The role of trust and networks in developing Nicaraguan farmers' agribusiness capacities

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Abstract

The main focus of most programmes in developing countries carried out by NGOs is to develop small-scale farmers' capacities. One approach hereby is to use multi-stakeholder innovation systems, such as the 'Nicaraguan Learning Alliance' (NLA). However, tools for the evaluation of multi-stakeholder innovation systems are rare. This paper reports on the implementation of a conceptual framework to carry out an impact evaluation of multi-stakeholder innovation systems using the NLA as the object of study. The assessment focused on the business relationship constructs of trust and capacity development. Survey interviews, in-depth interviews and focus group discussions collected data from agribusiness stakeholders linked with the NLA and from a control group of stakeholders involved with other networks. The quantitative data were analysed through factor and regression analyses. Results from the quantitative analyses were triangulated with qualitative data. The analysis shows that the NLA has been successful in developing smallholder farmers' capacities as a result of trust developed through its dedicated project managers. Nonetheless, the NLA has not been more successful at developing agribusiness capacities among Nicaraguan farmers than other networks with the same goals. Results from this study point to the need for facilitating more interactions between the different networks of farmers' cooperatives and organisations with other stakeholders already active within the Nicaraguan agrifood innovation system.

Keywords: capacity development, impact evaluation, innovation systems, Latin America, value chains

1 Introduction

Traditionally, researchers and experts transferred their agricultural knowledge to their target group following a linear approach. This model has largely failed because it did not respond to the actual problems of its intended beneficiaries, it rather evaluated the knowledge of locals as inferior and did not take into account how the different stakeholders influence production one way or another (Chambers, 1994; Pretty, 1995; Klerkx *et al.*, 2012).

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This shortcoming formed the basis for 'model two' also known as 'Participatory-Research-Action' (PRA), in which more interactions between the different stakeholders occur and changes can be adopted more rapidly (Hall, 2007). This new form of capacity development could be defined generally as an approach focusing on organisational, communal and social issues. The core of this approach is to combine theory and action in the process of collaborative learning. Reflection is taking place throughout the whole process and is also prompting the next actions (Coghlan & Brydon-Miller, 2014).

The International Center for Tropical Agriculture (CIAT) has developed Learning Alliances (LA) based on this knowledge (World Bank, 2012). LAs can be assimilated to innovation platforms (IPs): a group of individuals with different backgrounds and interests, who come together to diag-

nose and solve problems they face (Homann-Kee Tui *et al.*, 2013). The LA concept has so far been adopted in 20 countries worldwide (Lundy & Gottret, 2005). Innovation systems as applied to agriculture rely on the interaction of different stakeholders to foster knowledge sharing and innovation (Klerkx *et al.*, 2010). The general idea is to add value and create synergistic relationships between different members and to build up a network that transcends micro, meso and macro socio-geographical levels (CRS, 2009). The Nicaraguan Learning Alliance (NLA) is an alliance of organisations formed in 2003. The alliance is training its partners on agribusiness management and access to markets to replicate this knowledge through different geographical levels along its partner network down to farmers (AdA, 2014; World Bank, 2012).

Although innovation platforms are seen as a successful tool and used in many different countries and value chains, literature on the assessment of innovation platforms is very rare. Existing literature mostly focuses on the analysis of particular cases with a specific method, thus restricting the transfer to other platforms (Nederlof *et al.*, 2011). The conceptual framework developed by Cadilhon (2013) attempts to simplify complex data within the categories of structure, conduct, and performance. The conceptual framework already embeds certain variables, factors, and other influences relevant to the development and aims of innovation platforms. This is the only conceptual framework that combines the different categories (structure, conduct, and performance) with the topics of transaction costs and marketing concepts for the purpose of analysing innovation platforms. The data of this study will help test and refine the conceptual framework for monitoring and evaluation of the impact of innovation platforms (Cadilhon, 2013, p. 2).

The focus of this study was to evaluate trust as a conduct variable and capacity development as a performance variable following the alliance's objectives. Trust is an important component in value chains and has gained more attention from scientists within the past two decades. This important component can be seen as a factor, which significantly influences individuals, organisations, partner's competence, process, characteristics and institutions, systems, calculations, economics, intentional relations, technology or services. Thus, it is described by many researchers as a complicated and multifaceted concept with no uniform definition and measurement method available up to now. However, trust has a great influence on perception and individuality, which varies with participants (Laeequddin *et al.*, 2010, pp. 53, 56).

Capacity development has also been discussed extensively in the last few decades (Watson 2010, p. 241). It is dependent on principles, dimensions, actors, levels and strategies, and each case has to be seen as a combination of different influencing factors (Neely, 2010, pp. 13–16). In an agricultural context, it often takes the form of training activities and workshops (Horton *et al.*, 2003, p. 2). Capacity development is a principal goal of the NLA to increase the replication efficiency of the knowledge being produced within the network.

However, there are no studies or data comparing NLA participants and non-participants pertaining to the cooperatives and organisations using the NLA-guides. Furthermore, there are no measures to evaluate whether the capacity of the partners is generally increasing or not. To contribute to the evaluation of the NLA's activities, this article aims to answer the following research question: How does the NLA strengthen producers' capacities through its structure and network of members and partners?

The contribution of this article to the literature on IPs as a collaborative agricultural education mechanism is the pilot-testing of a conceptual framework characterizing how IPs work in a Latin American context through mixed research methods. Although LAs and IPs are more and more common, this study aims to contribute practical tools to evaluate them using quantitative and mixed methods.

2 Literature review

2.1 *Learning Alliances in the agricultural sector*

The LA approach is based on the concept of 'social learning' and 'innovation systems'. Social learning is defined as an interactive process of learning-by-doing between different stakeholders for the purpose of solving problems (Bandura, 1971). LAs specifically focus on research organisations, as well as donor and development agencies. Combining these two concepts creates a process of collaborative learning, adaption, and innovation among the participants. The objectives of LAs are to develop cumulative and shared knowledge about distinct approaches, learn across different boundaries, create synergies among participants (e.g. to advance specialised knowledge), exchange information between the participants, and develop flexible mechanisms that apply to different topics (CRS, 2009). It is typical for LAs to mix traditional socio-economic research with action research. The founding principles of LAs include clear objectives, shared responsibilities, costs and benefits, outputs and inputs, differentiated learning mechanisms, and long-term trust-based relationships. Every participant will have different objectives and interests, but it is crucial that common ground can be identified. A more general objective

enables participation by a wider array of members. Benefits for each stakeholder must exceed the value of their individual costs. In addition, the goals and interests of the alliance should not be in conflict with other key actions. Methods, tools, and approaches should change over time corresponding to changing situations of participants. All types of participants must be considered and respected regardless of gender, race, function, and other differentiating factors. In order to accomplish this, learning methods need to be flexible, interconnected, and viewed as long-term processes (CRS, 2009).

The main approach in the methodology of LAs is to move from a single cycle learning process to a double loop learning process. One cycle is divided into three segments. In the first step 'Reviewing our framework', problems are identified, learning topics are selected and defined, existing practices are analysed, and methods and tools are designed for adoption. The second step 'Implementing strategic actions', involves planning and implementing the approaches, methods and tools of development projects. In the third step, 'Documenting and analysing results' intervention results are systemized and evaluated before the changes in the state of development are presented to the members through workshops, training programs, platforms or other methods. After the completion of this cycle, the process starts again with the first step. This second time, the results from the first cycle are taken into account (Lundy & Gottret, 2005).

CIAT's experiences with LAs have been very positive since they were first initiated in the year 2000. Positive aspects are that stakeholders participate directly, pilot innovation occurs where help is needed, face to face information exchange occurs, and analyses throughout the entire experience help evaluate the alliance including its processes (Lundy & Gottret, 2005). However, LAs do not work for every project. One reason is member composition. Members have to be open to share information and reflect in order to enable the learning. This can be influenced by clusters or different methods of communication. Establishing an LA takes a considerable amount of time (CRS, 2009). The initiators must invest sufficient time in managing and coordinating the alliance as well as documenting, analysing, and sharing the information and results on every level. Though time commitments may be substantial,, they are crucial elements of the process. Additionally, providing funding becomes essential. It is easier to receive funding for specific projects than for projects with a wider scope. It is also vital to consider who is funding the project and to examine their motives and interests (Lundy & Gottret, 2005).

## 2.2 Background information on Nicaragua and the NLA

Although small in size, Nicaragua has a varied tropical landscape with fertile volcanic soil on agricultural plains, dry rangeland plateaus and hills, and humid evergreen agroforested mountains. Agriculture is an important economic sector for the country, representing 22 % of the national GDP, 32 % of national exports and 32 % of employment (FAOSTAT, 2014). However, Nicaragua is one of the poorest countries in Latin America (World Bank, 2017).

Nicaraguan farmers are organised in a dense network of cooperatives, a heritage of the former socialist Sandinista regime (Lafortezza & Consorzio, 2009). Due to the current government's connection to the previous regime, it embraces this socialist heritage and may continue to influence the structure of Nicaraguan agriculture. At present, many farmers are not well equipped to link themselves to suppliers and customers in today's market-oriented system. Agribusiness training could thus make a big difference in empowering farmers and their cooperatives to become better managers of their enterprises and livelihoods (Landmann & Cadilhon, 2016).

Having identified this training opportunity as a good long-term strategy to help rural farming communities link to markets, a partnership of ten international and local research organisations, non-government organisations, and one national-level farmers' cooperative [1] launched the NLA in 2003 (Lundy & Gottret, 2005). The objective of the NLA is farmer training on agribusiness. Much of the development of these activities and trainings in the first years were funded by aid money channelled through the international partners in the NLA. To achieve this, the NLA members first consulted each other to identify training topics and develop appropriate training methods. Based on this information, the NLA has established five training guides containing the skills and capacities farmers needed to improve [2]. These guides use methodologies designed to target Latin American farmers' cooperatives and rely on the participation of trainees in building their own understanding of the topic. The trainees first auto-evaluate the training process, before their results can be compared to training beneficiaries at different

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[1] CATIE (Center for Tropical Agricultural Research and Education); CIAT (International Center for Tropical Agriculture); CRS (Catholic Relief Service); FUNICA (Foundation for Technological Development of Agriculture and Forestry of Nicaragua); VECO Mesoamerica (VredesEilanden Country Office Central America); GIZ (German Agency for International Cooperation); LWR (Lutheran World Relief); FENACOOP R.L. (National Federation of Agricultural Cooperatives and Agribusiness)

[2] Guide 1: Self-evaluation provided for the management of rural associative enterprises; Guide 2: Strengthening socio-organizational processes; Guide 3: Strategic orientation with a focus on value chain; Guide 4: Development of business plans; Guide 5: Strengthening of services. These are all available in Spanish from http://www.alianzasdeaprendizaje.org/metodologia (accessed 15 January 2017)
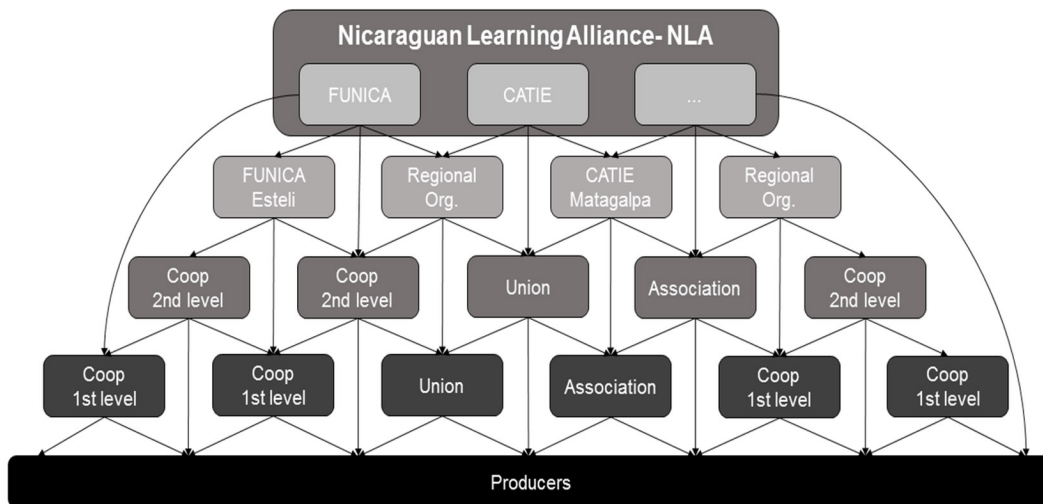
Fig. 1: *Structure of knowledge replication within the Nicaraguan Learning Alliance.*
Source: Landmann & Cadilhon (2016)

sites. Training methods and topics are adaptable to the local context of each farmer's cooperative. The process and topics of the training also promote equity across gender and social groups. Finally, the training process encourages individual and collective empowerment to engage in entrepreneurial activities. The NLA's novel idea was to use the existing network of agricultural cooperatives to snowball the training to individual farmer households. The NLA members trained regional-level cooperatives, which used the same methods to train village-level cooperatives, which in turn used them to train their individual farmer members (Fig. 1). Importantly, the NLA members assigned the training activities to one clearly identified project manager, who became the physical link between alliance members and the beneficiary cooperatives, thus creating a trusting relationship with the network of cooperatives.

Three learning cycles included 77 producer organisations and reached a total of 19,350 farming families involved in the production of various crops. Women represented 30 % of the trained farmers (AdA-Nicaragua, 2012; Landmann & Cadilhon, 2016). Although the process was at first subsidised by international partners, later on one of the NLA-members used the guides developed together with the other members independently.

3   Conceptual framework and research design

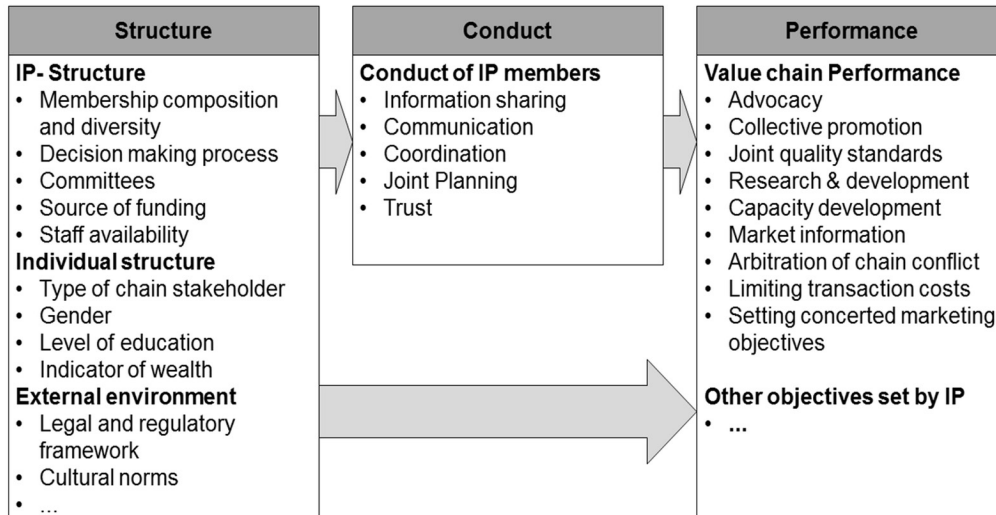### 3.1   *Conceptual framework to outline the analysis*

Mariami *et al.* (2015) describe a conceptual framework evaluating the impact of IPs. The authors build their framework based on three strands of literature from socio-economic theory.

First, the authors use the Structure–Conduct–Performance (SCP) model as a general outline for the study of multi-stakeholder groups such as IPs. Although it has been criticised for its use as a tool to understand the functioning of real-life markets, the authors noted the SCP model's elegant overarching logic: the structure of IPs can impact on its stakeholders' conduct, and in turn on the performance of the platform measured by reaching its objectives.

Mariami *et al.* (2015) incorporate elements from New Institutional Economics (NIE) to complement the overall SCP logic. Indeed, the NIE literature takes into account the uncertainty endemic within the food industry: technical and economic characteristics of the products due to agricultural production seasonality, weather instability, and food market cycles (Furubotn & Richter, 2010). NIE's focus on transaction costs, the organisation and development of economic activity pose as a perfect complement to the SCP model in trying to understand how IPs work to reach their objectives.

Mariami *et al.* (2015) then suggest going further into the characterisation of the way IP conduct and performance are measured by using concepts and constructs from the marketing management literature. Endorsing transaction cost economics, this strand of research studies in great detail how organisations reach more satisfactory marketing relationships by developing information sharing (Sanzo *et al.*, 2003), communication (Kumar, 1996), cooperation, coordination and joint planning (Anderson & Narus, 1984; Claro *et al.*, 2003), and trust (Kumar, 1996; Trienekens,

Structure	Conduct	Performance
IP- Structure	**Conduct of IP members**	**Value chain Performance**
• Membership composition and diversity	• Information sharing	• Advocacy
• Decision making process	• Communication	• Collective promotion
• Committees	• Coordination	• Joint quality standards
• Source of funding	• Joint Planning	• Research & development
• Staff availability	• Trust	• Capacity development
Individual structure		• Market information
• Type of chain stakeholder		• Arbitration of chain conflict
• Gender		• Limiting transaction costs
• Level of education		• Setting concerted marketing objectives
• Indicator of wealth		
External environment		**Other objectives set by IP**
• Legal and regulatory framework		• ...
• Cultural norms		
• ...		

Fig. 2: *Elements of the conceptual framework to evaluate innovation platforms (IP).*
Source: Landmann & Cadilhon (2016)

2011). Though IPs are not generally a means to organise the market transactions between its members, in the case of the NLA, the alliance does help its members improve the marketing orientation of their production and planning activities. Therefore, it is still relevant to use the conceptual framework proposed by Mariami *et al.* (2015) to structure this analysis. The authors combine the three complementary theories of the SCP model, NIE, and marketing relationships management into an overarching conceptual framework to understand how IPs work and to help evaluate their impact. Figure 2 shows how the conceptual framework proposed by these authors has been adapted from the original to fit the specific context of the NLA.

Trust has already been identified as an important component of business relationships in agricultural value chains of developing countries (Trienekens, 2011). Kumar (1996) defines trust as the belief that each party in a marketing relationship is interested in the other's welfare; neither will take action without first considering its impact on the other party. Many researchers describe trust as a multifaceted concept dependent in each case on the local context. Thus, trust can be seen as a factor related to competence, process, characteristics, institutions, systems, services, and even technology (a piece of equipment). Trust can be observed in the decision and actions of participants. From a business perspective, trust is an expected outcome of a certain event or action (Laeequddin *et al.*, 2010). Applying the concept of trust as found in the business relationship literature to the context of IPs seems particularly relevant as the different stakeholders found in an IP also have to develop trust between each other to reach common objectives. At the same time, these value chain stakeholders can also be competitors or dependent on one another.

Capacity development is defined in many ways (Ubels *et al.*, 2010). The United Nations define capacity development as a 'process through which individuals [...] obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time' (UNDP, 2008, p. 4). This definition includes social, political, and technical aspects. Bolger's (2000) review concluded that 'capacity development refers to approaches, strategies and methodologies used to improve performance at the individual, organisational, network/sector or broader system level'.

Farmers' capacities are mostly developed by training activities and workshops given or provided by different actors (Hall, 2007; Horton *et al.*, 2003, pp. 2–6). In this respect, capacity development describes both the process and the outcome of these activities, whereby the outcome is defined as changes in working processes and the introduction of new production methods (Hall, 2005, p. 612; Lusthaus *et al.*, 1999, pp. 15–19).

3.2 Data collection

Data were collected in Nicaragua from NLA members, their influenced partners, non-members of the NLA and their influenced partners, as well as from agribusiness private companies and universities. The data collection took place from July to September 2014 in Managua, and in the provinces of Matagalpa, Jinotega, Estelí, Madriz, Nueva Segovia, Masaya, and Chinandega (Fig. 3). These provinces were chosen, since most NLA members are working in these regions (e.g. CATIE in Matagalpa, CRS and FUNICA in Estelí and Jinotega).
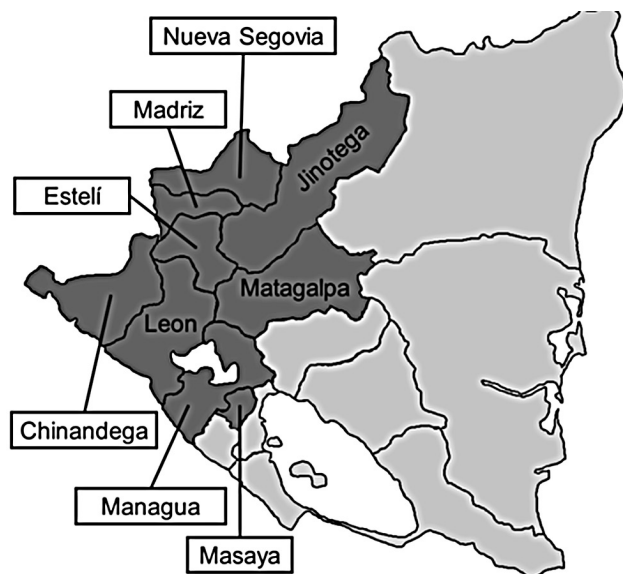
Fig. 3: *Map of Nicaragua identifying provinces where data collection took place. Source: Landmann & Cadilhon (2016)*

To collect qualitative data, key informant interviews and focus group discussions were held. Quantitative data were gathered through individual interviews using a structured questionnaire. Key informants (Table 1) were also interviewed with the aim of gaining a more profound understanding through a less structured conversation. The key informants in the different regions were chosen based on the different types of stakeholders involved in agricultural development: governmental organisations, non-governmental organisations, research institutes, universities, and private companies. The interviews conducted used a guide based on the individual survey and the conceptual framework.

Focus group discussions were held in the regions where the NLA is active. The characteristics of the villages and the composition of the members involved in the group discussions had to be similar to those of the villages representing the area of study. Focus group discussants and key informants were not included in the sample of individual questionnaires. The locations for the focus groups were randomly selected from the different regions in our study. All interview questionnaires and guidelines are accessible on the internet (Cadilhon & Landmann, 2015).

Focus group discussions followed the approaches of asking specific questions about definitions and background information, while also observing the direction taken by the focus group discussion. Focus group participants were members of first-level cooperatives chosen according to their membership and partners in the NLA network and their location. Three focus group discussions with different groups of producers and key informant interviews were held at the beginning of fieldwork as pre-tests of the individual

questionnaire. Results were considered before finalizing the questionnaire.

The individual questionnaire collected structural data about the organisation interviewed and used 53 Likert-scale statements to quantify the levels of conduct and performance. The respondents expressed their agreement with the statements proposed by the researcher through the Likert scale (Coding from 1 = 'strongly disagree' up to 5 = 'strongly agree' as well as N/A = not applicable).

In each location, preliminary individual interviews were held with managers of farmers' groups involved in NLA capacity development. To constitute the control group of farmers' organisations not involved in the NLA network, contact was made with other cooperatives and organisations with a similar structure in the same region. These organisations were identified by asking for references from the respondents within the NLA network, as well as by randomly interviewing numerous farmer organisations in the region where the fieldwork was undertaken. The resulting sample of interviews in all regions was double-checked against lists of all farmer organisations active in these areas. In total, 38 NLA-members or influenced partners and 52 members of other agribusiness development networks and organisations not influenced by the NLA were interviewed.

At the end of data collection, focus group discussions with NLA-influenced and non-influenced cooperatives were held to discuss unclear topics. Overall, data from six focus group discussions, 20 key informant interviews and 90 individual questionnaires were collected (Cadilhon & Landmann, 2015).

3.3 Data analysis

Graphical inspection and descriptive analysis of the structural data were undertaken first. Statistical differences were then identified between NLA members and their influenced groups as well as between the different levels of the network of the agricultural sector, compared with the reference group.

To avoid multicollinearity due to potential interrelationships between statements, factor analysis with orthogonal VARIMAX rotation reduced trust and capacity development statements to a smaller number of uncorrelated underlying factors. Reliability tests were carried out with all statements and afterwards with the calculated factors. The factors were also analysed with values of Cronbach's Alpha, Kaiser-Meyer-Olkin (KMO) measurement and Bartlett's Test of Sphericity. The acceptable factor loading chosen for this study (population of 90) is 0.564 (Field, 2009).

A multiple linear regression was undertaken with the factors developed from performance variables representing capacity development as the dependent variable. Independ-

ent variables were factors representing the trust component of the NLA members' conduct and additional individual structure and conduct variables as hypothesized by the conceptual framework (Fig. 2).

To affirm the validity and robustness of the regression models, common diagnostic tests were used: R-Squared showed the overall fit of the model and variance inflation factor (VIF) values were analysed (Field, 2009). Landmann (2015) describes the complete process of the factor and regression analyses.

The qualitative data relating to information sharing, communication, coordination, joint planning, and trust gathered from the focus group discussions and individual interviews were transcribed into a single document. Following best practices in mixed research methods (Patton, 2002), quotes from the stakeholders interviewed were selected to provide backing for the statistically significant results of the regression. Various other quotes were chosen because they enabled the interpretation of some of the non-significant results of the regression. The results presented below build upon the triangulation of both quantitative and qualitative data, therefore, go beyond an analysis produced by Landmann & Cadilhon (2016) in a case study form.

4 Results

4.1 Descriptive statistics of farmers' organisations

Coffee was the most produced crop for 41 farmers' organisations sampled; 33 reported basic grains (beans, corn and rice) and 16 declared other products (cattle, milk or dairy, vegetable, honey, cocoa). Twenty-six organisations focused on only one agricultural product.

In total, 12 respondents represent a national organisation (one NLA-member and 11 others). Six respondents represented regional organisations (three NLA-members and three others), two are from national-level cooperatives (one NLA-member and one other) and 14 represent regional-level cooperatives (seven NLA-partners and seven others). The sample included 54 village-level cooperatives (26 NLA-partners and 28 others).

Seventy respondents out of 90 mentioned their organisation was participating in more than one capacity development group. The majority of respondent organisations performed the function of farming, marketing or processing groups. Most groups were also providing capacity development services. Two-thirds of the organisations interviewed also had some financial role in providing credit to their members.

Table 1: *Institutions of key informants interviewed.*

Type of institution	Name of institution
Consultant	Kuan-Consultants & Associates
Foundation	FUNICA – Nicaraguan Foundation for Technological Development of Agriculture and Forestry
Governmental institution	CONICYT – Nicaraguan Council of Science and Technology
Governmental institution	MAGFOR – Ministry of Agriculture and Forestry
Governmental institution	MINED – Ministry of Education
NGO	CATIE – Tropical Agricultural Research and Higher Education Center
NGO	CRS – Catholic Relief Services
NGO	HEIFER International Nicaragua
NGO	LWR- Lutheran World Relief
NGO	SWISSAID
NGO	VECO MA – VredesEilanden Country Offices Mesoamerica
Private company	Exportadora Atlantic S.A.; ECOM Nicaragua
Private company	Ritter Sport
Producers organisation	APEN- Association of Producers and Exporters of Nicaragua
Producers organisation	FENACOOP – National Agricultural Cooperative Federation and Agroindustrial R.L.
Producers organisation	MAONIC – Movement of Nicaraguan Agroecology and Organic Producers
Producers organisation	UPANIC – Union of Agricultural Producers of Nicaragua
University	UCA – Centroamerican University
University	UCATSE – Agricultural Catholic University of the Dry Tropics
University	UNA – National Agrarian University

Source: Authors' own research.

Out of the 90 respondent organisations, 57 were established cooperatives, 14 associations, eight NGOs, five private companies, and six were related to government. The most important source of funding came from NGOs (37 cases) followed by cash from operations generated (25 cases), credit provided by the private sector (11 cases), membership fees (10 cases), while seven were government funded.

Of all organisations sampled, twenty-six organisations have fewer than 100 members as producers while 27 represent between 100 and 499 producers. Organisations speaking for 500 to 999 farmers are represented by nine respondents and organisations having 1,000 to 4,999 farmers as members are represented by 16 respondents. Only ten organisations represent more than 5,000 producers. The largest organisation interviewed counts 50,000 producers as members. In terms of gender balance of the producers, 69 % were men and 31 % women (Cadilhon & Landmann, 2015).

4.2 Regression analysis – structure and conduct influencing performance

The regression results presented in Table 2 derive from an econometric model to test selected parts of the conceptual framework depicted in Fig. 2. The variables chosen as explanatory variables are consistent with the literature review and conceptual elaboration by Mariami *et al.* (2015), who propose constructs that can be used to measure structure, conduct, and performance in the context of innovation platforms. Thus, Table 2 identifies, on the one hand, the influence of structure (characterized by the number of years the interviewee has worked for the organisation, the connection of the organisation with the NLA, and the position of the organisation inside the network) on the factor 'innovation'. Secondly, it describes the influence of the learning partners' conduct (represented by statements clustered into information sharing, coordination, joint planning and two trust factors) on the factor 'innovation'. The factor 'innovation' represents the capacities developed by the organisation in the last years measured by new products, knowledge and new techniques or machinery. 'Innovation' is based on the following statements: (1) We have developed new products in the last six years; (2) Our knowledge about our activity has improved in the past six years; (3) In the past six years, we have used new techniques or machinery in our production, production process or management. In the end, two structure variables, two joint planning statements and both trust factors show a significant impact on performance. The adjusted *R*-Squared of this regression is 40.4 %, and the whole regression is statistically significant at a level inferior to 0.1 %. All *B*-values are between one and minus one with only one exception. Respecting the conditions of the equation model meant that the influence of the independent variables on the dependent variable is relatively small (Field, 2009).

The number of years working for the organisation has a significance of 0.1 % and a Beta-value of 0.294, which shows that the amount of time the interviewee has worked for an organisation increases the factor innovation. The connection of the organisation with the NLA does not have a statistically significant influence on the factor innovation. On the other hand, the position of the organisation inside the network does have a significant influence (Sig. = 4.8 %; Beta-value = −0.178). The attributes of this variable are ordered in an ordinal scale related to the position inside the network: national organisations or institutions have a value of one, regional organisations a value of two, cooperatives at third level a value of three, cooperatives at second level a value of four and cooperatives at the first level closest to the farmers a value of five. The bigger the value, the more local the organisation. Being closer to the farmers' level rather than at national level decreases 'innovation'.

Two statements related to information sharing between the farmers and other stakeholders as well as between the NLA or their organisations and the farmers do not have a significant influence. The statement 'We plan our activities together with the NLA/ our organisation according to our production potential and customer demand' has a negative significant influence (Sig. = 2.6 %; Beta-value = −0.224). On the other hand, the statement 'Joint planning of activities with the NLA/ our organisation has improved in the last six years' has a positive and statistically significant influence (Sig. = 0.1 %; Beta-value = 0.378) on innovation. Yet, the statements 'our viewpoints are taken into account by the NLA/ our organisation when they plan their activities' as well as 'we prefer to have long-term relationships' do not have a significant influence.

Both trust factors labelled 'trustful relationships' (Sig. = 1.1 %; Beta-value = 0.248) and 'trustful contracts' (Sig. = 1.3 %; Beta-value = 0.231) have a positive significant influence on 'innovation'. The factor 'trustful relationships' is based on the following statements: (1) The NLA/our organisation always keep their promises; (2) The NLA/our organisation always give us correct information; (3) The NLA/our organisation actions and behaviours are very consistent; (4) The NLA/our organisation always try to inform us if problems occur. The factor 'trustful contracts' is based on the statements: (1) We only develop a relationship with business partners who are fair to us and (2) We only maintain a relationship with our business partners with clearly written terms and conditions.

Table 2: *Regression analysis of selected structure and conduct indicators on the factor 'innovation'.*

Dependent variable: Factor: Innovation			Unstandardized Coef.		Standardized Coef.			Collinearity Statistics	
			B	Std. Error	Beta	t	Sig.	Tolerance	VIF[†]
(Constant)			−1.709	0.907		−1.883	0.064		
Structure		*Years working for the organisation*[‡]	0.044	0.013	0.294	3.381	*0.001*	0.914	1.094
		Connection with NLA[§]	0.249	0.177	0.124	1.405	0.164	0.885	1.129
		Position of the organisation inside the network[¶]	−0.131	0.065	−0.178	−2.010	*0.048*	0.883	1.132
Conduct	Information exchange	We usually share information about production with other stakeholders.[‖]	0.172	0.117	0.130	1.467	0.147	0.881	1.135
		The NLA/ our organisation exchange information about their on-going activities with us.[‖]	0.208	0.123	0.167	1.690	0.095	0.711	1.407
Conduct	Coordination	*We plan our activities together with the NLA/ our organisation according to our production potential and customer demand.*[‖]	−0.260	0.115	−0.224	−2.265	*0.026*	0.707	1.415
Conduct	Joint planning	Our viewpoints are taken into account by the NLA/ our organisation when they plan their activities.[‖]	0.028	0.142	0.022	0.201	0.842	0.558	1.791
		Joint planning of activities with the NLA/ our organisation has improved in the last six years.[‖]	0.447	0.126	0.378	3.541	*0.001*	0.607	1.646
Conduct	Trust	We prefer to have long term relationships.[‖]	−0.174	0.125	−0.127	−1.387	0.169	0.828	1.208
		Factor: Trustful relationships	0.252	0.096	0.248	2.613	*0.011*	0.771	1.298
		Factor: Trustful contracts	0.230	0.091	0.231	2.532	*0.013*	0.834	1.200

Notes: Variables with significant influence on factor 'Innovation' are shown in italics;
R-Square = 0.480; Adjusted R-Square = 0.404; Significance = 0.000; level of significance $p < 0.05$
[†] VIF: Variance inflation factor;
[‡] Scale: Years in numbers;
[§] Scale: 0 = No; 1 = Yes;
[¶] Scale: 1 = National organisation; 2 = Regional organisation; 3 = Cooperative 3rd level; 4 = Cooperative 2nd level; 5 = Cooperative 1st level;
[‖] Scale: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree
Source: Landmann & Cadilhon (2016)

4.3   Qualitative data

According to one key informant and professor at UCATSE – Agricultural Catholic University of the Dry Tropics being asked on the training activities of producers organisations: 'It will be given [the same] training that another organisation has conducted. It could be provided a service complementing the organisations offers: currently this is a little bit the problem in Nicaragua. There are sixty-eight organisations working in extension, but there is nobody who offers credit or the full range of extension service'. This statement underlines the findings from the regression model that joint planning of activities between farmers' cooperatives and training organisations is negatively related with innovations. Because there might be other organisations involved in training activities on similar subjects.

Information sharing is strongly linked to trust, which in return has a strong impact on fostering innovations. For example, a key informant and a board member of the national commission for coordination and management at MAONIC, the Movement of Agro-ecological and Organic Producers of Nicaragua, declared: 'Each alliance depends to which extent transparency is achieved. If the organisation is transparent, trust is existing. [...] That is the condition we see, which is required. But we also ask the other partner, if he agrees on our point of view when possible'. The professor at UCATSE explained the discrepancy between information sharing and innovation by a mainly top-down flow of information in Nicaraguan agricultural development and extension: 'one problem of these alliances is the management of information. [...] Feedback is required, as a member but also from the bottom, meaning producer of the cooperative and the organisations. There should be a bottom-up information flow but according to our experience it doesn't work. The information does not flow with the same speed from one side to another [as easily as from the other]'.

Our key informant from MAONIC supports the fact that organisations and stakeholders working with producers are mostly aware of challenges and improve farmer's training. To 'focus on small producers as the core of the solution to solve problems' is one goal of MAONIC. According to the board member, the farmer himself is the 'leader of change to

achieve the goal of change and improvement'. MAONIC is 'empowering [the farmer] to improve the information about his own farm [. . .]. If that fails, no project [. . . and] no government will help him out of poverty'.

A project manager at FUNICA – the Nicaragua Foundation for Agricultural and Forestry Technological Development, an NLA member and key informant, supports the point that trust influences the factor innovation, saying 'the level of trust has an influence on capacity development within the NLA'. He explains how trust was created within the NLA network and the beneficiary farmers' organisations: 'meeting their expected contributions is important. For example, if there is a project and they will comply, the organisation has to contribute a certain amount of resources, generate the planned results, provide information which is requested, basically'.

To illustrate the results of the 'trustful relationships' factor, we consider the declarations of a manager working for the private sector firm Exportadora Atlantic S.A. in Nicaragua and key informant. He states very generally that 'everything is based on trust. Trust and transparency have to be the axis of all organisations'. More specifically, he explains that farmers trust 'the economic solidity of the company' as well as 'the transparency' with which the company negotiates with farmers. 'We also trust in producers; we deposit 2,000, 3,000, 20 or 100 million dollars that he can work and grow his fruits'. The board member of MAONIC confirms the statement of the private firm by highlighting the importance of the relationship between transparency and trust but also says that, 'If there is trust then, even with a few resources, much more could be done'.

A consultant at CATIE – the Tropical Agricultural Research and Higher Education Centre – and key informant describes the structure of the NLA as one where '[all NLA-members] are at the same level. There is no hierarchical structure, [. . .]. There is a lot of trust, and quite some transparency in communication'.

During a focus group discussion with small-scale farmers on 5th August 2014 in Chinandega, the farmers said they trust NGOs and 'mistrust the governmental institutions'. They linked the former to the fulfilment of promises and financial support. A consultant of MINED – the Ministry of Education – and key informant supports this argument saying that: 'producers [. . .] distrust the government [. . .], because sometimes [. . .] the financial expectations of producers are not fulfilled'. Most stakeholders do not work together with governmental institutions. The farmers 'read [the contracts and agreements of the government] [. . .] but they do not have much confidence'. The farmers interviewed explain this as follows: 'we do not have all information [. . .] and do not know the intention of the gov-

ernment'. From the farmers' perspective, there is a lack of transparency in governmental activities.

5 Discussion of results and conclusions

5.1 Representativeness of the data

The Central American Bank for Economic Integration (BCIE) has undertaken a similar study of farmers' organisations in Central America using data from 63 representative Nicaraguan cooperatives (Lafortezza & Consorzio, 2009). The results from this study are similar to those of the BCIE study: the main products produced and exported are the same, as is the gender balance within the cooperatives. The main difference between the two studies lies in the size of the organisations interviewed: our study incorporates very large cooperatives with more than 10,000 members and active at regional and village levels. The BCIE study's sample also differs from the sample of this study as 35 percent of the BCIE sample had not received any training while all the farmers' organisations sampled in this study had benefited from some sort of training. Although there are some differences between the two studies' samples, the similarity in overall results allows to consider that this study's sample is also representative of farmers' organisations active in the provinces where the NLA is present.

5.2 Efficiency of the NLA's capacity development process

The old structures of cooperatives and the different levels within the cooperative network are still present and an important factor in agribusiness development. The private, public, and NGO sectors are familiar with farmers' cooperatives being widely spread out in Nicaragua and have adapted their methods to this structure. The NLA has used the wide network of agricultural cooperatives to snowball its training on agribusiness from the national level to a large number of individual farmers. However, the other support organisations in the Nicaraguan agricultural innovation system are doing the same so all farmers' cooperatives and their farmer members are connected one way or another to a source of training on agribusiness management. Every key stakeholder interviewed was practising capacity development in the study area. A majority, 77 percent, of respondents reported being supported by more than one organisation. This is the most reasonable explanation for the fact that a 'connection to the NLA' does not have a significant influence on 'innovation'.

The lack of significant influence of information sharing on innovation in the regression is surprising as qualitative data indicate that information sharing is strongly linked to

trust, which in turn has a strong impact on fostering innovations. However, one possible explanation is that agricultural training is generally a top-down process. As a probable consequence, information sharing has no significant influence on innovation. The generalised top-down extension method also explains that only when joint planning is seen to be improving does it have a positive impact on innovation. Furthermore, the data show that the farmers' viewpoint is not taken into account. This supports the idea of rethinking and reorganizing the capacity development sector as well as the structure of agricultural organisations and institutions, just as the NLA has done. Although all providers of agribusiness training in Nicaragua are using the strong cooperative-oriented structure within the country's agricultural sector to improve farmers' knowledge of agribusiness and markets, yet, all stakeholders follow their own approaches. Cooperation and networks between different types of stakeholders are rare.

In fact, the qualitative data indicated that the organisations participating in the NLA network would greatly value an exchange of their experience and progress with other organisations. Thus, the NLA and other stakeholders working in the sector of capacity development should open their network to other stakeholder types, even though the government does not seem to show interest in such a cooperation. This could make the training method more efficient, sustainable, and successful. Using organised networks seems to be the right pathway for agricultural training given the structure of Nicaragua's agriculture, but interactions could be improved between actors of the same level and different levels.

On the other hand, there is no visible influence of the duration of a relationship on 'innovation'. One explanation could be farmers' easy access to cooperatives: out of 90 respondents, 70 were at least in two different cooperatives.

Several cooperatives consider that capacity development will be successful only if accompanied by financial support. The NLA has thus embedded financial support to put the agribusiness development skills learned during its learning cycles into practice. Financial support is necessary, but the main goal is to have successful producers who are not dependent on the financial support from NGOs (Lundy & Gottret, 2005). Indeed, successful IPs in the long-term are those that manage to renew their funding source to keep covering their costs, or those that manage to change their business model in order to become financially self-sustainable (Cadilhon *et al.*, 2016, Dror *et al.*, 2016).

The quantitative and qualitative data show on the one hand that the content and process of NLA's training are very good. On the other hand, the qualitative data show that the way the training is undertaken with farmers could be im-

proved if adjusted to the regional circumstances. This statement was confirmed during the focus group discussions, several key informant interviews, and some individual questionnaires. The current strategies of some NLA members to adapt the training to the local environment are successful, and this is a response to some criticism from the final beneficiaries. On the other hand, it is difficult to trace the success of the NLA training. If one member changes the method and uses the information on their own, it is no longer helpful for the other NLA members. Indeed, changing the learning method to adapt it to local context jeopardizes the approach of the LAs to build up a platform to share information and learn from each other. The institutional learning platform is no longer efficient and sustainable if improvements and changes are not shared with the other NLA members. Opportunities for communication and meetings with other knowledge networks to share and exchange information are also missed by some cooperatives. Lundy & Gottret (2005) describe an approach in the method of the LA to create networks at the micro, meso, and macro levels. These intertwined networks do not exist in Nicaragua and would be the answer to some current criticisms. The NLA itself already identified enlarging knowledge networks as one weakness and included this in the changes that are planned for the coming years (AdA-Nicaragua, 2012).

5.3 Trustful relationships improve the NLA learning process

The quantitative and qualitative results of this study show a clear impact of various components of trust within the NLA network and its capacity development outcomes. The regression model showed that 'trustful relationships' and 'trustful contracts' both had a positive significant influence on 'innovation'.

As described above, the farmers have a better perception of NGOs than of government. More worryingly, it seems that NGOs almost have no collaboration with governmental organisations. This, on the one hand, shows distrust of government action but on the other hand, also shows that the alliances between NLA members and governmental institutions could be strengthened.

The study's results identify the relationship existing between trust and capacity development in the case of the NLA. The regression and qualitative data triangulation indicate that structure and conduct have an influence on performance. The influence of trust on capacity development and innovation identified by this research contributes evidence for the conceptual framework of innovation platforms proposed by Mariami *et al.* (2015). Furthermore, the influence between IP structure and conduct is also observable, for example, in the fact that NGOs, as financial sources of

the farmers' organisations, have a significant influence on 'trustful relationships'. The influence of conduct on performance is visible as well: results show that 'trustful relationships' and 'trustful contracts' have a positive influence on 'innovation' emerging from capacity development variables. The findings complement those of past research identifying linkages between how an IP is structured, the conduct of its members and its expected outcomes (Badibanga *et al.*, 2013; Subedi *et al.*, 2014; Kago *et al.*, 2015; Mariami *et al.*, 2015; Pham *et al.*, 2015; Dror *et al.*, 2016; Teno & Cadilhon, 2016).

Reverse causality is a limitation which could occur using regressions as an analysis tool (Field, 2009). In our study, we assume that this problem is relatively small as the conceptual framework is based on theories which are already used very often. Furthermore, this specific conceptual framework was already used in a similar way in different settings, moreover we triangulated our quantitative data with qualitative data. However, to be sure that reverse causality is not occurring, more detailed data would be helpful.

The method used to evaluate the impact of the NLA could also be improved, by including financial and business figures in the questionnaire for direct comparison of economic impacts. This data could also be collected through the auto-evaluation mechanism developed by the NLA whereby farmers' organisations evaluate their own learning progress. This would simplify making adjustments to the training method and the conceptual framework used to evaluate impact.

References

AdA (2014). Alianzas de Aprendizaje (AdA). CIAT. Available at: http://www.alianzasdeaprendizaje.org/portal/index.php (accessed on: 15 June 2017).

AdA-Nicaragua (2012). *Alianza de Aprendizaje Nicaragua: Plan Estratégico 2013–2016*. Alianza de Aprendizaje Nicaragua, Managua: 13.

Anderson, J. C. & Narus, J. A. (1984). A Model of the Distributor's Perspective of Distributor-Manufacturer Working Relationships. *Journal of Marketing*, 48 (4), 62–74. doi:10.2307/1251511.

Badibanga, T., Ragasa, C. & Ulimwengu, J. (2013). *Assessing the Effectiveness of Multistakeholder Platforms: Agricultural and Rural Management Councils in the Democratic Republic of the Congo*. International Food Policy Research Institute (IFPRI), Washington DC.

Bandura, A. (1971). *Social Learning Theory*. General Learning Press, New York.

Bolger, J. (2000). *Capacity Development: Why, What and How*. Capacity Development-Occasional Series, Vol. 1, No. 1, May 2000, CIDA, Policy Branch, Hull, Quebec.

Cadilhon, J.-J. (2013). A conceptual framework to evaluate the impact of innovation platforms on agrifood value chains development. Paper presented at the 138th EAAE Seminar on Pro-Poor Innovations in Food Supply Chains, Ghent, Belgium, 11–13 September 2013.

Cadilhon, J.-J. & Landmann, D. H. (2015). Nicaragua Learning Alliance monitoring and evaluation study 2014. ILRI – International Livestock Research Institute, Nairobi, Kenya. Available at: http://data.ilri.org/portal/dataset/nicaragualearningalliance (accessed on: 18 September 2016).

Cadilhon, J.-J., Pham, N. D. & Maass, B. L. (2016). The Tanga Dairy Platform: fostering innovations for more efficient dairy chain coordination in Tanzania. *International Journal on Food System Dynamics*, 7 (2), 81–91.

Chambers, R. (1994). Participatory rural appraisal (PRA): Challenges, potentials and paradigm. *World Development*, 22 (10), 1437–1454. doi:10.1016/0305-750X(94)90030-2.

Claro, D. P., Hagelaar, G. & Omta, O. (2003). The determinants of relational governance and performance: How to manage business relationships? *Industrial Marketing Management*, 32 (8), 703–716. doi:10.1016/j.indmarman.2003.06.010.

Coghlan, D. & Brydon-Miller, M. (eds.) (2014). *The SAGE encyclopedia of action research*. SAGE Publications Ltd.

CRS (2009). *Working Together, Learning Together – Learning Alliances in Agroenterprise Development*. Edited by: Best, R., Ferris, S. & Mundy, P., Catholic Relief Services (CRS), Baltimore, USA.

Dror, I., Cadilhon, J.-J., Schut, M., Misiko, M. & Maheshwari, S. (eds.) (2016). *Innovation Platforms for Agricultural Development. Evaluating the mature innovation platforms landscape..* Routledge, Oxon (United Kingdom) and New York (USA).

FAOSTAT (2014). Nicaragua. FAOSTAT, Statistics Division, Food and Agriculture Organization of the United Nations, Rome, Italy.

Field, A. (2009). *Discovering statistics using SPSS. Introducing Statistical Methods*. SAGE Publications, Los Angeles [i.e. Thousand Oaks, Calif.]; London.

Furubotn, E. G. & Richter, R. (2010). Introduction. *In:* Furubotn, E. G. & Richter, R. (eds.), *The New Institutional Economics of Markets*. Edward Elgar Publishing, Cheltenham, UK.

Hall, A. (2005). Capacity development for agricultural biotechnology in developing countries: an innovation systems view of what it is and how to develop it. *Journal of International Development*, 17 (5), 611–630. doi: 10.1002/jid.1227.

Hall, A. (2007). *Challenges to Strengthening Agricultural Innovation Systems: Where Do We Go From Here?*. United Nations University – UNU-MERIT, The Netherlands.

Homann-Kee Tui, S., Adekunle, A., Lundy, M., Tucker, J., Birachi, E., Schut, M., Klerkx, L., Ballantyne, P., Duncan, A., Cadilhon, J. & Mundy, P. (2013). *What are innovation platforms?*. Innovation Platforms Practice Brief 1, ILRI, Nairobi, Kenya.

Horton, D., Alexaki, A., Bennett-Lartey, S., Brice, K. N., Campilan, D., Carden, F., de Souza Silva, J., Duong, L. T., Khadar, I., Boza, A. M., Muniruzzaman, I. K., Perez, J., Chang, M. S., Vernooy, R. & Watts, J. (2003). *Evaluating capacity development: experiences from research and development organizations around the world..* International Service for National Agricultural Research (ISNAR), the Netherlands; International Development Research Centre (IDRC), Canada; ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), the Netherlands.

Kago, K. M., Cadilhon, J.-J., Maina, M. & Omore, A. (2015). Influence of innovation platforms on information sharing and nurturing of smaller innovation platforms: a case study of the Tanzania Dairy Development Forum. 29th International Conference of Agricultural Economists, Milan, Italy.

Klerkx, L., Aarts, N. & Leeuwis, C. (2010). Adaptive management in agricultural innovation systems: The interactions between innovation networks and their environment. *Agricultural Systems*, 103 (6), 390–400. doi: 10.1016/j.agsy.2010.03.012.

Klerkx, L., Leeuwis, C. & van Mierlo, B. (2012). Evolution of systems approaches to agricultural innovation: concepts, analysis and interventions. *In:* Darnhofer, I., Gibbon, D. P. & Dedieu, B. (eds.), *Farming Systems Research into the 21st Century: The New Dynamic*. pp. 457–483, Springer, Dordrecht, New York.

Kumar, N. (1996). *The power of trust in manufacturer-retailer relationship*. Harvard Business Review.

Laeequddin, M., Sahay, B. S., Sahay, V. & Waheed, K. A. (2010). Measuring trust in supply chain partners relationships. *Measuring Business Excellence*, 14 (3), 53–69.

Lafortezza, D. & Consorzio, E. S. C. (2009). Inventario de las cooperativas productivas: Honduras. Banco Centroamericano de Integración Económica (BCIE), Honduras.

Landmann, D. H. (2015). *The influence of trust in the Nicaraguan Learning Alliance on capacity development of members and other influenced groups*. Master's thesis, Georg-August-Universität Göttingen, Germany.

Landmann, D. H. & Cadilhon, J.-J. (2016). With trust and a little help from our friends: how the Nicaragua Learning Alliance scaled up training in agribusiness. *In:* Dror, I., Cadilhon, J.-J., Schut, M., Misiko, M. & Maheshwari, S. (eds.), *Innovation Platforms for Agricultural Development. Evaluating the mature innovation platforms landscape*. pp. 16–41, Routledge, New York.

Lundy, M. & Gottret, M. V. (2005). *Learning Alliances: An Approach for Building Multi-stakeholder Innovation Systems*. International Center for Tropical Agriculture (CIAT), Cali, Colombia.

Lusthaus, C., Adrien, M.-H. & Perstinger, M. (1999). Capacity development: definitions, issues and implications for planning, monitoring and evaluation. Universalia Occasional Paper, No. 35, Universalia, Québec, Canada.

Mariami, Z. A., Cadilhon, J.-J. & Werthmann, C. (2015). Impact of innovation platforms on marketing relationships: The case of Volta Basin integrated crop-livestock value chains in Ghana. *African Journal of Agricultural and Resource Economics*, 10 (4), 328–342.

Nederlof, S., Wongtschowski, M. & van der Lee, F. (eds.) (2011). *Putting heads together*. Bulletin 396, KIT Publishers, Amsterdam, The Netherlands.

Neely, C. L. (2010). *Capacity Development for Environmental Management in the Agricultural Sector in Developing Countries*. OECD Environment Working Papers, No. 26, OECD Publishing.

Patton, M. Q. (2002). *Qualitative research and evaluation methods*. (3rd ed.). SAGE Publications, Inc. ISBN: 0-7619-1971-6

Pham, N. D., Cadilhon, J.-J. & Maass, B. L. (2015). Field Testing a Conceptual Framework for Innovation Platform Impact Assessment: The Case of MilkIT Dairy Platforms in Tanga Region, Tanzania. *East African Agricultural and Forestry Journal*, 81 (1), 58–63. doi: 10.1080/00128325.2015.1041257.

Pretty, J. N. (1995). Participatory learning for sustainable agriculture. *World Development*, 23 (8), 1247–1263. doi: 10.1016/0305-750X(95)00046-F.

Sanzo, M. J., Santos, M. L., Vázquez, R. & Alvarez, L. I. (2003). The Role of Market Orientation In Business Dyadic Relationships: Testing an Integrator Model. *Journal of Marketing Management*, 19 (1), 73–107. doi: 10.1362/026725703763771971.

Subedi, S., Cadilhon, J.-J., Ravichandranc, T. & Teufel, N. (2014). Impact evaluation of innovation platforms to increase dairy production: A case from Uttarakhand, Northern India. 8th International Conference of Asian Society of Agricultural Economists (ASAE) on Viability of Small Farmers in Asia 2014; Saver, Banladesh. International Livestock Research Institute (ILRI), Nairobi, Kenya.

Teno, G. & Cadilhon, J.-J. (2016). Innovation platforms as a tool for Improving agricultural production: the case of Yatenga province, northern Burkina Faso. *Field Actions Science Reports*, 9. Available at: http://factsreports.revues.org/4239

Trienekens, J. H. (2011). Agricultural Value Chains in Developing Countries A Framework for Analysis. *International Food and Agribusiness Management Review*, 14 (2), 51–82.

Ubels, J., Acquaye-Baddoo, N.-A. & Fowler, A. (eds.) (2010). *Capacity development in practice*. Earthscan, London; Washington, DC.

UNDP (2008). *Capacity Assessment Methodology: User's Guide*. Edited by: J. Colville. United Nations Development Programme (UNDP), New York, USA.

World Bank (2012). *Agricultural Innovation Systems*. World Bank, Washington D.C. doi: 10.1596/978-0-8213-8684-2

World Bank (2017). *Nicaragua: Paving the way to faster growth and inclusion. Systematic country diagnostic*. Washington D.C.