A model of agricultural sustainable added value chain: The case of the Dominican Republic value chain

Modelo de cadena de valor agraria sostenible: La cadena de valor de la República Dominicana

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Abstract

The aim of this paper is to develop a model of sustainable added value chain (SAVC). The model i) considers consumers expectations, ii) analyses the determinant producers´ factors to perform the SAVC and iii) ranks the agricultural subsectors according the SAVC. The value chain methodology was used to assess the sustainability of the agricultural value chain and develop the model. The model was tested in the Dominican Republic's agricultural value chain. The results showed i) producers´ access to SAVC depends on the subsector, location and resources, ii) organic banana and avocado are the subsectors with the best potential SAVC while sweet potatoes and rice have the lowest potential and iii) producers are in an early stage to adopt the consumers´ expectations endangering SAVC. Using mixed methods to investigate the SAVC this paper provides an approach that reflects the complex and iterative nature of a real supply chains and can be used by researchers, policymakers and practitioners to better understand and describe decision making and to develop informed policies and interventions beyond SAVC. This research challenges the innate complexity of local supply chains and the presence of barriers for SAVC.

Keywords
Agricultural value chain model • consumers´ expectations • logit • subsectors ranking • producers´ sustainability

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Resumen

Este artículo tiene por objeto el desarrollo de un modelo de cadena de valor agraria sostenible (CVS). El modelo tiene en cuenta, i) la demanda de los consumidores, ii) los factores determinantes para que los productores accedan a la CVS y iii) ordena los sectores en la CVS. En el desarrollo se empleó la metodología de la cadena de valor y el modelo fue validado en la cadena de valor agraria de la República Dominicana. Los resultados muestran que, i) el acceso a la CVS por los productores dominicanos depende del sector, la localización y los medios disponibles, ii) sectores como el plátano orgánico y el aguacate están mejor posicionados en la CVS y los sectores del arroz y la batata están peor situados y iii) los productores consideran poco la demanda de los consumidores alejándose de la CVS. Este trabajo ayudará a investigadores, políticos y gestores en la toma de decisiones para alcanzar la CVS.

Palabras clave

Modelo de cadena de valor agraria • preferencias de los consumidores • logit • clasificación de sectores • sostenibilidad de los productores

Introduction

Globalization has changed the structure of supply chains significantly (14), however little is known about the determinant factors for producers to perform Sustainable Added Value Chain (SAVC). The sustainability of the agricultural value chain of developing countries requires further research to take into account the innate complexity of the local supply chains, the uncertainty of the value added by intermediaries, the lack of efficient aggregation of associations, the presence of barriers for direct access to the chain and the consumers´ perception of foodstuffs originating from developing countries (17, 29). The risks faced by producers in SAVC originate from the interactions between the consumers' expectation and global competition. The majority research the impact of global changes on local agricultural value chains focused on short-term adaptations to reduce losses or enhance benefits (31). However, there is a need to consider more holistic approach to conceptualize a global SAVC. Various authors presented a range of institutional, social, environmental and economic challenges (7, 15) that have emerged around SAVC in developing countries (31).

Conventional value chain analysis approaches single value chains one at the time; while a SAVC analysis requires a thorough understanding of the intricate relationships between several supply chains (2). Additionally, an empirical investigation of key value chain factors embedded in particular places and institutional settings are required (6). In order to accomplish a more sustainable value chain, theoretical approaches must be tested on practical applications (26). Fold (2008) remarked the necessity to consider the way in which local agricultural systems are currently positioned into SAVC. This paper seeks to study a model of SAVC and its validation in the Dominican Republic agricultural supply chain.

Theoretical framing, hypotheses and model

Agricultural added value chain and consumers expectations

A social SAVC understands the consumers´ expectations. However, the relationship between rural agricultural producers and urban food consumers is unbalanced in favor of the urban consumer at the expense of the rural stakeholder (26). Tolentino-Zondervan *et al.* (2016) remarked the need to dedicate more attention to the feedback of information and more specific production requirements from consumers to producers because the producers rarely consider the consumers´ expectations due to the distance and asymmetric flow of information between those stakeholders (8, 17). The agricultural SAVC needs to become more buyer-driven, consumer-quality-focused and more aware of public and private standards (16, 19). Fold (2008) showed that Ghanaian producers differentiated their products, developed a sense of corporate social responsibility, implemented the notion of fair trade pineapple plantations, ready-to-eat product design, health and ethical concerns among consumers to adapt to consumers. Walsh-Dilley (2013) described how Bolivian quinoa producers became more aligned with markets and supply chains opportunities. Furthermore, Warner (2016) analyzed the Costa Rican rice producers´ livelihood goals that influence their adaptation to free trade agreements chains. The relationship between consumers´ expectations and the resulting behavior by producers is not simple, direct or linear (23). Producers are starting to adopt consumer expectations into their agricultural practices (17) enriching the agricultural SAVC (26). Therefore, a SAVC has to consider global consumers´ expectations (2), while remaining mindful of the dumping of agricultural surpluses and low-price imports from other countries. The first of the hypotheses that this study seeks to test is as follows: H_1: If producers do not adopt the consumers´ expectations they are endangering the SAVC.

Globalization and developing countries agricultural added value chain

Globalization has been intensely researched although the ongoing debate about its intrinsic benefits on the one hand and inequalities of international agricultural value chains continue in developing countries on the other hand (12, 15). Some benefits emerge from the extension of markets that offers a more viable and stable livelihood to producers, which is contrasted by the unfair local middlemen which often results in oversupply and unsustainably low, fluctuating prices within local markets (3). Some authors have viewed the SAVC through the lens of producers "upgrading" and in doing so capture more value for their products by accessing added-value chains (8, 20). Tobin *et al.* (2016) exposed the process in which smallholders are integrated into high value markets to contribute to poverty alleviation that offer income opportunities for smallholding. However, in order to gain access and advantages from these high value chains, the development and marketing of non-traditional agricultural products and/or broader changes in supply chain dynamics behind global consumers´ expectations have to be undertaken (31).

For example, Leguizamon (2016) highlighted the reorganization of soybean production and marketing in Argentina; while Malawian tobacco growers adapted their production and commercialization (19), and Chilean raspberry growers changed their business model (6) in order to access added-value chain opportunities. On the other hand, producers´ transformative adaptations to global markets could also involve arable land left fallow, the rent of land to other farmers, or the sale of fixed assets (land, buildings, machinery, etc.) (31). Second hypothesis that this study seeks to test is as follows: H_2: Producers perform of a SAVC depends on the subsector, location and resources.

Sectors SAVC

The transformative adaptations to a SAVC could be accompanied by elevated levels of stress and despair for producers. In developing countries it would require the accompaniment of vulnerable subsectors (17), especially not to displace smallholder farmers (31). The analysis and ranking of local subsectors, will allow support the producers´ in the adaptation to SAVC (6). The literature to-date rarely considers the local context of producers' participation in, or exclusion from, the value chain; neither a proactive and forward-looking planning of subsectors in order to orient producers (23) to ensure producers' viability (7). Scoones (2009) highlights that a number of studies persistently ignored producers´ forward-looking plan in a SAVC, and as such failed to connect with issues of governance and management of the supply chain and subsequently failed to address the longevity of agricultural sustainability. The third of the hypotheses that the study seeks to test is as follows: H_3: The management of SAVC needs to rank subsectors according producers´ viability. Based on the before mentioned hypotheses the following model was proposed (figure 1, page 115). In a first stage, it evaluates the consumers´ expectations in order to adjust the SAVC to the consumers demand (H_1). Then, the model characterizes the producers´ factors (criteria 1, 2 and 3) to perform a SAVC (H_2). Later, the model applies the factors to agriculture subsectors to rank vulnerability of SAVC (H_3).

Methods

Data collection

The value chain methodology developed by Gereffi and Fernández-Stark (2016) was used to validate the SAVC model in the Dominican agricultural value chain. The Dominican Republic´s agricultural chain was chosen due to its current transition to the Caribbean and America Free Trade Agreement-Dominican Republic (CAFTA DR) and the lack of studies of the agricultural value chain in the country (11). A value chain analysis means a whole-of-chain perspective (25). Four stages in collecting data were employed. First, residents of Santo Domingo, were selected to study the consumers´ agricultural chain expectations, being the main food supply chain in the country. A total of 402 Santo Domingo consumers were surveyed, which means for the 787129 Santo Domingo inhabitants in a 95% of significance level, a standard error of 4.9%, during November 2016-January 2017.

Considering a sampling with a standard error lower than 5%, 425 surveys were launched and 402 valid answers were obtained.

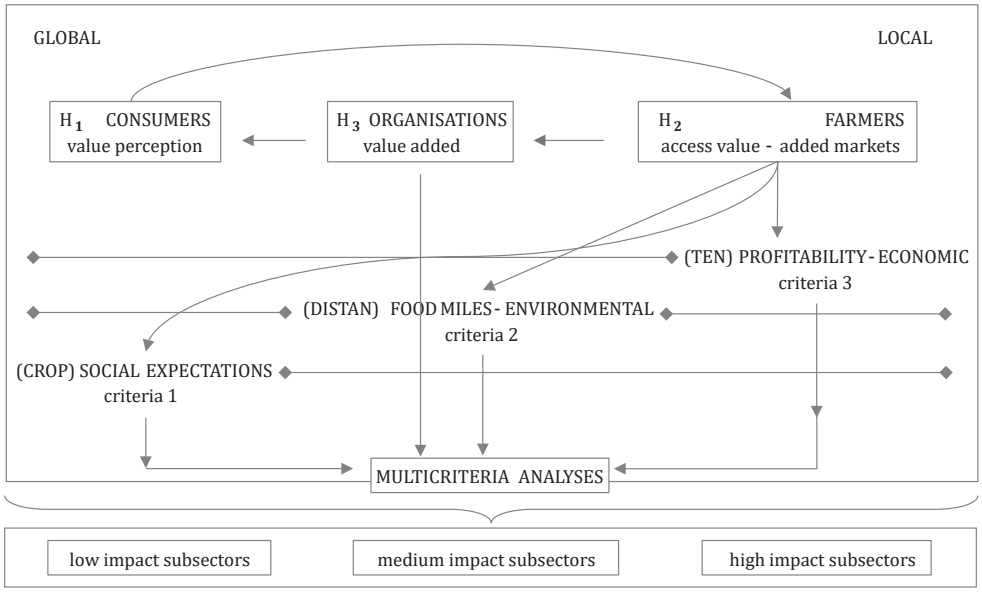


Figure 1. Model of Sustainable Added Value Chain (SAVC), based on three explicit hypotheses taking into account (global) consumers, (local) farmers, and supporting organizations.

Figura 1. Modelo de cadena de valor sostenible (SAVC), considerando las hipótesis de partida, los consumidores (global), los productores (local) y las organizaciones de apoyo.

Secondly, 207 producers from the Barahona region were interviewed (from which 30 produced rice, 31 organic bananas, 31 common beans, 30 pigeon peas, 46 coffee, 9 avocado and 30 sweet potatoes) to analysis the producers´ adaptation to a SAVC. The Barahona region represents a typical Dominican Republic rural region where 63.3% of households are rated as poor (not able to purchase the basic food basket); while 21% of the population is described as impoverished (not able to acquire the basic foods in regards to adequate proteins and energy sustenance). A survey was conducted in the light of [1] farm tenure and management and [2] access to added value chains (table 1, page 116).

In a third stage of the research a Delphi study was developed in order to collect data of the determinant factors in the agricultural subsectors of rice, sweet potatoes, avocado, coffee, pigeon pea, common beans and organic banana. This Delphi two-round expert panel started on the April 19th, 2017 was conducted with 18 experts from producers´ associations, managers of the Santo Domingo supplies chain, scholars and civil society representatives. Finally, an expert focus group discussed the results of the comprehensive sustainability of Dominican agricultural value chain and validated the findings. This focus group was developed on March 10nd, 2017 in San Cristobal city. The group consisted of eleven experts including technicians, agriculture sector advisers, agriculture ministry technicians, producers and consumer representatives.

Table 1. Distribution of frequencies of the farm tenure, management and access to the markets variables for the sample of farmers in Barahona province, express in average and percentage (%).

Tabla 1. Distribución de frecuencias de la propiedad, manejo y acceso al mercado de las explotaciones de la muestra de la provincia de Barahona expresada en porcentajes y medias.

Variable	Value	%	Variable	Value	%
Age (**AGE**)	30 to 45 years	30.0	Organization (**INT**)	Sole operator	42.2
	46 to 60 years	46.7		Co-operative	16.6
	61 to 75 years	20.0		Association	41.2
	75+	3.3	Land tenure (**TEN**)	Ownership	34.9
Number children (**N**)	N (average 4.34)			Occupation	9.2
Education (**EDU**)	No formal	4.8		Rented	15.5
	Start primary	46.4		State cession	4.4
	Primary finish	10.6		Others	34.1
	Secondary	15.0		Legal and rented	1.9
	University	16.5	Distance (**DISTAN**)	Less 1 km	42.0
	Other	6.7		1-5 km	8.2
Size farm (**SIZE**)	1-50 ta *	16.7		More 5 km	49.8
	51-200 ta	40.0	Credit (**CRED**)	Public	18.9
	201-500 ta	30.0		Private	25.2
	501-1000 ta	13.3		No credit access	55.9
Technical assist (**ASIS**)	No assistance	23.2	Crops (**CROP**)	Rice	14.5
	Public assistance	55.8		Sweet potatoes	14.5
	Private assistance	9.1		Avocado	4.3
	Private and public	12.0		Coffee	22.2
Crop system (**CSYS**)	Organic	10.6		Pigeon pea	14.5
	Conventional	89.4		Common beans	15.0
Market (**COMERC**)	Local	49.0		Organic Bananas	15.0
	Global	51.0	Workers (**W**)	Number (average 0.99)	

*ta = tarea = 628 sq m / *ta = tarea = 628 metros cuadrados

Logistic regression model: Determinant factors to access SAVC

To obtain the significant variables to access to added-value chains a two-way dependence was calculated, SPSS v.23.0 software package was used. The farm variable to be explained and the explanatory dichotomous outcome variable a, "COMERCIALIZATION" or "not COMERCE" was calculated by means of a chi-squared (χ^2) test of significance between the items. To accept or reject the hypothesis H_0, which implies no relation between the variables, the value of the χ^2 statistics and the respective *p-values* were considered. The significant variables obtained were included in a logistic regression model, logit. In the logit model the log odds of the outcome was modelled as a linear combination of the predictor significant farm variables: i) crop, ii) distance to market, iii) land tenure and iv) crop system to obtain the determinant factors to access to added-value chains. The dataset has a binary response (outcome, dependent) variable called "COMERC", which was equal to 1 if the farm accessed to external added-value chain and 0 otherwise.

Electre I method: Subsectors outranking

The subsectors were outranked according the determinant factors using Electre I method (10). The crop criteria were given a 10% higher consideration for decision makers (0.4) than the distance (0.3) and tenure (0.3) considering the crop profitability strong decision factor for producers. The weight vector resulted was:

W= [W_{CROP}=0.4, W_{DISTAN}=0.3, W_{TEN}=0.3]

The crop (CROP) criteria were measured as crop profitability calculated as crop gross profit. The gross profit was calculated as the selling price of a crop, less the costs of cultivation. The selling price was obtained as the average price paid to producers. The crop costs were calculated considering the crop´s labors, work force and inputs needed in a year per *tarea* (628 s.q.m.) and recorded in February 2017 from producers. The distance criteria (DISTAN) was calculated as the transport kilometers paid by producers, from the main production areas to current added value chains. Fruits and vegetables are transported to country main markets in Santo Domingo and Santiago, where some of them are also shipped for export, such as bananas to Europe, avocados to USA or sweet potatoes to Puerto Rico. The legumes are sent to near destinations like Santo Domingo. Commodity crops like rice are transported to the rice processors located in Santo Domingo and Santiago. Coffee is mostly used for the domestic market (table 2).

The tenure (TEN) criteria was calculated as the percentage of land legally owned by producers in front of the percentage of land rented, occupied or owned by the state, declared by the Delphi panel. Based on the data, the resulted performance matrix (table 3, page 118) was obtained.

All the criteria were coded in numerical scales with identical ranges. Considering the logit model, the criteria except the distance were considered "more of the criteria better" (+). ELECTRE concordance algorithm $c_{average}$= 0.5 and ELECTRE discordance algorithm $d_{average}$= 0.64680127 were considered and the concordance-discordance matrix obtained.

Table 2. Distance **(DISTAN)** in km from origin to consumption considering main crop production area shipped from the main national markets, Santo Domingo and Santiago de los Caballeros, to destiny.

Tabla 2. Distancia **(DISTAN)** expresada en kilómetros desde el origen hasta el consumo, considerando la zona de producción y los principales mercados de Santo Domingo y Santiago de los Caballeros.

	Origin	Santo Domingo (km)	Santiago(km)	Export-Destination	Average (km)
Rice	Constanza	141	117	S. Domingo-Santiago	129
Sweet potatoes	La Vega	141	117	Puerto Rico	129
Avocado	Cambita	40	175	USA	107
Coffee	Barahona	216	320	Punta Cana	304
Pigeon pea	San Juan	189	-	Santo Domingo	189
Common beans	San Juan	189	-	Santo Domingo	189
Org. Bananas	Azua	83	112	EU Amsterdam	98

Table 3. Decisional multi-criteria matrix. Performance matrix.
Tabla 3. Matriz decisional multicriterio.

	Profitability (US$/ha) (CROP) (+)	Food miles (km) (DISTAN) (-)	% Land ownership (TEN) (+)
Rice	511	129	22.2
Sweet potato	717	129	13.8
Avocado	1694	107	41.9
Coffee	2102	304	25.6
Pigeon pea	1433	189	28.5
Common beans	795	189	14.8
Organic Banana	1917	98	43.5

Results and discussion

Consumers´ expectations

Results show that the 53.8% of respondents do not prefer local foodstuffs and nearly quarter more only when they have the same price and quality of imports (18). The consumers expressed a need to improve the local foodstuffs (8) and food safety practices. The experts pointed out the consumers distrust on the national products motivated by the consumers´ perception of lack of traceability and quality control of local productions, moreover heterogeneity and absence of hygiene (16). They expressed that some Dominican products can improve their quality but some others are comparable with imports, being a matter of consumers´ value perception of foodstuffs quality (24) (table 4, page 119).

Moreover, most of the consumers declared to buy preferentially in supermarkets due to their convenience, cleanliness and hygiene although many consumers expressed best fruits and vegetables are sold on green markets (5). They pointed out the need to improve the hygiene, organization and infrastructures of the green markets. An asymmetric flow of information between supply chain stakeholders was found (8, 17), while there is a need to increase the consumers´ confidence on local grown food (7).

Table 4, page 119, has confirmed the first of the hypotheses that the research study sought to test: H_1: The producers do not adopt the consumers´ expectations endangering SAVC.

Producers´ determinant factors to access to added-value chains

The principle aim of the logistic regression analysis was to run an overall model with the significant variables obtained to perform SAVC. The original dataset in the logit model included the following variables: Crop system (CS) (*p-value*=0.000); Crop (CROP) (*p-value*=0.000); farm tenure (TEN) (*p-value*=0.003) and distance to the market (DISTAN) (*p-value*=0.000).

The analysis was developed in two steps. The first model in the output is a null model, that is, a model with no predictors, a univariate logistic regression analysis. The second model output the determinant variables to access to added-value chain (*p-value*<0.05).

Table 4. Distribution of frequencies of consumer´s agrifood consumption habits and preferences in Santo Domingo city, express in average and percentage (%).

Tabla 4. Perfil de los hábitos de consumo y preferencias de los consumidores de la ciudad de Santo Domingo, expresado en porcentajes y medias.

Variable	Value	%	Variable	Value	%
Household members	1 to 2	20.4	Best green products	Supermarket	37.5
	3 to 4	48.9		Green market	39.6
	5 to 6	30.7		Greengrocer	22.9
Agrifood aquisition	Produce	4.1	Move for preference	Yes	35.3
	Purchase	5.9		No	64.7
Often of purchase	Once a week	63.3	Surcharge for preference	Yes (5-10%)	51.9
	Twice a week	26.5		No	48.1
	+ 15 days	10.2		Private	25.2
Green supply in city	Adequate	40.0	Local improvement needs	Freshness	29.7
	Inadequate	58.2		Cleanliness	18.7
	Unknown	1.8		Support local	17.2
Local preference	No	53.8		Prices control	10.9
	If same price	21.2		Increase variety	3.1
	If same quality	21.2		No intermediaries	1.6
	Same price and quality	3.8		More storage	1.6
Purchase place	Supermarket	55.6		Fairs organize	1.6
	Greengrocer	28.4		Unknown	15.6
	Street market	16.0			

The odds ratio revealed that being a producer of rice, sweet potatoes, common beans or pigeon pea, *versus* a producer of coffee, organic banana or avocado decreases the log odds of perform a SAVC by 0.113.

Being an owner of the land *versus* being a renter or occupier increases the log odds of added-value markets by 0.744. Additionally, selling over 5 km increases the log odds of selling in added-value supplies chain by 2.035 (table 5).

The overall model includes these predictors. The chi-square value of 203.733 with a *p-value* of 0.000, less than 0.001 tells that the model as a whole fits significantly better than an empty model (a model with no predictors).

Table 5. Significance analyses of the logistic model in two steps: Wald Forward. Logistic regression analyses of the significant producers´ variables.

Tabla 5. Análisis de regresión logística en dos pasos, Wald hacia delante para las variables significativas.

Variables	Coef. (βi)	*p-value*	Wald	Odds-Ratio		
				Lim.$_{lower95\%}$	OR	Lim.$_{superior95\%}$
Crops (**CROP**)	-2.178	0.000	39.829	0.058	0.113	0.223
Land tenure (**TEN**)	-0.296	0.037	4.357	0.564	0.744	0.982
Distance (**DISTAN**)	0.711	0.031	4.669	1.068	2.035	3.878

The crops (CROP), the land tenure (TEN) and the distance to the markets (DISTAN) provides significant variables in the overall model equation to access to added-value supply chains (*p-value*=0.000; *p-value*=0.037; *p-value*=0.031). The outcome overall logit model is, p_i (Access to an added-value supply chain): *.

Fold (2008) demonstrated how the nature of the crop, such as storability and transportability, impacts on a potential performance of SAVC. He also pointed out that financial capacity and logistic capability of producers are key parameters on upgrading added-value chains (8, 17, 23). Clark and Inwood (2016) also indicated capability of farm increases distribution radius becoming larger and increases the potential SAVC.

Fold (2008) argued that a set of requirements has to be satisfied by farmers to perform SAVC covering various issues from availability and suitability of land (TEN) to personal qualifications and reputation (21). Caceres (2015) agreed with results indicating land ownership is less important than land control in flexibility and efficient crop production in global chains. Moreover, the Dominican producers argue lack of transportation and storage resources to perform SAVC.

Smallholders´ barriers are becoming considerably higher as they need to qualify for inclusion in organized producers´ schemes (8). The smallholders weaken financial access, important for purchasing food and travel to make those purchases (27) and for them the implementation of even basic technical norms is a significant challenge. Reducing the distance food is transported is also of concern in SAVC (26). The Dominican SAVC requires for some products (CROP) increase long-distance interconnectivity (DISTAN), owning of capital and technology (TEN), change in the organization of production and in the role of the state in the producers perform of SAVC (2).

The logit model has confirmed the second of the hypotheses that the research study sought to test: H_2: Producers perform of a SAVC depends on the subsector, location and resources.

Subsectors ranking for SAVC management

The multi-criteria analysis ranked subsectors according SAVC vulnerability (table 6, page 121). The organic banana for exportation and the avocado concluded the best positioned crops to a SAVC. The organic banana is indifferent to coffee.

The coffee was preferred to the rice and common beans. The pigeon pea is preferred positioned to rice, sweet potatoes and common beans. Common beans are preferred to sweet potatoes.

The electre graphic (figure 2, page 121) concluded less positioned subsectors to SAVC were rice and sweet potatoes.

The Electre graphic concluded a high vulnerability of SAVC in sweet potatoes and rice subsectors while a moderate impact could be expected in pigeon pea and common beans subsectors.

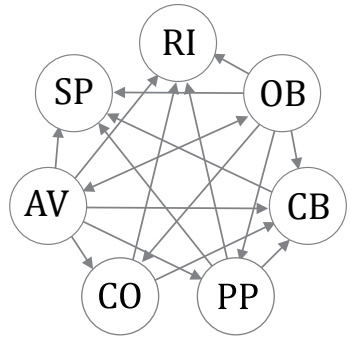
In order to face a SAVC model is needed subsectors restructuration to become sustainable. In this adaptation the existence of multiple livelihood strategies must be considered (17).

* $$ln\frac{p_i}{1-p_i} = 10.156 - 2.178 * CROP - 0.296 * TEN + 0.711 * DISTAN$$

Table 6. Dominance Concordance-Discordance Matrix, contained a "1" whenever both concordance and discordance indexes for a pair of crops were 1, otherwise valued 0.

Tabla 6. Matriz de dominancia agregada (concordante-discordante) donde "1" significa que la matriz de concordancia y discordancia toma el valor 1 para cada par de cultivos, "0" en el resto de casos.

		Attribute 2 under the influence of subordinate						
		RI	**SP**	**AV**	**CO**	**PP**	**CB**	**OB**
Atribute 1 influencing dominator	Rice (RI)	–	0	0	0	0	0	0
	Sweet Potatoes (SP)	0	–	0	0	0	0	0
	Avocado (AV)	1	1	–	1	1	1	1
	Coffee (CO)	1	0	0	–	0	1	0
	Pigeon Pea (PP)	1	1	0	0	–	1	0
	Common Beans (CB)	0	1	0	0	0	–	0
	Organic Banana (OB)	1	1	1	1	1	1	–



Within each of the pair-combinations an arrow pointing towards a member indicates dominance over that member. RI, rice; OB, organic bananas; CB, common beans; PP, pigeon peas; CO, coffee; AV, avocado; SP, sweet potatoes.

Entre cada par de cultivos la flecha señala la dominancia de un cultivo frente al otro. RI, arroz; OB, bananas ecológicas; CB, habichuela; PP, guandul; CO, café; AV, aguacate; SP, batata.

Figure 2. Domination between pairs of alternative agricultural produce in the Dominican Republic by the electre method.

Figura 2. Dominancia del método Electre entre los cultivos analizados en la República Dominicana.

Decisions for adaptation to SAVC need to be taken at various scales: by producers´ individual in horizontal integration to reduce collective risks and by governments on behalf of society (23). The experts declared that these subsectors could approach the SAVC improving the presentation, cleanliness and safety of the products. The producers must comply with specific products requirements, meet the food safety requirements, quality and reduce wastages and inefficiencies improving their production management, practices and income (28). It is needed to improve in marketing (19). New and higher-value crops SAVC have to be sought and introduced (6), switch to more profitable alternatives, ongoing SAVC diversification.

The experts also proposed to SAVC enhance the agro-food products local transformation adding value (1) due to the considerable profits made from processing (19). Table 6 (page XXX) and figure 2 (page 121) have confirmed the third of the hypotheses that the research sought to test: H_3: The management of SAVC needs to rank subsectors according viability.

Conclusions

A divide between subsectors that hinder a SAVC in the Dominican Republic was proven. The increasing perception by consumers of low quality of produce within some subsectors, the lack of collaborative efforts, and capability of producers to SAVC confirm these trends. Producers will face heterogeneously a SAVC model. For producers who are in position to meet standards this can be a source of competitive advantage, while those without the necessary capital to meet the requirements from buyers will face exclusion from the chain. The SAVC requires get advantage of the benefits of integration with the control and the governance and tasks of local small scale productions to ensure and emphasis the social and environmental sustainability. To create a SAVC that avoids the capital accumulation elsewhere in the chain, interventions could be needed to equate stakeholders. In doing so, technological and financial constraints of the local producers might be overcome, or at least significantly reduced.

Practical implications

Using mixed methods to investigate the SAVC this paper provides an approach that reflects the complex and iterative nature of real value chains and can be used by researchers, policymakers and practitioners to better understand and describe decision making and to develop informed policies and interventions in SAVC scenarios. The approach used in this paper can assist to address SAVC challenges by helping to understand the underlying issues and consider more inclusive interventions. It hopes to contribute to a better understanding of the local implications in developing countries of SAVC restructuring beyond sustainability.

Future research lines

The perceived limitations of governance in the Dominican supply chain and the regulation through private mechanisms led to further research to harmonize both achieving development and resources sustainability goals. Governing sustainability through value chains implies a set of regulatory practices that use the chain as a medium for influencing producer decision making and strategies for upgrading their practices for sustainable production. The guideline of future researches is the critical role played by institutions in securing the viability of SAVC. This study also highlights the importance of national agricultural policies to diminish the supply chain uncertainties. It is also of interest to investigate how the producers can access resources necessary to perform a SAVC and to achieve long-term goals such as improvement in producers´ livelihoods and agriculture sustainability. Extent to the analysis of the factors that facilitate and constrain the willingness and capacity of those they target to adopt pre-defined or standardized upgrading strategies it is of interest. It is of interest and unresolved the resulting of regional inequities, marginalized areas, smallholders´ poverty in the adaptation to SAVC. The promotion of the creation of local organization, cooperation and collaboration are crucial to achieve the knowledge, background and expertise of SAVC.

References

1. Bloom, D.; Hinrichs, C. C. 2010. Moving local food through conventional food system infrastructure: Value chain framework comparisons and insights. Renewable Agriculture and Food Systems. 26: 13-23.
2. Borras, S. M.; Franco, J. C.; Isakson, S. R.; Levidow, L.; Vervest, P. 2016. The rise of flex crops and commodities: Implications for research. Journal of Peasant Studies. 43: 93-115.
3. Burnett, K.; Murphy, S. 2014. What place for international trade in sovereignty?. Journal of Peasant Studies. 22: 1065-1084.
4. Caceres, D. M. 2015. Accumulation by dispossession and socio-environmental conflicts caused by the expansion of agribusiness in Argentina. Journal of Agrarian Change. 15: 116-147.
5. Castillo-Valero, J. S.; Villanueva, E. C.; García-Cortijo, M. C. 2018. Regional reputation as the price premium: estimation of a hedonic model for the wines of Castile-La Mancha. Revista de la Facultad de Ciencias Agrarias. Universidad Nacional de Cuyo. Mendoza. Argentina. 50(2): 293-310.
6. Challies, E. R. T.; Murray, W. E. 2011. The interaction of Global Value Chains and Rural Livelihoods: The case of smallholder raspberry grower in Chile. Journal of Agrarian Change. 11: 29-59.
7. Clark, J. K.; Inwood, S. M. 2016. Scaling-up regional fruit and vegetable distribution: potential for adaptative change in the food system. Agriculture and Human Value. 33: 503-519.
8. Fold, N. 2008. Transnational sourcing practices in ghana´s perennial crop sectors. Journal of Agrarian Change. 8: 94-122.
9. Gereffi, G.; Fernández-Stark, K. 2016. Global value chain analysis: A primer. Durham, UK: Center on Globalization, Governance and Competitiveness at the Social Science Research Institute.
10. Hatami-Marbini, A.; Tavana, M. 2011. An extension of the Electre I method for group decision-making under a fuzzy environment. Omega. 39: 373-386.
11. IICA. 2009. Strategic plan for the agrarian sector in Dominican Republic. Dominican Republic Agriculture Ministry. Santo Domingo. Dominican Republic.
12. Jarosz, L. 2011. Defining world hunger: Scale and neoliberal ideology in international food security. Food Culture and Society. 14: 117-139.
13. Leguizamon, A. 2016. Disappearing nature? Agribusiness, biotechnology and distance in Argentine soybean production. The Journal of Peasant Studies. 43: 313-330.
14. Los, B.; Timmer, M. P.; Vries, G. J. 2015. How global are global value chains? A new approach to measure international fragmentation. Journal of Regional Science. 55: 66-92.
15. Murmis, M.; Murmis, M. R. 2012. Land concentration and foreign land ownership in Argentina in the context of global land grabbing. Canadian Journal of Development Studies. 33: 490-508.
16. Nicolae, C. G.; Isfan, N.; Bahaciu, G. V.; Marin, M. P.; Moga, L. M. 2016. Case study in traceability and consumer´s choices on fish and fishery products. AgroLife Scientific Journal. 5: 103-107.
17. Pegler, L. 2015. Peasant inclusion in global value chains: economic upgrading but social downgrading in labour processes?. The Journal of Peasant Studies. 42: 929-956.
18. PROCHILE. 2013. Dominican Republic Food distribution channel Study 2013. Santo Domingo. Dominican Republic: Comercial Chile Office in Santo Domingo ProChile.
19. Prowse, M.; Moyer-Lee, J. 2014. A comparative value chain analysis of smallholder Burley Tobacco Production in Malawi – 2003/4 and 2009/10. Journal of Agrarian Change. 14: 323-346.
20. Rutherford, D. D.; Burke, H. M.; Cheung, K. K.; Field, S. H. 2016. Impact of an agricultural value chain project on smallholder farmers, households, and children in Liberia. World Development. 83: 70-83.
21. Sánchez-Toledano, B. I.; Kallas, Z.; Gil, J. M. 2017. Importancia de los objetivos sociales, ambientales y económicos de los agricultores en la adopción de maíz mejorado en Chiapas, México. Revista de la Facultad de Ciencias Agrarias. Universidad Nacional de Cuyo. Mendoza. Argentina. 49(2): 269-287.
22. Scoones, I. 2009. Livelihoods perspectives and rural development. The Journal of Peasant Studies. 36: 171-196.

23. Singh, C.; Dorward, P.; Osbahr, H. 2016. Developing a holistic approach to the analysis of farmer decision-making: Implications for adaptation policy and practice in developing countries. Land Use Policy. 59: 329-343.
24. Schnettler, B.; Sánchez, M.; Miranda, H.; Orellana, L.; Sepúlveda, J.; Mora, M.; Lobos, G.; Hueche, C. 2017. "Country of origin" effect and ethnocentrism in food purchase in Southern Chile. Revista de la Facultad de Ciencias Agrarias. Universidad Nacional de Cuyo. Mendoza. Argentina. 49(2): 243-267.
25. Soosay, C.; Fearne, A.; Dent, B. 2012. Sustainable value chain analysis – a case study of Oxford Landing from "vine to dine". Supply Chain Management: An International Journal 17: 68-77.
26. Soper, R. 2016. Local is not fair: indigenous peasant farmer preference for export markets. Agriculture and Human Value. 33: 537-548.
27. Tobin, D.; Brennan, M.; Radhakrishna, R. 2016. Food access and pro-poor value chains: a community case study in the central highlands of Peru. Agriculture and Human Value. 33: 895-909.
28. Tolentino-Zondervan, F.; Berentsen, P.; Bush, S.; Idemne, J.; Babaran, R.; Lansink, A. O. 2016. Comparison of private incentive mechanisms for improving sustainability of Filipo Tuna Fisheries. World Development. 83: 264-279.
29. Valdes Salazar, R. 2018. Measuring market integration and pricing efficiency along regional maize-tortilla chains of Mexico. Revista de la Facultad de Ciencias Agrarias. Universidad Nacional de Cuyo. Mendoza. Argentina. 50(2): 279-292.
30. Walsh-Dilley, M. 2013. Negotiating hybridity in highland Bolivia: Indigenous moral economy and the expanding market for quinoa. Journal of Peasant Studies. 40: 659-682.
31. Warner, B. P. 2016. Understanding actor-centered adaptation limits in smallholder agriculture in the Central American dry tropics. Agriculture and Human Value. 33: 785-797.