), coffee (22.2%), pigeon pea (14.5%), common beans (15.0%) and organic
17 bananas (15.0%). Producers were men, predominantly aged 46-60 (46.15%), and have
18 started primary education (46.15%). Producers declared an average of 9.89(±1.13) sq m
19 cultivated land and the amount of farm workers was 0.99. Most of them declared not
20 having access to agricultural credits (55.56%) and relied on some public technical
21 assistance (55.98%). We developed a Delphi study to evaluate the producers'
22 association performance in the supply chain. This two-round expert panel started on the
23 19th February, 2015 was conducted with 18 experts from producers' associations,
24 managers of the Santo Domingo supplies chain, scholars and civil society
25 representatives. The analysis of the Santo Domingo supplies market included interviews
26 with wholesalers, retailers and managers. We interviewed the Merca Santo Domingo
27 supplies market manager in 2015 and the general Dominican markets manager in 2016.
28 We carried out face-to-face semi-structured surveys with 24 wholesalers (from a total of
29 35) and 30 retailers (from a total of 40) in 2015 and again in 2016. Then, we surveyed a
30 total of 400 Santo Domingo consumers to measure the behaviour and perception of food
31 value and markets, during January 2016. The table 2 presents the profile of the
32 consumers of the sampling.

33 **Note to typesetter: Insert Table 2 here**

34 Finally, an expert focus group discussed the results of the comprehensive Dominican
35 value chain and validated the findings. This focus group was developed on 3 February,
36 2016 in San Cristobal city. The group consisted of eleven experts including technicians,
37 agrofood sector advisers, agriculture ministry technicians, producers and consumer
38 representatives.

39 **4. Results and Discussion**

40 **4.1. Information flows and social sustainability of the Dominican supply chain**

1 In order to analyse how the food supply chain meets the consumer expectations (Reefke
2 and Sundaram, 2017) we asked local consumers about their foodstuff preferences and
3 intermediaries about their perception of consumer preferences (Table 3). The consumers
4 declared flavour as their main preference, followed by colour and ripeness. Women
5 declared more preferred size, price and ripeness than men. Men preferred a larger
6 weight and shape than women. While retailers and wholesalers considered size as the
7 consumers' first preference, consumers placed it in fifth position. On the other hand,
8 retailers considered price as the third factor in consumers' buying decisions, while
9 consumers placed it fourth and wholesalers placed it sixth. This dynamic represents a
10 gap in information between final consumption and suppliers, that can lead to a non-
11 inclusive, transparent and responsive information flows (Soosay et al., 2012) in the local
12 Dominican food value chain. At the same time, global US consumers expect from the
13 CAFTA DR, bananas and plantains (\$831 million), coffee (unroasted) (\$762 million)
14 other fresh fruit (\$630 million), raw beets and cane sugar (\$231 million), processed
15 fruits and vegetables (\$183 million), and fresh vegetables (\$180 million) (Office of the
16 United States Representative, 2013) to be completely fresh, clean, healthy and safe,
17 according to traceability requirements (Ras and Vermeulen, 2009).

18 **Note to typesetter: Insert Table 3 here**

19 Local consumers declared a lack of cleanness and food safety related to Dominican
20 foodstuffs (Table 4) (SESPAS, 2009). There is a strong consensus regarding the need to
21 improve food safety in the Dominican local food chain. The Santo Domingo supplies
22 market manager stated that the supplies market requires harmlessness and hygienic
23 foodstuffs to be sold, while the producers and producers' associations declared that the
24 production stage lacks the resources to prepare foodstuffs according to these
25 requirements. The Santo Domingo supplies market has set up a service to aid producers
26 in improving food safety and traceability requirements (Chin and Tat, 2015). In this
27 sense, the Santo Domingo supplies market requirements can become a driving force in
28 meeting the consumers' expectations for Dominican local foodstuffs (Ortiz-Miranda
29 and Moragues-Faus, 2015).

30 **Note to typesetter: Insert Table 4 here**

31 The flows of information (Dubey et al., 2016) in the Dominican value chain show that a
32 quarter of wholesalers do not seek out information and that 60% of the retailers were
33 informed by their previous suppliers. The weak information flows indicate that the
34 stakeholders have to make more use of the information that exists for their collective
35 competitive advantage (Soosay et al., 2012). The Santo Domingo supplies market
36 counts these numbers with a market information service used by a third of wholesalers,
37 but none of the retailers. The information market service compiles the foodstuff prices,
38 statistics and purchase conditions and can coordinate the supply during periods of
39 shortage. The intermediaries expressed that their main problems are the high prices, low
40 quality of the food, scarcity and heterogeneity. The wholesaler's main problems were
41 also the price and quality of food together with the commercial negotiation,
42 transportation and the producers' lack of financing. In this sense, the Santo Domingo

1 supplies market can achieve the information flows between the stakeholders, thereby
2 reducing risk, increasing equity and transparency and contributing to the sustainability
3 of the value chain (Erol et al., 2009; Reefke and Sundaram, 2017). Furthermore, the
4 Santo Domingo supplies market social commitment contributes to supporting the local
5 producers and enhancing the channeling of the local producers' foodstuffs along the
6 national markets' network (Erol et al., 2009) with a possible ethical sourcing and
7 purchasing (Rimmington et al., 2006) which contributes to protect the national identity
8 (Robertson, 2005) . The presence of the Santo Domingo supplies market information
9 service, the supplies market commitment to support local producers and the
10 commitment of producers to hygiene and food safety have confirmed the first of the
11 hypotheses that this study sought to test, H_1 : The development of the supplies market
12 can contribute to a social GSSC model increasing food safety and flows of information.

13 **4.2. Integration and economic sustainability of the supply chain**

14 The economic assessment of the value chain includes the coordination and integration
15 of supply chain members to maintain commercial long-term benefits (Ding et al., 2016).
16 The analysis revealed the foodstuff flows from primary production to final consumption
17 (Soosay et al., 2012) along the Santo Domingo supplies market. Figure 2 shows the
18 percentage of foodstuff flows and the key stakeholders involved in each stage of the
19 Dominican supply chain, as declared by i) wholesalers, and ii) retailers.

20

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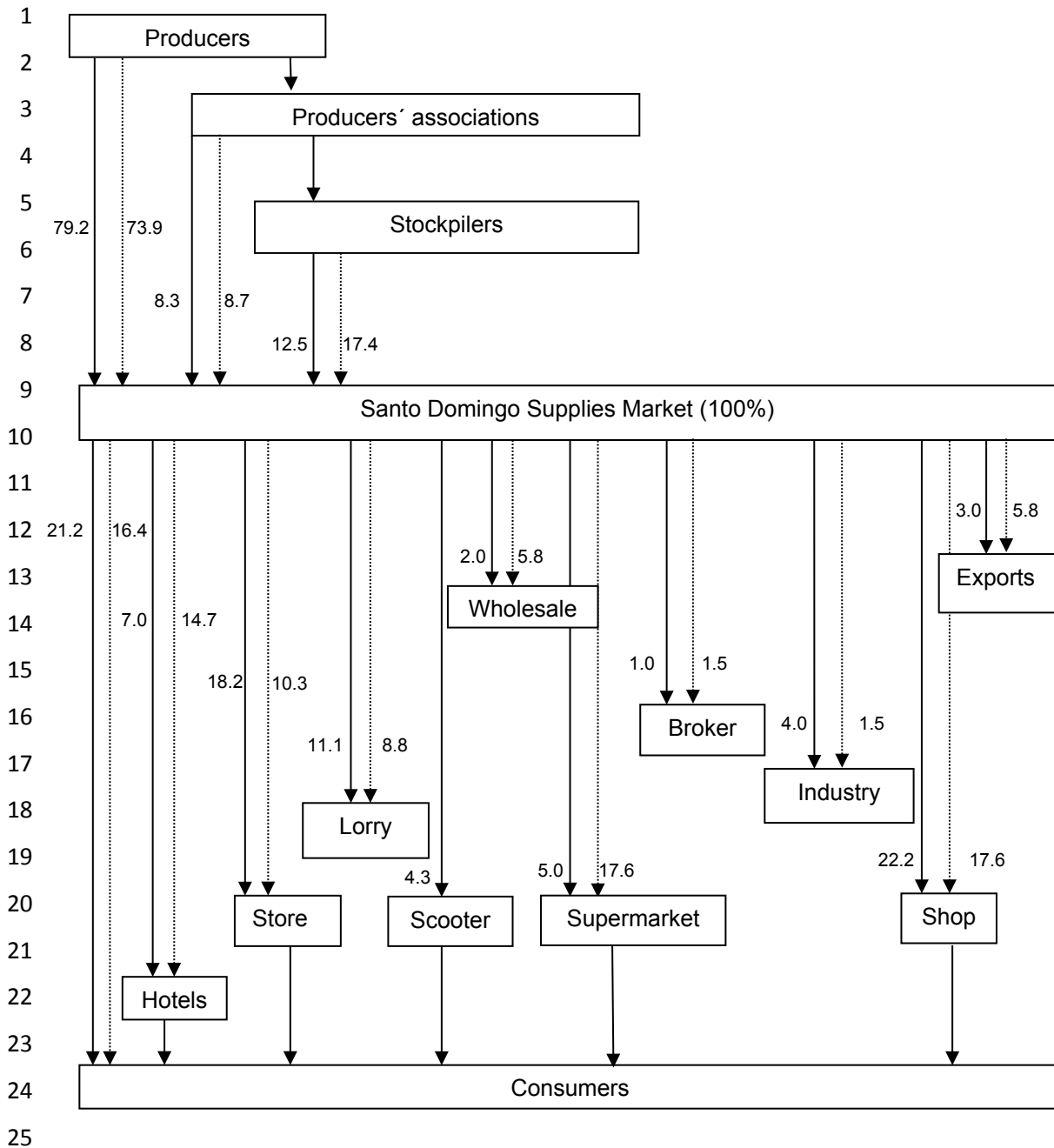


Figure 2. Santo Domingo supplies market value chain. Global and local suppliers and clients declared by wholesalers (left continuous lines) and retailers (right discontinuous lines) show the percentage (%) of foodstuffs received and sent by chain layers.

We have to note that although the supplies market stakeholders stated that they were supplied by local producers, the producers' surveys revealed that the intermediaries use persons in the field who are called "buscones" in Spanish who inform them of the convenient moment and conditions for wholesalers to purchase the products. In this sense, a strategic Dominican supply chain members' collaboration and integration would be crucial for the success of a GSSC (Dubey et al., 2016). Five strategic destinations are described, i) consumers, ii) hotels and resorts, iii) exportation, iv) industry and v) shops, eliminating possible useless intermediaries. Three of these final destinations, supermarkets, hotels and exporters were supplied by retailers (17.6%,

1 14.7%, 5.8%) more than wholesalers (5.0%, 7.0%, 3.0%) which can cause a lengthening
2 of the supply chain. Moreover, 5.8% of retailers supplies wholesalers.

3 Despite there being around 1,124 producers' associations in the country (IICA, 2009)
4 none of them help local producers' access consumers by means of commercialisation
5 activities. Producers declared a lack of resources for warehousing, cleaning, classifying
6 and transporting foodstuffs to consumers. Self-financing is also a challenge for
7 Dominican producers (Reefke and Sundaram, 2017). The experts pointed out that
8 producers need to make access to consumers a priority and they must adopt an
9 entrepreneurial spirit (Ras and Vermeulen, 2009). Additionally, it was found that the
10 integration between producers and retailers, industries or consumers is scarce
11 (Esfahbodi et al., 2016). At the global CAFTA DR exportation level, poor use of the
12 Santo Domingo supplies market (3% of wholesale sales and 5.8% of retail sales) was
13 noted and the experts declared the existence of a side distribution channel for
14 international exportation companies. The experts noted the need for better inter
15 organisational integration between links to promote easy access to innovative
16 technologies for the whole supply chain (Dubey et al., 2016). The Santo Domingo
17 supplies market manager spoke about the supplies market's commitment to support the
18 integration of local producers and the elimination of intermediaries. In this sense, the
19 supplies market contacts producers with industrial cooperatives, like Copaneyba, Vega
20 Real or Altgracia that invest in rural areas to add value to foodstuffs and eliminate
21 intermediaries. The supplies market accompanies local producers in creating
22 commercialisation cooperatives, and advising them about low interest rates and national
23 credits from the Agrarian Development National Special Fund (FEDA). Moreover, the
24 Santo Domingo supplies market can subsidise the producers' transportation costs when
25 they fulfill their requirements. The presence of the Santo Domingo supplies market
26 advice service promoting and reinforcing the creation of producers' commercial
27 associations, its commitment to improving coordination among supply chain members
28 and the subsidy for foodstuffs' transportation have confirmed the second of the
29 hypotheses that the research study sought to test, H₂: The development of the supplies
30 market can contribute to an economic GSSC by integration of local producers and the
31 elimination of intermediaries.

32 **4.3. Green value chain and environmental supply chain sustainability**

33 The Dominican consumers showed little environmental concern for the performance of
34 the supply chain and markets (Table 4), while global consumers expect increasingly
35 safe and healthy products (Ras and Vermeulen, 2009) that come from fair-trading and
36 for fair consumption (Turner et al., 2007). Furthermore, local consumers preferred
37 American and European importations or Dominican foodstuffs for exportation rather
38 than local products due to cleanliness and safety (Table 4). The consumer preference for
39 international foodstuffs can increase greenhouse gas emissions and the carbon footprint
40 due to food miles (Passel, 2013). Food transportation creates most of the greenhouse gas
41 emissions in the food supply chain (Frohmann et al., 2012). Frohmann et al. (2012)
42 have advised about the environmental costs of the consumption of imports. The experts

1 agreed that the consumption of imports is a matter of education and consumers' income
2 in the Dominican Republic. We found that younger consumers (aged 15-24) preferred
3 more imports (31.25%) than older (40-54) consumers (11.23%). Households with only
4 one generation preferred more imports (82.98%) than households with 2-3 generations
5 (63.83%), which indicates a possible increase in consumption of imports in the future.
6 Although the United Nations has provided recommendations for the ecological footprint
7 for Dominican exportation foodstuffs (Frohman et al., 2012), there is a lack of measure
8 and control on the greenhouse gas emissions levels along the Dominican value chain
9 (Reefke and Sundaram, 2017), and even less on the comparison of greenhouse gas
10 emissions levels between imports and local productions. In this sense, the measurement
11 and control of the greenhouse gas emissions levels can be put in place to mitigate and
12 minimise negative environmental impacts. In this line, sustainable distribution
13 initiatives should be implemented in order to eliminate the emissions associated with
14 products transportation along the supply chain (Green et al., 2012). Hollos et al. (2012)
15 found that sustainable distribution aids the reduction of waste levels and CO₂ emissions
16 in the chain, as it entails green packaging and logistics characteristics that minimise the
17 footprints left as a result of product transportation.

18
19 The GSSC requires consideration of the environmental impacts of the production
20 process as food flows through the supply chain (Hsu et al., 2013). The experts stated
21 that there were few environmental certified intermediaries in the local Dominican
22 supply chain. Wholesalers and retailers declared few initiatives for remanufacturing and
23 recycling (Zhu et al., 2008). Moreover, they presented limited sustainable logistic
24 considerations such green packaging (considering size, shape, and materials), which are
25 crucial in sustainable distribution (Seuring and Müller, 2008) for reducing materials
26 usage, increased space utilisation in the warehouse, and reduction in handling required.
27 In this sense, the intermediaries are at an early stage of adopting distribution practices to
28 support environmental planning, with the consideration of better handling, shorter
29 movements (Figure 2), minimising the possible empty miles from the supplies market to
30 consumers, using more direct routes, and better space utilisation (Zhu et al., 2008).

31 On the other hand, the experts declared that the side distribution channel for
32 international exportations alongside logistics providers with green expertise,
33 capabilities, and resources results in effective sustainable distribution initiatives (Zhu et
34 al., 2008). Sarkis (2006) points out that green logistics providers aim to provide
35 outsourced logistics services that have the capacity to minimise negative environmental
36 impacts.

37 In this line, the country's main exports are organic foodstuffs. This global order has
38 caused some Dominican producers to adopt environmental practices. International firms
39 have instituted sustainable procurement policies with local suppliers in response to
40 increasing pressure from regulatory bodies and the environmental expectations of global
41 customers (Esfahbodi et al., 2016). Nevertheless, experts declared that organic products
42 are sold locally without a surcharge and ecological label due to the local consumers'
43 lack of environmental concern.

1 The experts declared little presence in the Dominican value chain of the reverse logistic
2 process where used or end-of-life products are retrieved from the point of consumption
3 for possible recycling and remanufacturing purposes (Lai et al., 2013). In this sense, the
4 wholesalers and retailers declared up to 15% of food rejections in the supplies market
5 due to lack of quality or quantity. The wholesalers declared rejections were sold to
6 lower quality markets (37.5%), gifted (31.25%), or thrown away (31.25%), while
7 retailers declared mainly gifting or throwing rejections away. Apart from the gifted or
8 resale of rejections, no effective reuse or surplus sales and divestment (Zhu et al., 2008)
9 of other unused products or unproductive assets of the supply chain were declared. The
10 experts stated an absence of appropriate waste management policies, legislation on
11 recycling and remanufacturing (Zhu et al., 2008), and appropriate closed-loop
12 infrastructure. In this sense, the experts declared the Dominican value chain far from
13 being a circular economy. This forward/linear supply chain (Figure 2) that suggests
14 constant inputs of natural resources and an unlimited capacity to assimilate waste
15 (Geyer and Jackson, 2004) requires the ‘close the supply loop’ by including the reuse,
16 remanufacturing, and recycling of products and materials (Zhu et al., 2008). Moreover,
17 the experts indicated a lack of green resources, expertise and capabilities (Esfahbodi et
18 al., 2016) together with scarce environmental cooperation (Ding et al., 2016). The
19 experts expressed the necessity of involving the government in the green performance
20 of the food supply chain and in the stakeholders’ environmental activities.

21 The Santo Domingo supplies market manager stated that the supplies market comes
22 with a sustainable waste management system. In this sense, the supplies market uses
23 power supplied by the Palamarca Electric power station of Santo Domingo North which
24 provides fridge warehouses to load unsold products, reducing wastage. Furthermore,
25 market leftovers are given to the local food bank and the supplies market strategic
26 location of Santo Domingo port and international airport favour better handling and
27 shorter movements (Zhu et al., 2008). Additionally, the Santo Domingo supplies market
28 with supply agreements to the national hotels association (ASOARES), exporters
29 association (CANAGROUP), Future South Development Association (“Sur Futuro”),
30 Dominican Agribusiness Board (JAD), and Dominican Import-Export center (CEI-RD)
31 all help to minimise possible empty miles, use more direct routes, and minimise
32 negative environmental impacts and wasted resources, from the acquisition up to the
33 final use and disposal of products (Hsu et al., 2013). Moreover, the Santo Domingo
34 supplies market encourage green packaging and reverse logistic and sustainable
35 distribution initiatives that can close the supply loop and meet the environmental GSSC.
36 The Santo Domingo supplies market contributes positively to improving the supply
37 chain environmental performance (Erol et al., 2009). In doing so, the supplies market
38 made the decision to source domestically or even locally, as opposed to internationally
39 (Carter and Easton, 2011). It promotes loop, sustainable, and efficient food local chains.
40 Moreover, the Santo Domingo supplies market contributes to healthy consumption
41 (SESPAS, 2009) by reducing fats, soda, preserved and precooked foods (Menchú et al.,
42 2013) and invests in campaigns on fair closed-supply loop food consumption, shifting
43 consumption patterns.

1 The Santo Domingo supplies chain sustainable waste management system, direct access
2 to better handling and shorter movements, agreements to use more direct routes, the
3 ability to minimise wasted resources and possible empty miles, along with a
4 commitment to a closed-supply loop that includes green packaging, reverse logistics,
5 and sustainable distribution have confirmed the third of the hypotheses that the research
6 study sought to test, H₃: The development of the supplies market can contribute to an
7 environmental GSSC closing the supply loop and reducing food miles.

8 **5. Conclusions**

9 This study is an attempt to develop a theoretical framework for GSSC in developing
10 countries, within the complex dynamic of distribution (as a result of globalisation), and
11 also considers the need to take advantage of the respective regions. Since the literature
12 of GSSC in developing countries is very limited, this study will help researchers to
13 understand the use of a GSSC model for developing countries, with regards to
14 sustainable indicators and engaging with empirical methods, as a powerful methodology
15 for conceptual framework development. In this sense, the current study analyses the
16 drivers in the adoption of a GSSC management, which addresses sustainability at all
17 stages and interactions, ensuring it meets domestic expectations and permits
18 competition in the global market. The GSSC theoretical framework developed helps
19 inter-organisational dynamic interactions, the flow of information, and environmental
20 management of the supply chain in developing countries through a glocal approach. The
21 GSSC model also helps to clearly understand the key role of the intermediary
22 stakeholders' organizations, supplies market, and the development of a sustainable
23 supply chain depicts the actions needed to attain the desired sustainability level. The
24 results of our present study show the supply chain managers and policymakers the right
25 direction to take to achieve sustainability. The results show that GSSC should shape
26 environmental sustainability, economic development, and consider social welfare. It
27 needs to harmonise global trade orders and act locally to cover customers' expectations
28 and protect national identity. In this sense, the supplies market can: i) become a driving
29 force for producers to meet consumers' expectations; ii) achieve the information flows
30 between layers; iii) enhance the distribution of local products in glocal market
31 networks; iv) promote producers' organisations and engage their customers in
32 sustainability initiatives; v) improve the coordination among supply chain members
33 supporting the easy access to innovative technologies; vi) improve the supply chain
34 environmental performance; and vii) encourage green packaging, reverse logistics, and
35 sustainable distribution initiatives that can close the supply loop and meet the
36 environmental GSSC.

37 *Practical implications*

38 This research can encourage managers to regulate food supply chain stakeholders'
39 business activities without harming the environment while meeting the social
40 expectations. It can serve as an audit tool and later on as a benchmarking tool for
41 managers and stakeholders to invest in appropriate infrastructures that enhance a GSSC.

1 This research can help policymakers to ensure measures exist for a sustainable supply
2 chain, especially in order to improve food safety and fair consumption. According to the
3 supply chain performance and regional environmental conditions, the government may
4 implement a step-wise policy in which environmental standards will be periodically
5 revised and stricter emission standards enforced. This paper can contribute to improving
6 a producer's ability to address the challenges put forward by value chain stakeholders,
7 which can be promoted by strengthening the association and information flow for the
8 members of the chain. The holistic vision of the value chain presented in the paper can
9 influence the stakeholders' avoidance of uncertainty.

10 The model can aid policymakers at central national level to monitor the local/global
11 supply and demand, to support strategy decisions in order to achieve sustainability goals
12 and to consider operational decisions such as enhancing strategic subsectors, signing
13 appropriate trade agreements, controlling imports and exports, and establishing trade
14 barriers in order to convince the supply chain to extend its focus beyond traditional
15 economic goals to the triple bottom line.

16 *Limitations*

17 The research limitations come about through the selective bias and the ambiguity of the
18 inferred hypotheses. The dynamic supply chain development due to globalisation,
19 CAFTA DR, dependency on foreign markets and imports, outsourcing, risks of supply
20 chain disruption or consumer preferences that limit the research to the study context
21 also deserve special attention.

22 The implementation of the GSSC model can be limited by the lack of commitment and
23 social responsibility of the supply chain's stakeholders. The absence of a general
24 concern for environment conservation and a corporate commitment from stakeholders to
25 environmental supply, means the lack of environmental cooperation could obstruct
26 green resources, expertise, and environmental concern capabilities. Moreover, the lack
27 of collaboration can limit the access to innovative technologies for the local and lower-
28 tier members of the supply chain.

29 *Further research directions*

30 There is scope for further research regarding the generalisation of the findings with
31 respect to the majority of emerging and CAFTA DR economies. Future studies may
32 examine other emerging markets to eliminate the potential effect of country-level
33 variance such as market size, economic development and legal systems. This study can
34 map the optimal decision policies of government subsidies and incentives for an
35 environmental performance of the supply chain that requires deeper analysis. The
36 effective reuse, recycling or surplus sale and divestment of unused products or by-
37 products from the food supply chain are also an important research direction for
38 environmental sustainability. The assessment of food miles for imports can provide
39 scenarios for sustainable food transportation, logistics and distribution. Further research
40 can serve to eliminate wasteful activities and identify activities that offer the greatest

1 scope for adding value to consumers through improved food safety and environmental
 2 performance. The model can be generalised for other studies related to consumer
 3 shifting patterns, market externalities that affect the chain performance, global
 4 regulations that impact the sustainability of the chain, and national subsectors support.

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1 **Tables**

2 Table 1. Sustainable supply chain indicators revision

Social	Economical	Environmental
Customer satisfaction (Reefke and Sundaram, 2017; Halme <i>et al.</i> , 2006).	Management and control of the chain (Soosay <i>et al.</i> , 2012)	Environmental integration and cooperation (Soosay <i>et al.</i> , 2012; Reefke and Sundaram, 2017; Dubey <i>et al.</i> , 2016; Lee <i>et al.</i> , 2012; Tseng and Chiu, 2013; Erol <i>et al.</i> , 2009; Nordheim and Barrasso, 2007).
Health and Safety (Dubey <i>et al.</i> , 2016; Reefke and Sundaram, 2017; Choi and Sirakaya, 2006).	Management skills: planning, leadership, organizing (Ras and Vermeulen, 2009; Darby and Jenkins, 2006).	
Fair trade and consumption (Passel, 2013).	Operational skills: financing & administrative (Rimington <i>et al.</i> , 2006; Ras and Vermeulen, 2009; Ortiz-Miranda and Moragues-Faus, 2014; Reefke and Sundaram, 2017).	Enabling info technologies (Dubey <i>et al.</i> , 2016; Reefke and Sundaram, 2017).
Information flows and strategic suppliers collaboration (Soosay <i>et al.</i> , 2012; Dubey <i>et al.</i> , 2016; Dam and Petkova, 2014; Vachon, 2010).	Logistic optimization (Dubey <i>et al.</i> , 2016; Passel, 2013; Reefke and Sundaram, 2017).	Institutional pressures (Dubey <i>et al.</i> , 2016; Ding <i>et al.</i> , 2016; Passel, 2013; Hopwood <i>et al.</i> , 2005).
Equity (Dubey <i>et al.</i> , 2016; Chin and Tat, 2015; Rimington <i>et al.</i> , 2006).	Economic balance (Martínez-Jurado and Moyano-Fuentes, 2014; Dubey <i>et al.</i> , 2016).	Green production (Dubey <i>et al.</i> , 2016).
Internal pressures (Dubey <i>et al.</i> , 2016; Reefke and Sundaram, 2017; Darby and Jenkins, 2006; Searcy <i>et al.</i> , 2007).	Continuous improvement (Dubey <i>et al.</i> , 2016).	Food Miles (Passel, 2013; Lakshmimeera and Palanisamy, 2013; Esfahbodi <i>et al.</i> , 2016; Green <i>et al.</i> , 2012).
Employment (Ras and Vermeulen, 2009).	Diversity (Dubey <i>et al.</i> , 2016).	Efficiency warehousing (Reefke and Sundaram, 2017).
Social values & ethics (Dubey <i>et al.</i> , 2016; Rimington <i>et al.</i> , 2006).	Innovativeness (Ras and Vermeulen, 2009).	Waste management (Hopwood <i>et al.</i> , 2005; Esfahbodi <i>et al.</i> , 2016; Zhu <i>et al.</i> , 2008).
Impact local community and Rural development (Ding <i>et al.</i> , 2016; Tang and Zhou, 2012; Reefke and Sundaram, 2017; Choi and Sirakaya, 2006).	Technical skills (Ras and Vermeulen, 2009).	Greenhouse gas emissions (Reefke and Sundaram, 2017).
Transparency (Erol <i>et al.</i> , 2009).	Increased tech information (Hopwood <i>et al.</i> , 2005; Reefke and Sundaram, 2017; Ding <i>et al.</i> , 2016; Erol <i>et al.</i> , 2009).	Environment conservation (Dubey <i>et al.</i> , 2016; Wiese <i>et al.</i> , 2012; Reefke and Sundaram, 2017; Tang and Zhou, 2012; Diakaki <i>et al.</i> , 2006).
Market timing (Ras and Vermeulen, 2009).		Environment corporate commitment (Dubey <i>et al.</i> , 2016; Hopwood <i>et al.</i> , 2005).

3

4

1 Table 2. Profile of the consumers surveyed with respect Santo Domingo population

Consumers		% Sample	%Santo Domingo (ONE, 2015)
Gender	Male	43.75	48.59
	Female	56.25	51.41
Age	15-24	35.16	32.16
	25-39	40.42	39.42
	40-54	24.42	28.42
Household size	1-2	20.41	
	3-4	48.98	
	5-6	30.61	
Household generations	1	41.70	
	2	49.79	
	3	8.51	

2

3 Table 3. Means and Standard Error for the characteristics preferred by customers expressed by supply
4 chains' stakeholders. Intra-groups analysis ANOVA test, F and *p-value*

Destination preference	Means (SE)			Intra-groups analysis
	Retailer	Wholesaler	Consumer	F
Size	7.48(±0.13)	7.81(±0.09)	3.58(±0.068)	141.72***
Flavour	7.33(±0.12)	4.04(±0.08)	7.65(±0.07)	187.36***
Price	5.30(±0.24)	3.29(±0.14)	5.15(±0.12)	194.19***
Ripeness	4.89(±0.06)	1.28(±0.13)	5.79(±0.10)	230.17***
Colour	4.81(±0.19)	6.81(±0.09)	7.19(±0.11)	139.08***
Texture	2.52(±0.13)	4.62(±0.20)	3.34(±0.09)	43.31***
Weight	2.11(±0.10)	1.81(±0.09)	1.90(±0.14)	5.38**
Shape	1.30(±0.13)	6.38(±0.18)	1.40(±0.079)	457.99***

5 ***p*<0.01; ****p*<0.001

6

7 Table 4. Consumer's requirements, preferences, willingness to pay and perceptions to improve the
8 Dominican food value chain expressed in percentage of responses

Variable	Cases	%	Variable	Cases	%
Local	Improve food quality and hygiene	15.50	Pay surcharge	No	48.50
Makets	Support and invest on local production	15.50		5-10%	31.00
Needs	Control and stability of food prices	11.00		>10%	20.50
	Improve food freshness	7.75	Prefer imports	Yes	53.75
	Improve markets organization	7.75		Same price	21.25
	Market cleanliness	6.25		Same quality	21.25
	Improve food presentation	6.25		Price and quality	3.75
	Improve markets maintenance	5.25	Safety local food	No	54.0
	More food variety	3.00		Yes	46.0
	Reduce intermediaries	1.50	Supply quantity	No	16.0
	Improve storage	1.50		Yes	83.0
	Increase retailers	1.50	Traceability control	Scarce	62.25
	Organize food festivals	1.50		Enough	22.00
	No answer	15.75		No answer	15.75

9

Highlights:

- Indicators for a sustainable performance of the supply chain are selected.
- Global Sustainable Supply Chain Model for developing countries is created.
- Foodstuffs and information flows through Dominican supplies market are measured.
- Collaboration and integration is a challenge on green performance of supply chain.