



SOLINSA
Support of Learning and Innovation
Networks for Sustainable Agriculture

Agricultural Knowledge Systems In Transition:
Towards a more effective and efficient support of Learning
and Innovation Networks for Sustainable Agriculture

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THE LATVIAN FRUIT- GROWING NETWORK

LINSA Case Study Report: Latvia

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Executive summary

The Latvian Fruit-growers' LINSa is a network formed more than a decade ago around the goal of developing integrated fruit-growing in Latvia. This includes objectives on production, marketing, research, advisory, policy making, consumer education, environmental management. There are about 400 members, both individuals and organizations: producers and their cooperatives, research, business companies, NGOs, etc. The network is nation-wide, with several centres of closer connections around research institutes, the Fruit-growers' Association, regional cooperatives. The network is strong on peer-learning among farmers as well as inter-institutional learning and collaboration between researchers and practitioners. There is a shared set of norms on proper fruit-growing. Innovation is oriented towards private and public good.

Fruit LINSa is a **network of networks** or a constellation of practices. The LINSa is characterised by **multifunctional** objectives (production, marketing, research, advisory, policy making, education, environmental management), several **directions** of innovation (technical, social, economic) and **hybridity** in terms of participants (organisations, individuals, groups; public and private partners).

The LINSa is engaged in intensive technological, economic and policy learning. There are three main nodes of interaction in the network around which knowledge is shared and learning happens in quite dense interaction: research institutes with their sub-networks of knowledge transmission to farmers and co-learning with them; the Fruit-growers association; smaller regionalised producers groups and cooperatives.

The LINSa represents a dynamic balance of diversity and commonality. The network is integrated by structural factors (economic equality of farms, similar size), the common knowledge needs, a strong sectoral identity and political recognition. The object of mutual engagement is learning and innovative projects aimed at long-term development of farms and the fruit-growing sector in general. Despite the diversity of actors, there is a shared set of norms with regard to proper conduct of activities in fruit-growing. The mode of operation in LINSa is cooperation, not competition.

Fruit LINSa represents a combination of incremental, radical innovation and retro-innovation (valorisation of traditional values, varieties, etc.). LINSa supports the socio-technical transition to sustainability through environmental, social, health, employment and rural livelihood contributions. The LINSa contributes to local embeddedness of fruit-growing practices and technologies and facilitates the sector's development in a participatory manner. Fruit LINSa stimulates also social innovation – establishment of cooperatives, producer groups, collaboration with schools and state institutions, involvement of general public.

The links with AKIS are well established and strategic for sustainable development of fruit sector. Boundary interaction between LINSAs and AKIS (especially research and advisory service) is explicit and it enhances innovation. Public support to LINSAs has been moderate but has stimulated modernisation of individual farms, establishment of producers' groups and activation of AKIS links with farmers.

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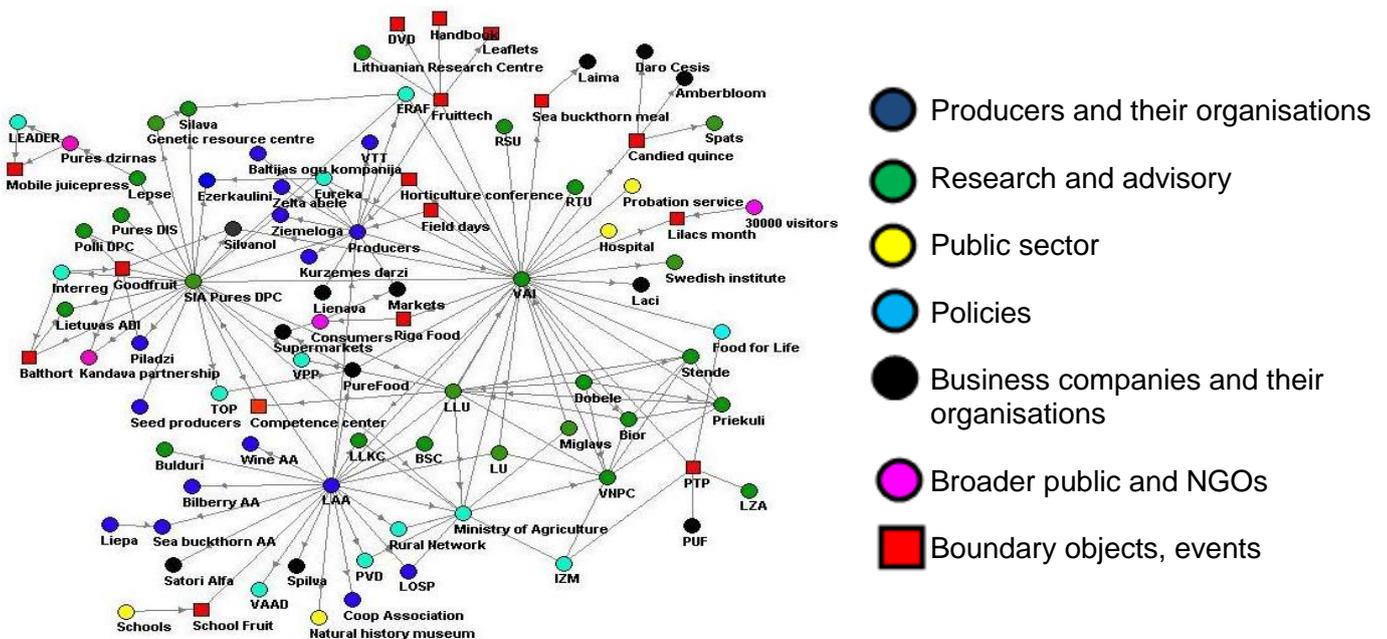
1 INTRODUCTION

The fruit-growing network is diverse in terms of agents, interactions and organizational forms. The LINSAs involve diverse **actors**: producers and their organisations, research and advisory, business companies, policy makers, broader public and NGOs (Figure 1). There are about 400 members in fruit LINSAs. The network is spread across the country and develops around particular clustering or nodal actors, such as the Latvia State Institute of Fruit-Growing, Pūre Horticultural Research Centre, Fruit Growers' Association and farmers cooperatives.

The LINSAs can be considered a **network of networks** or a constellation of practices, since there are **multifunctional** objectives (production, marketing, research, advisory, policy making, education, environmental management), several **directions** of innovation (technical, social, economic) and considerable **hybridity** in terms of participants (organisations, individuals, groups; public and private partners).

Despite of diversity of actors there is a **shared set of norms** with regard to proper conduct of activities in fruit-growing and the mode of operation is cooperation, not competition. From the point of view of market development, the LINSAs have entered the **stage of maturity**, with increased collective marketing and infrastructure development. Some of the activities (public educational and cultural events) are open not only to LINSAs participants, but also to the general public and consumers.

1. Figure *Fruit-growing network* (the lines between nodes stand for knowledge flows)



Many of the key actors **perform hybrid roles** – being producers, participants of cooperatives and also researchers. This fosters dense and diverse interlinkages. The LINSAs arrangements differ in degrees of **formality**. More formally structured entities are the research institutes, the Fruit-growers' Association and producers' cooperatives; while informal ones are producers' and scientists' knowledge networks. There is a considerable proportion of **coordination** between actors - educational activities, meetings and new initiatives; shared creation and use of information/education resources.

Throughout the LINSAs, the **basis of relationships** is voluntary collaboration, with norms of reciprocity and trust shared by participants. **Participation** can be characterized as open and non-excluding; with a considerable shared repertoire (incl. **reifications**). An examples of such reification is the integrated fruit-growing principles, the understanding of the need for adapting various borrowed technologies and varieties to the local conditions, websites, learning videos, manuals, demonstration leaflets etc. The participation in the LINSAs is quite open, and the **common repertoire** is extensive, forming a basis for further negotiation of meanings, strengthening of trust and **collaboration**.

The relationships in LINSAs can be said to be almost **egalitarian** (there is definitely no subordination), since all LINSAs participants are equally in the process of joint learning, and no one has **visible advantages**. Major institutional actors, especially LSIFG have a certain advantage of being able to obtain varied project funding, etc., but these **resources are shared** with the broader community.

LINSAs	Network characteristics						
	Number of members	Degree of innovation	Age of network	Governance and learning	Structural composition	Public financial support	Sustainability outcomes
Fruit	400	Incremental and radical	Old, but with many new actors	Rather well horizontally coordinated	Hybrid, but quite homogenous producers in terms of farms' size and production mode (ie integrated farming)	Medium	Contribution to economic, social, environmental, cultural sustainability

1. Table Learning and innovation context in Fruit LINSAs

The **communication infrastructures** are mostly based on face-to face learning activities (training events, seminars, etc.) and web-resources (homepages, databases, interactive Q &A pages, newsletters, etc.). There are also professional publications for practitioners. Important communication infrastructures are provided by the annual general meeting of the Latvian Fruit-growers Association. Important communication venues are provided by projects (training, experience-exchange). Core groups of the most active participants are using many infrastructures and channels of communication. A considerable proportion of less active participants would only be consulting a couple of

homepages and communicating informally with a trusted peer growers or researchers.

The Table 1 below summarizes the fruit-growing LINSAs across the characteristics which influence the learning and innovation processes. Those network properties form the context in which innovation takes place.

2 METHODS

This study combines a transdisciplinary case study approach (Stauffacher et al 2006) with action research (Stinger 2007) and grounded methodology (Glaser and Strauss 1967). We interacted with LINSAs during a two year period in a series of research and learning activities, using different methods: workshops, study tours, special training seminars, individual and group interviews, document analysis, questionnaires, participant observation, network mapping and other.

These methods allowed us to explore the composition, evolution and governance of the network, map the stakeholders, establish their learning methods and determine knowledge flows between actors. As the fruit-growing LINSAs have over 400 members, we established closer links with smaller groups of producers (sub-networks) to deepen insight into their learning and interaction practices over time. To build trust and promote the development of the LINSAs, we acted on jointly determined issues of interest, e.g. organised a study tour to Lithuania, and contributed to organisation of special training seminars for farmers (e.g. on plant protection). This enhanced LINSAs members' participation in joint learning activities and raised their interest to collaborate with SOLINSA researchers.

The research plan was flexible and evolving. We tried to adjust our collaborative research and learning activities with LINSAs to their events and avoid 'artificial' interaction with LINSAs. Instead we looked for contexts in which to organically include and probe new methods of interaction, adjusting them to LINSAs topicalities. Our role could be justified only if we understood the LINSAs needs and could contribute on our part. Interactions in LINSAs are very situated and we as 'external' agents could not intervene and impose our agenda unless it had come up organically meeting the farmers needs, like an idea to organise a study tour of a training seminar. The research was adjusted to LINSAs events, timing and agenda. Validation of preliminary results and joint planning of next activities (e.g. the knowledge flows questionnaire, workshops) made LINSAs members co-authors and appreciated their expertise.

Comparing with the beginning phase of research mutual trust was increased especially with several key network actors. The involvement of LINSAs actors in collaborative tasks and demonstrating respect to their activities, events (adjusting research agenda to LINSAs agenda) were the main mechanisms of trust-building. However, for researchers and growers in fruit sector it is not self-evident what social scientists can explore in their domain, probably, because in

Latvia collaboration between scientific disciplines and researchers and industry is not yet common. This suggests that even collaborative and transdisciplinary research methodology has to be continuously evaluated and adjusted with stakeholders and LINSAs practitioners.

3 RESULTS OF THE ANALYSIS

3.1 Constraints and opportunities for LINSAs within their particular context and the support needs for successful LINSAs

Constraints and problem-situation: The establishment of the Latvian fruit-growing network is a response to the fruit-growing practitioners' and researchers' need to generate knowledge on technological, economic and political aspects of integrated fruit-growing. As the formal educational and advisory system in fruit-growing was relatively absent, LINSAs tried to fill this gap by variety of learning activities. The LINSAs originated in 1995 when Latvia State Institute of Fruit-growing (LSIFG) was established. During the 90ies the LINSAs developed through establishing links among actors and strategic network building. The creation of National Fruit-growers Association in 1998 stimulated horizontal collaboration. From 1999, subsidies to fruit-growers started, with subsidies for equipment since 2002. Thus the LINSAs evolved from bottom-up and was later promoted by top-down policy measures with an aim to develop the sector.

Opportunities: In recent years links between research and practice in the fruit sector are stimulated by establishing national and EU-funded collaborative science-industry platforms. The general trend is the formation of new links (e.g. with retailers, development of producer groups), and the inclusion of new orchard owners.

Research institutes, especially LSIFG, have a comparative advantage in obtaining project funding, but these resources are shared and ultimately promote the development of the LINSAs. As researchers need feed-back from growers learning becomes a shared enterprise.

The LINSAs is taking part in the **sector's governance** by collaborating with agricultural organisations and the Ministry of Agriculture in policy formulation. The LINSAs is also characterised by openness towards the **consumers and the general public**, organising public events and cultural activities as a means of learning and educating. Examples of such culturally attuned events are the Apple Day, Strawberry Days, the Lilac festival, the Plants week, and excursions to outstanding gardens that appeal to the general public.

3.2 Mechanisms of network development, learning and innovation processes and connections with the formal AKS systems

Mechanisms of network development: The Fruit Growers' Network is **integrated by several mechanisms** working on a number of levels: knowledge needs in several thematic areas (agrotechnology, plant protection, storing and sorting, processing, marketing, consumer/public education); educational and collaborative activities (including projects) of several key institutions; public policies and support measures that provide stimulus to develop fruit-growing in a certain (common-integrated) way; market pressures and the need for joint arrangements and joint marketing vis-a-vis the retailers.

The network participants are joined by a shared fruit-growing sector's **identity and values:** shared set of practices, shared cultural references to the sector's past, traditional agriculture and the landscape. **Political recognition** and a **positive public image** of the sector also help to integrate the LINSAs. The **egalitarian nature of the network** stimulates integration and multiple knowledge flows.

Learning and innovation processes: There is variation in the **level of participation**. The most central, most densely and diversely linked actors benefit more in their access to information and opportunities. We observe that less participation is characteristic of those who have no ambition to develop market activities, or increase orchard productivity. Actual exclusion might be related to breaching the norms of acceptable practices in fruit-growing.

Network activities have produced a number of **reifications and artefacts:** varieties accepted for cultivation; manuals on cultivation techniques; learning videos, public events and festivities, etc. Although different actors are mutually adjusting their frames through multiple kinds of interaction, full convergence on technical or other issues is rarely achieved as issues remain a boundary object for many actors (Klerkx et al 2012).

The fruit LINSAs display characteristics of both **incremental innovation** (building on historically accumulated stock of knowledge and historical institutions and experts) **and radical innovation** (in the sense that it creates new economic spaces for small-holders and commercial orchard owners, as well as it brings up new product innovations). The LINSAs also include elements of **retro-innovation** by bringing back and sustaining traditional methods of production and traditional varieties. **Novelties** can be observed in setting up new orchards and developing small-scale processing facilities, new ways of direct selling, etc. **Niche** is exemplified by the strengthening and development of the market for local fruit. A **regime shift** can be illustrated by participation of certain key LINSAs actors and organizations in policy lobbying. LINSAs produce many **social innovations** – establishment of cooperatives, producer groups, collaboration with schools and state institutions, involvement of general public,

various linkages with consumers. **Cultural activities** (public events, festivals, etc.) are a part of social innovation.

Connections with the AKS: The LINSAs are well connected with **the formal AKIS** and some of the AKIS actors constitute a part of LINSAs. This is especially the case of two horticulture research institutes and a number of researchers who participate in producers groups and collaborate with growers. Different AKIS organisations have specific use-value and relevance for LINSAs: the research institutes (LSIFG, PHRC) richly provide basic knowledge on integrated fruit growing; the Association reliably provides information about the sector in the context of agricultural policies; Latvia University of Agriculture and Bulduri Horticultural College offers courses. Agricultural input providers offer advice which is also used by farmers. AKIS actors provide knowledge to LINSAs members in various forms: demonstrations, field days, seminars, individual consultations, handbooks, learning videos, websites, virtual databases, Q & A sections in the organisation's homepages etc. The main connecting mechanisms between AKIS organisations and LINSAs are applied research projects (INTERREG, Structural Funds projects, State Research Programmes, etc.) and individual consultations between the growers and researchers. The leading researchers in fruit sector act as knowledge brokers and feel personally committed to develop links with LINSAs. The **growers** on their part actively participate in field days organised by research institutes and turn for advice to trusted researchers on various issues.

Several **barriers** can be observed in connection between AKIS and LINSAs. The internet-based communication is felt somewhat problematic for the older generation farmers. English language skills were mentioned as opportunity and constraint. Deterioration of vocational education in fruit sector was felt a problem. Un-clarity about intellectual property rights and costs was mentioned as a barrier in access to information. Researchers and growers are sometimes guided by different knowledge agendas. Practical credibility and commercial usefulness of advice are of high priority for farmers whereas the researchers are often curious of scientific experimentation. Sometimes farmers feel that university researchers are hesitant to undertake research projects if the funds are not sufficient although; the farmers think that researchers could do projects for less money. Advisory service (the Latvian Rural Advisory and Training Centre) with few consultants in horticulture cannot meet all knowledge demands of growers; however it tries to respond to certain needs, for example training about cooperation.

3.3 Learning approaches, methods and tools used in LINSAs

Learning in the LINSAs unfolds in several interrelated domains: fruit-growing technologies, economic organisation, use of available state support (and engagement with policy-makers to negotiate it).

The information is not hoarded in closed networks, on the contrary, it is readily shared both by researchers and practitioners in various formal and informal ways.

Specific and locally coordinated learning happens in sub-networks, e.g. producers' groups and cooperatives which have specific economic and technological learning needs, while the learning in informal individual networks is more diffuse and mostly emerges from day-to-day interaction.

Fruit LINSAs are strong on **peer to peer learning** among farmers as well as inter-institutional learning and **collaboration between researchers and practitioners**. Boundary interaction between stakeholders is explicit and it enhances both innovation and role changes (researchers become consultants, farmers co-innovate with researchers, etc). Involvement of scientists is diverse and there is considerable trust between scientists and growers.

The learning is inclusive and takes multiple forms. Individual growers develop trust based learning networks with other growers and researchers. The most efficient forms of learning are experiential and interaction based: study visits, field days, demonstrations, on-site training, consultations with researchers, conferences and seminars. LINSAs also make use of professional literature and periodicals, websites, learning videos, web based training tools. Micro analysis of learning demonstrates frame alignment and creation of new technical, economic, organisational and social knowledge. Collaborative projects stimulate diverse knowledge flows.

Participation and reifications are found to be generally inclusive, with some structural factors (size, commercialization, generation) influencing the intensity of learning. The common repertoire is extensive, forming a basis for further negotiation of meanings and strengthening of trust. Cultural activities and public events (e.g. Apple day, Cherry day) appear as effective forms of learning and communication between the researchers, growers and consumers.

Knowledge flows survey conducted with a smaller subset of fruit-growing LINSAs (15 growers representing several cooperatives) allowed to identify the main sources of knowledge and forms of learning (see Appendix 1). The knowledge flows differ by subject of learning. **New ideas** and methods in horticulture are learnt from other farmers during field days, study tours, seminars organised by research institutes and through informal contacts. **Foreign experience** is an important source of new ideas. Learning about **technical issues** (production technologies, apple varieties, plant protection, etc.) occurs in interaction with colleagues (other farmers) and researchers. Farmers also use professional literature. For **production advice** the farmers turn to trusted peers or researchers. Knowledge about **primary processing** (storage, sorting, packaging, etc.) is acquired from other farmers, producers' organisations and cooperatives. When it comes to **processing and new product development** the farmers consult the researchers, food technologists, more experienced producers or learn by doing. **Marketing knowledge** is generated mainly through own experience, in consultations with other farmers, and through contacts with retailers and cooperatives. In terms of **policy learning** (agricultural policy issues, subsidies, etc.) the state institutes (Rural

Support Service, the Ministry of Agriculture), farmers organizations and professional consultants are the main counterparts.

Learning processes follow **different stages of development of the network**. In the beginning the network was more concerned with technical learning (varieties, cultivation techniques etc.). In the current stage in network development learning mostly concerns with economic issues of marketing, collective organisation of supply chain and communication with consumers.

Learning is often multipurpose and multi-issue activity as different learning needs might be satisfied during the same learning activities. Farmers especially value face-to face and experiential training events (field days, demonstrations, study tours) based on direct interaction between practitioners and researchers.

By the main driver and mode of learning knowledge flows in Fruit LINSAs can be classified:

- Colleagues – peer-to-peer learning – social learning,
- Farmers-researchers link – organisational, inter-institutional learning,
- Own experience – experiential, individual learning,
- Foreign experience – *translational* learning.

Learning and possible joint action for more sustainable practices in fruit growing is an outcome of gradual mutual accommodations of network members, both with regard to the meaning of issues of concern (issue framing) and the nature of relationships that develop through network interactions (relationship framing). 'Frame alignment' happens in face-to-face interaction (Goffman 1974) of social learning but it can take place also in more indirect forms of communication and self-interaction where participants' frames are either confirmed or somewhat modified by the experiences and relationships in the network.

3.4 Tasks, roles and emerging quality needs for the knowledge and skills of actors and institutions

The knowledge demand in fruit LINSAs exceeds the knowledge supply. Network members admitted in interviews: "We all are learning." The **emerging knowledge needs** are primarily related to the need for **institutionalised cooperation** to optimise competitiveness and ability to develop the links with retail chains. This poses questions of storage, sorting, quality standards, marketing and administration. Thus **marketing knowledge and skills** become crucial. The use of the state support measures for producers cooperatives wishing to develop joint infrastructures also poses the question of **management and project implementation skills**.

The acquisition of knowledge depends on the initiative of the interested agents and the existence of prior linkages. Most active producers groups (which sometimes include also researchers) seek new knowledge and experience through organising study visits and seminars; whereas committed researchers

and research institutes organise educational activities within the framework of applied research and demonstration projects. Learning is a high priority in the LINSa and there is a general awareness that all participants are in a similar (“learners”) position. Identification of learning needs is carried out both by formalised means (questionnaires in the homepages) and through on-going interaction of AKIS organisations and practitioners.

3.5 Support measures which are most effective and cost efficient

Public support is provided to individual farmers, cooperatives and producers’ groups, the AKIS institutions, and to the Fruit-Growers’ Association:

- **EU and nationally co-funded support programmes** include: “Support to modernization of farms”, “Support to new farmers”, “Support to perennial growing”, “Support to integrated growing” (started in 2006).
- **Producers’ cooperation** was promoted by recent support mechanisms to marketing cooperatives and producers’ groups (in 2012).
- An impetus for development of the fruit LINSa is provided by **EU cross-border and ERAF projects**, for example INTERREG (2010-2012).
- **ERAF funds**: In the recent years several policy measures have targeted the **collaboration between science and practice**, e.g. industry platforms (Latvia Food Technologies platform).
- **ERAF Funds**: These Funds have been also used to set up a National Research Centre for the use of agricultural resources and food.
- **National RD funding**: the Ministry of Education and Science in 2010 funded a State Research Programme for Sustainable Use of Local Resources and Innovation. Some fruit research institutes are taking part in this programme.
- **FP7 projects**: Pure Horticultural Research Centre has been involved in FP7 project, involving also SMEs (started in 2013).
- **EC funding** for School Fruit scheme has been an important funding opportunity for fruit growers and their cooperatives who supply schools with local fruit. The amount of funding for this programme in Latvia in 2013/2014 was 900 200 Euros.
- **Membership fees** of the Association of Fruit growers generate some minor income covering salary of office administrator, the website and annual conferences.
- **Smaller grants from the Ministry of Agriculture** are used by LINSa to cover specially commissioned researches on fruit growing sector issues.

Period of funding: Most of funding mentioned above has been allocated and received from 2002 / 2004 onwards with increase of availability of EU and national funds from 2009 onwards. For example EC funding for School Fruit scheme has increased from 700 thousand EUR in 2010/2011 to 900 200 Euros in 2013/2014.

The **intensity of public support** in fruit sector is calculated at the level of 40% to 75% of total farm investment. Subsidies for integrated growing cover 40% of expenditures of farm modernisation. Support provided to producers’ groups

cover 75% of investment for joint infrastructure development and equipment (e.g. for harvesting, storage, packing, transportation, etc.).

The **policy principles** for supporting integrated fruit-growing set out the targets to support the fruit-growers who use technologies that protect the environment; to promote modernization and improved logistics for fruit-growers; to promote the competitiveness of the sector; and promote the collaboration between research and practice.

The support programmes and instruments are becoming more **targeted**, for example, providing separate support measures to small-holders, and limiting the maximum funding available to the large farms; providing additional support to the new farmers.

Evaluation criteria used to evaluate support: The above mentioned support programmes have had their **internal evaluation procedures and reports**. These were commissioned by the funding agencies. For example the evaluation of RD programmes and measures have been implemented by the Institute of Agricultural Economics. Recent **policy evaluations** of Rural Development programmes included aspects of evaluation of effects of public support for the fruit sector. These evaluations allow assessing the **effectiveness of support** highlighting several directions of positive impact on LINSAs:

- **Producers' cooperation** was promoted by recent support mechanisms to marketing cooperatives and producers' groups (in 2012) which has triggered **organizational innovation** in LINSAs and development of new producers groups (until then, there were only 4 producers groups, an average of 10 growers cooperating).
- In the recent years several policy measures have targeted the **collaboration between science and practice**, e.g. industry platforms (Latvia Food Technologies platform), the National Research Centre for the use of agricultural resources and food; the State Research Programme for sustainable use of local resources and innovation.
- In assessing the commensurability of support, the LINSAs members pointed out that the **support has benefitted a broad range of fruit-growers** who have been able to plant orchards, increase harvests and fruit quality, modernise equipment and technologies, address topical learning needs, enter relationships with the retail sector, and reach the producers' group stage, all roughly within 10 years. Support has benefitted **the wider society** as well through availability of locally grown integrated fruit, **environmental and rural development effects**. However, different programs seem to be more accessible to medium-sized farms, as it requires co-funding.
- Overall, the policy measures seem to have been **beneficial** for the development of the sector, one may presume that this fortunate fit between the needs and the responses is at least in part achieved by intensive ongoing consultations and participation of LINSAs in the policy-making process.
- Evaluations suggest that the fruit LINSAs have benefitted especially from the:

- **EU cross-border and ERAF projects** that research institutes develop and implement in collaboration with farmers' organisations and foreign partners, for example, a project funded by INTERREG allowed the development of collaboration with Lithuanian partners and supported cross-border exchange of experience.
- **Sustainable food and public health programmes** (e.g. School Fruit) which have had a positive effect on LINSAs through proposing a new market channel for local fruit, and providing a stable outlet of produce. School Fruit programme also mobilised LINSAs for collective supplies, and direct links with consumers.

3.6 Evaluation criteria used for assessing the effectiveness and cost-efficiency of support measures that are exploited by LINSAs

These **evaluations of funding agencies** show that the policy instruments have been successful in promoting the establishment of new orchards, the increase of the proportion of local fruit sold through retail chains, and the increasing trust of consumers in Latvian-grown berries and fruit. The scope of commercial orchards has grown considerably, e.g. the apple orchards grew by 30% from 2004 to 2009.

Also within **SOLINSA project** we discussed effectiveness of support with LINSAs stakeholders and similar conclusions were reached about the kind of impact the support has generated.

Regarding **cost efficiency** the general observation is that **even a limited financial support** given to Fruit LINSAs has generated a considerable impact in terms of strengthening the LINSAs capacity and economic performance of its individual members.

Since much of support targeted integrated fruit growing it has generated **important sustainability outcomes** (e.g. increase of land area cultivated by integrated methods, promotion of sustainable food consumption, social effects on local employment).

On a more **negative** side, it is noted that the cost of production is still very high (owing to low cooperation and hence outdated storage facilities and other relevant logistical arrangements) and only the state support provides the possibility to obtain some profit. Now the policy measures are **increasingly targeting** the establishment of cooperatives, which is seen as a chance to improve the expenditure-to-profit ratio, and thus promote the further development of the sector.

The policy so far has been supportive but did not shield the producers excessively, so there has been no observable distortion in the development of the sector, which may be attributed to effective dialogue with policy-makers and on-going re-assessment of impact. The policy measures combined with LINSAs

activities have promoted an increased presence of local fruit and berries in retail outlets and increased public trust; even more growth is somewhat detained by still low level of cooperation (to optimise infrastructure, logistics and hence costs).

3.7 Operational tools that AKS actors could use to improve support for LINSAs and to enhance the capacity of involved actors, in order to foster successful LINSAs

Applied and participatory research projects: Such projects usually initiated by research institutes develop new technologies and production methods in cooperation with growers. They also propose a range of experiential training activities (field days, demonstrations, visits, seminars, etc.) that are found useful by farmers. Projects produce also user oriented learning tools (e.g. videos, manuals).

Trans-border cooperation: In fruit LINSAs trans-border cooperation projects (Interreg, Eureka) are notably efficient for stimulating learning and innovation. Such projects stimulate not only scientific cooperation, but also farmers to farmers and farmers to researchers cooperation. Trans-border projects typically foster exchange of new ideas and expose dimensions in food chain organisation that might be overlooked in national contexts (for example – the aspects of public image of the sector, its sustainability profile).

Experiential learning: Fruit LINSAs case suggests that farmers especially appreciate experiential and practice based forms of learning, such as field days, study tours, demonstrations, on-site training seminars. These learning activities stimulate also relationship framing, by immersing participants in different lived worlds and providing positive emotions in learning.

Web and ICT learning tools: In fruit LINSAs various web based and ICT tools of information and knowledge sharing have proven efficient: e.g. webpages of research institutes, Q&A sections in organisational websites, communication of information through email lists and SMS, web-based training courses, etc.

LINSAs facilitation: Some LINSAs may need facilitation in order to develop. This is especially the case in complex LINSAs (networks of networks, constellations of communities of practices, hybrid networks) with different stakeholders and interests. Our research identified several ideal-typical roles of network facilitators:

- **'Frame openers'** provide a communication space by embracing the interests of all major stakeholder groups especially in initial stages of innovation.; An 'opener' creates learning spaces so that different innovation actors are included (researchers, farmers, consumers, food companies, local administration). 'Openers' are usually in top positions in their organisations and sometimes close to political decision-makers.

- ‘**Frame alignment facilitators**’ provide broader strategic frames to promote the development of practice and the network. ‘Facilitators’ addresses long-term development needs. They pronounce a public mission of innovation and concern with public good as well.
- ‘**Peacemakers**’ provide safe and neutral spaces and frames in times of controversy. A role of ‘peacemaker’ becomes topical in times of controversy when she or he acts as conflict resolution facilitator, providing frames that would make a dialogue possible.

We found that these roles may be performed by the same person. Structurally those kinds of facilitators often belong to independent research or business organisations, capable of making decisions on their own. They are trusted researchers or practitioners who interact with a range of stakeholders and act in the interests of broader development. Often these persons were women.

Reflection: LINSAs need reflection on learning needs, opportunities, processes and outcomes. AKIS organisations can provide a non-partisan reflection among actors on the way issues are framed from different perspectives (individual, collective, societal, etc.) and how they are accorded in the network strategy. Effective methods of intervention would include those providing opportunities to express opinions in an egalitarian environment, promote active listening and validation of practices that other actors consider their achievement.

4 CONCLUSION

Over a decade of development the fruit LINSAs have developed as a network of networks or a constellation of practices with multifunctional objectives (production, marketing, research, advisory, policy making, education, environmental management), multiple directions of innovation (technical, social, economic), different learning streams (technological, economic, organisational, policy), and hybrid constitution (participants are organisations, individuals, groups; public and private partners). The LINSAs represent a dynamic balance of diversity and commonality.

There are three main nodes of interaction in the network around which knowledge is shared and learning happens: research institutes with their sub-networks of knowledge transmission to farmers; the Fruit-growers association; and smaller regionalised producers groups and cooperatives. There are also many smaller communities of learning based on proximity and informal knowledge sharing among producers.

The fruit LINSAs are especially strong on **peer to peer learning** among farmers and **collaboration between researchers and practitioners**. Involvement of researchers is diverse and there is considerable trust between scientists and growers. Quite dense learning ties between farmers and farmers and researchers have resulted in the expansion of various kinds of knowledge in the network: tacit and codified, experiential and research based.

The **knowledge links** can be said to fall into several categories: 1) producer-to-producer (including cooperatives), 2) producers-and-researchers, 3) individual producers' information exchange and business networks involving diverse stakeholders, 4) the cooperation maintained by major network actors (e.g. the Association, LSIFG), 5) Triple Helix-type collaboration between scientists, the Association, and policy-makers.

Although the **sets of competencies** as to some degree distinct (applied research, commercial fruit-growing, policy work, community maintenance, education, etc.), many forms of activities (most notably those supported by long-term projects) promote agents shifting between roles and developing new competencies.

Successful learning outcomes in the network manifest themselves in increased ability for collective action and more collaborative ways of dealing with differences. Success in learning exists along a continuum, where participants move towards more concerted frames and practices on certain kinds of issues, while retaining different frames in other cases.

Learning and joint action for more sustainable practices in fruit growing is an outcome of gradual mutual accommodations of network members, both with regard to the meaning of issues of concern (issue framing) and the nature of relationships that develop through network interactions (relationship framing). Borrowing from Benford and Snow (2000) we call this accommodation process 'frame alignment'. We argue that it happens in face-to-face interaction of social learning but it can take place also in more indirect forms of communication and self-interaction where participants' frames are either confirmed or somewhat modified by the experiences and relationships in the network.

Participation and interaction in LINSAs is related to structural traits of the network such as the level of economic equality among actors (in the fruit network 95% of farms are small, researchers are often part-time farmers) and the level of investment needed. More equality facilitates more participation, achievement of agreement and shared practices.

The greater alignment in LINSAs produces two broad kinds of collective action. The first kind is identical or similar individual actions carried out in concert and which correspond to agreed norms and standards in the network, for example the practitioners of integrated fruit-growing apply similar technologies in their orchards. The other kind is explicit collective actions, such as establishing a cooperative or engaging in organised policy lobbying. We argue that it is precisely the frame alignment that makes possible individual actions carried out in harmonious concert within networks.

The challenges faced by the network are related to the need for cooperation, establishing links with retail chains, acquisition of the best fruit varieties most suitable for Latvia's climate, appropriate use of chemicals in integrated production, and educating consumers on the benefits of locally produced integrated fruit.

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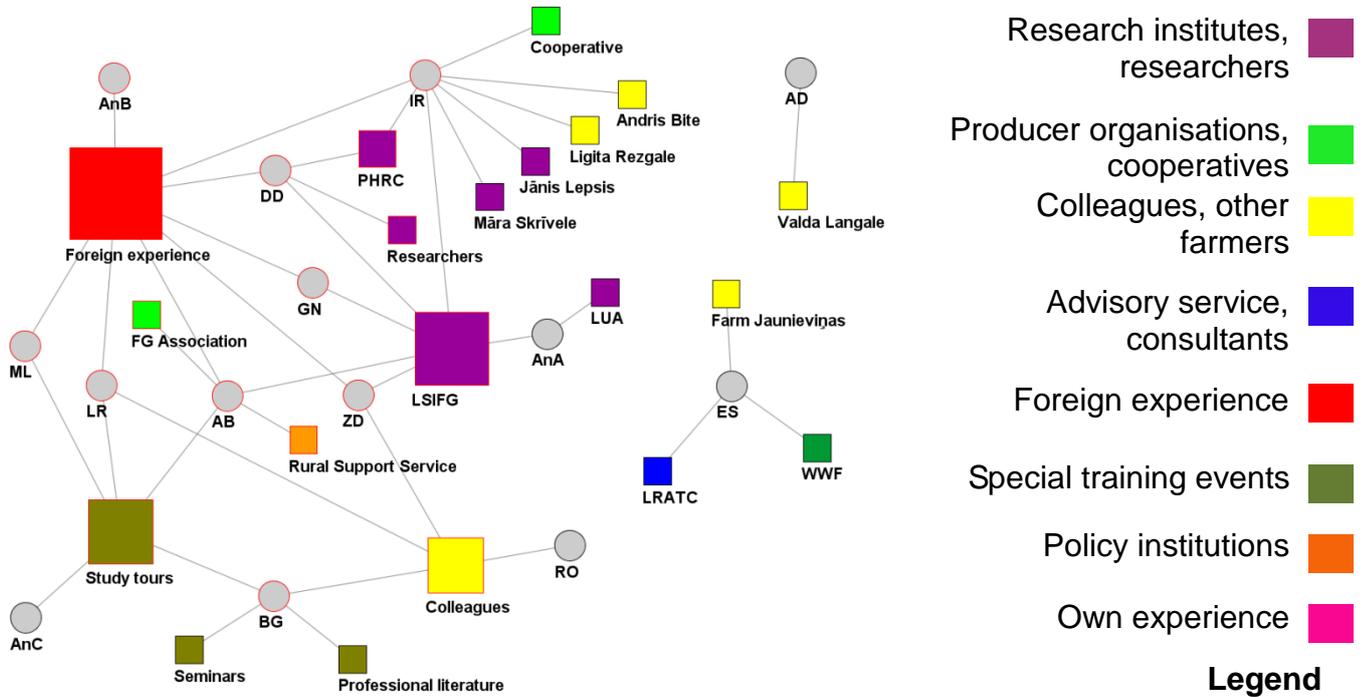
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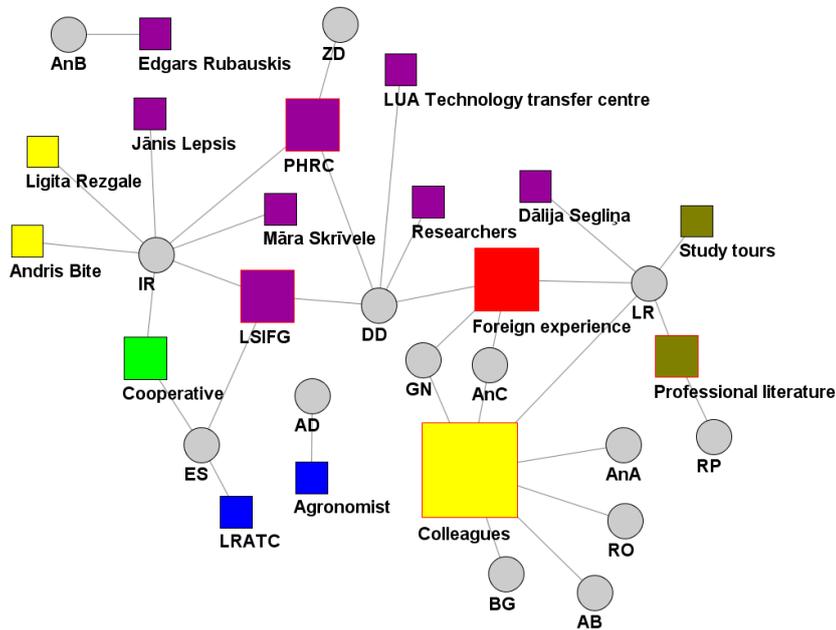
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APPENDICES

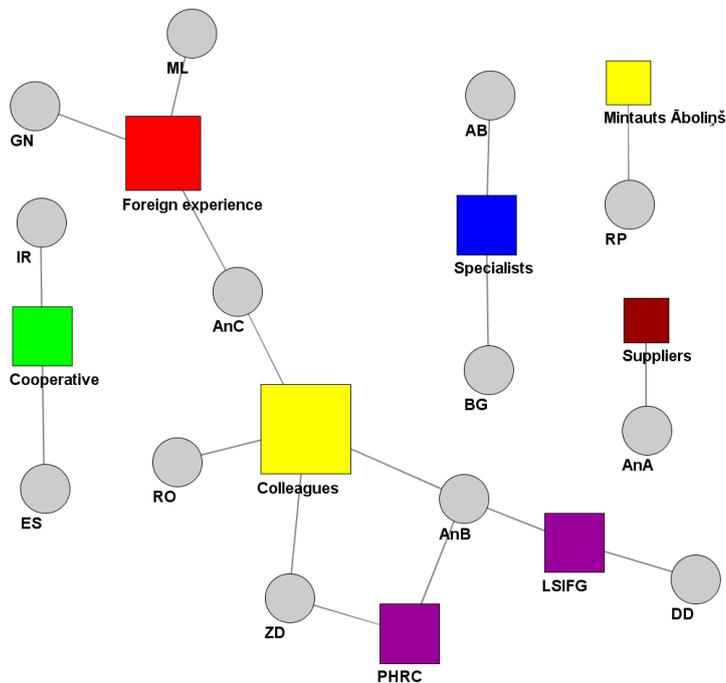
Appendix I: Knowledge flows in Fruit growing LINSAs



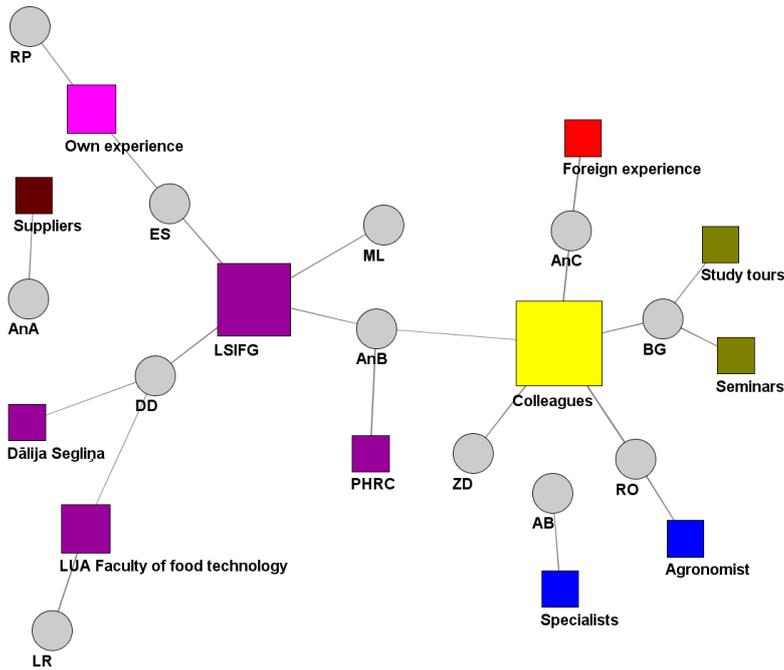
2. Figure Learning new ideas (From which people or organisations do you learn new ideas in fruit growing?)



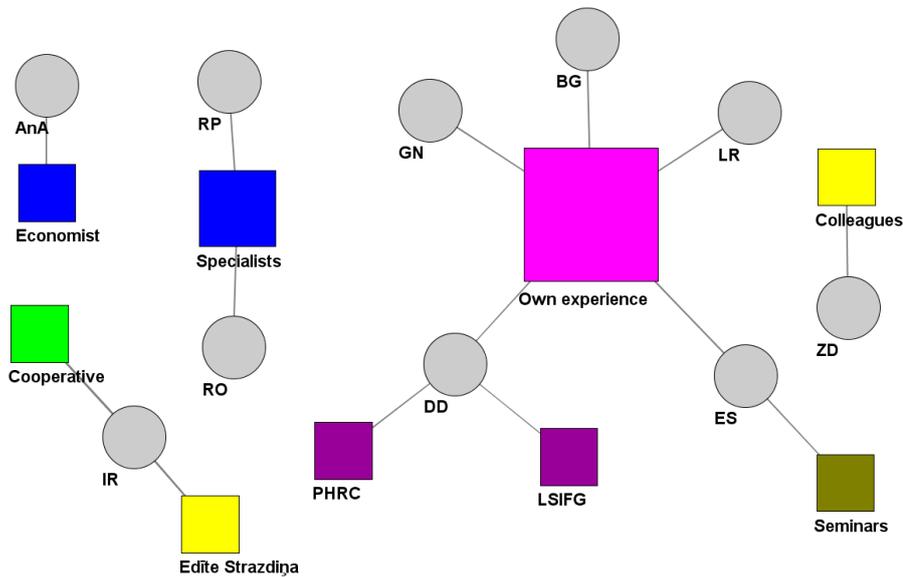
3. Figure Technical learning (Which people or organisations do you turn for advice regarding technical issues in fruit growing?)



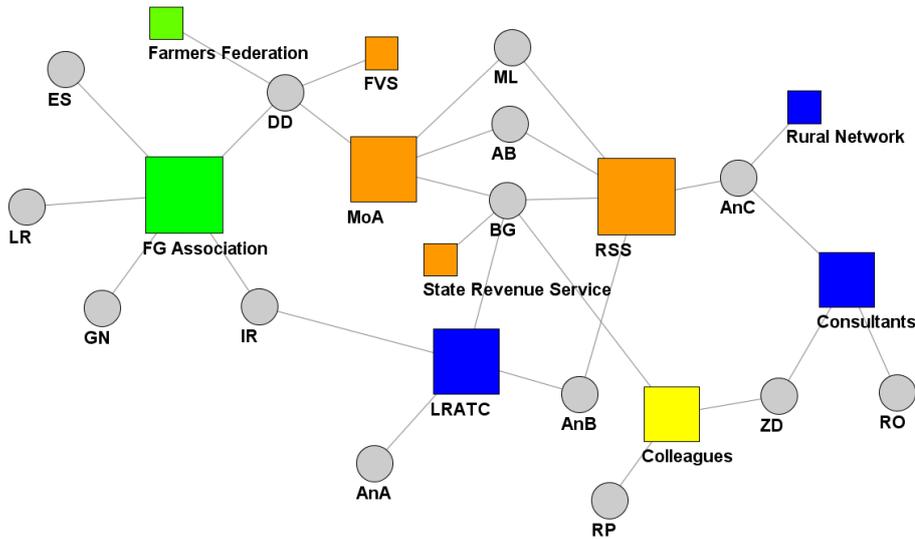
4. Figure Learning about primary processing (Which people or organisations do you turn for advice regarding issues of primary processing: storage, sorting, packaging?)



5. Figure Learning about processing (Which people or organisations do you turn for advice regarding processing?)



6. Figure Learning about marketing (Which people or organisations do you turn for advice regarding marketing issues?)



7. Figure Learning about policies (Which people or organisations do you turn for advice regarding agricultural policies, subsidies, etc?)

Appendix II: Latvian Fruit – Growing Network