

The potential of digital platforms to facilitate the diffusion of diversification strategies in agriculture

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Abstract: *The agricultural landscape of Switzerland is dominated by industrialized but struggling milk production. Producers are facing ever-falling prices, environmental changes and increasing requirements for state supports. Facing these challenges, some farmers have developed their own products for niche markets, adopted rare or ancient breeds or demonstrated the capacity to adopt income-generating innovations. The diversification of agricultural production on farms and within whole regional landscapes has further advantages than just income diversification. It offers adaptation and buffer capacity in case of economic crisis or environmental changes and it makes the agro-ecosystem more resistant to pests and diseases and distributes risks. However, the majority of farms still encounters barriers in changing crops and diversifying. Interviews with producers in this study revealed that the main challenges are the lack of technical information about rare crops and breeds, the need to identify adapted crops and equipment to the location and the personal motivations that require an entrepreneurial or risk-taker personality. Information technologies and particularly new tools in the area of social networking could play an important role in increasing access to information and connections between peers, even internationally, and deserve more attention in the transition to sustainable agriculture. Interviews with market actors revealed multiple potentials for niche products, but also the need for increased availability of market information to producers. Social media are also starting to be used for this purpose. This study thus looked into the potential of multi-stakeholder online platforms and the role of key actors for the diffusion of innovation and niche products in agriculture and identified current limitations where efforts could be put to increase support to diversifying producers.*

Keywords: *diversification, innovation, niches, multi-stakeholder platform,*

Introduction

The agricultural landscape of Switzerland is dominated by industrialized but struggling milk production. Producers are facing ever-falling prices, environmental changes and increasing requirements for state supports. The number of farms has been steadily decreasing in the last decades and the ones remaining seem to specialize on a few crops. As a result, the average size of farms is increasing. Figure 1 shows the situation of the Swiss agriculture. Almost three quarters of the agricultural land is used for pasture, thus mainly for milk and meat production. Furthermore, 40% of the arable land is also used to produce animal feed (feedgrain and silage maize). In the sector of cereal production, it is also relevant that wheat occupies 53% of the surface and in total 83% of cereals comprise only three species. In sum, one can also point out that the self-sufficiency ratio is especially high in beef and milk products sectors and particularly low in the fruits and vegetables categories. In this paper, “niche products” are all productions belonging to the minor parts of the chart (figure 1) and especially to the category “others”.

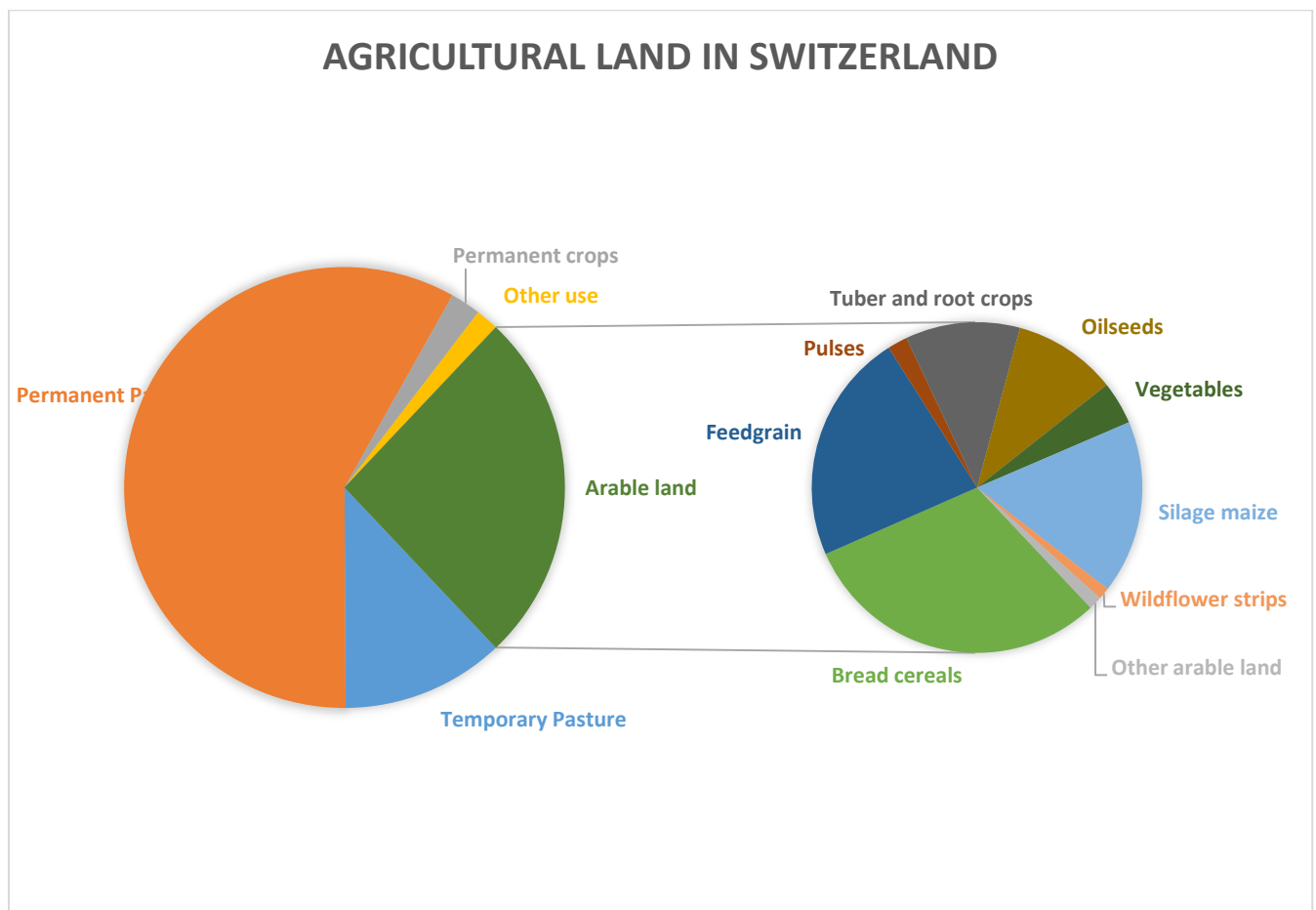


Figure 1. Use of agricultural land in Switzerland by proportions of crop types, with details for “arable land” (Data source: FOAG 2017).

When looking at the evolution of food diversity in Switzerland, which has had a relatively diverse diet since a long time, diversity has only increased by 3.7% over the past 50 years, which is the 5th lowest rate in the world (Kammlade & Khoury, 2017). Meanwhile, Shanon and Simpson’s index places Switzerland in the middle range (Kammlade & Khoury, 2017). This is in line with a global tendency of homogenisation of the global food supply between countries and loss of global crop diversity (Khoury et al., 2014). However, global comparable data on less prominent crops are scarce and would need improved monitoring. Still, preserving local breeds and diversity in the cultivated landscape seems ever more relevant for food security and adaptability to environmental challenges. Fraser (2006) emphasized the roles of low diversity in the cultivated landscape played in the cases of the Irish, Indian and Philippian famines in the 19th century and famines in Ethiopia in the 80s. Other factors like poverty are obviously playing an equally important role, especially as is shown in the Ethiopian case where only richer farmers could afford to plant a diversity of crop as a safety net against drought (Fraser, 2006).

Nowadays, the enabling environment surrounding farmers still plays a crucial role in allowing diversity and furthering diversifying or differentiating strategies; even in a rich country like Switzerland. Diversifying occurs when producers implement other crops or breeds in addition to their current production (horizontal diversification), when they implement a subsequent step of the product’s transformation on farm (vertical diversification) or when they implement other parallel activities on the farm like agro-tourism (lateral diversification) (Zander, 2008). Differentiation, on the other hand, is a marketing strategy that promotes the specific qualities of the product (e.g. organic) in order to increase the willingness to pay and generate a premium. Both strategies are important to increase and value diversity in the cultivated landscape and are seen as opposed to specialization and uniformisation. The latter is, however, cited as a consequence of the Common Agricultural Policy, in addition to societal

driving forces such as urbanization (Lefebvre et al., 2015). In Switzerland, the direct payments system has also been incentivising farmers to remain within traditional cultures and has been criticized for a lack of focus on innovations (Bardsley & Bardsley, 2014).

Facing these challenges, some farmers have developed their own products for niche markets, like adopted rare or ancient breeds or demonstrated the capacity to adopt income-generating innovations (e.g. something totally new like new recipes or processing) or services. The diversification of agricultural production on farms and within entire regional agricultural landscapes has more advantages than just income diversification. It offers adaptation and buffer capacity in case of economic crisis or environmental changes and it makes the agro-ecosystem more resistant to pests and diseases and spreads risks. The whole socio-ecological system around farms could thus become more resilient, if more farmers adopted more diverse and innovative production (Darnhofer, Bellon, Dedieu, & Milestad, 2010). At a larger scale, less dependency from state supports, less dairy surpluses, mitigated nitrogen surplus, stabilized prices and higher self-sufficiency ratio in some commodities could be long-term positive effects of farms' diversification. In addition, diverse landscapes contribute to the aesthetic and touristic attractiveness of regions.

However, the majority of farms still seems to encounter barriers in diversifying crops or differentiating because of risk adversity in general, technical obstacles, uncertain long-term state support, family traditions or market pressures. Ferjani et al. (2007) specifically studied the barriers to organic conversion among Swiss arable farms. They found that the fears towards weed control techniques, the heavy and expensive bureaucracy, and also the lack of knowledge in organic agriculture are the main factors to hinder conversion. They conclude by suggesting that farmers should be put in contact with and shown example of successful organic farmers, as they give more credits to peers and that would make the risk of conversion more acceptable. Long-term stable state support is equally important, but this paper will focus more on the first aspect of encouraging networks to facilitate diversification and innovation in agriculture.

A way to diffuse innovation is through localized networks of actors, such as some circumscribed in Ingram et al. (2015) as "Learning and Innovation Networks for Sustainable Agriculture (LINSAs)". LINSAs are "networks of producers, customers, experts, NGOs, SMEs, local administrations, as well as official researchers and extensionists, that are mutually engaged with common goals for sustainable agriculture and rural development - cooperating, sharing resources and co-producing new knowledge by creating conditions for communication" (Brunori et al., 2013, p. 4). These networks have been shown to foster adaptive changes ultimately leading to sustainability in agro-food systems (Ingram et al., 2015). The theory of the diffusion of innovations (Valente, 1996) shows that social network connections (to opinion leaders or bridging actors), exposure, and personal thresholds are decisive in adopting an innovation. The "conditions for communication" mentioned in the definition by Brunori et al. (2013) are nowadays greatly influenced by ICT. Particularly social networking could play an important role in increasing exposure and creating networks and deserves more attention in the transition to sustainable agriculture. This is why this paper focuses on the potential of multi-stakeholder platforms, and especially online communities, to support farms in adopting diversification strategies. Platforms are understood along this paper as digital spaces where diverse and non-discriminated actors can have access to information, exchanges with peers or experts and can use diverse tools offered through information technologies (blogs, videos, etc). Already in 1998, Röling wrote that "The interactive Internet might be the ultimate Multi- Stakeholder Platform" (Röling & Jiggins, 1998). Interaction through Internet might help to listen and connect, to expose stakeholders to others, and thus to support multi-stakeholder issues.

Goal of the paper

This paper aims to assess the potential of diversification strategies based on niche products in Swiss agriculture. The demand for niche products on the Swiss market is evaluated, based on market study and interviews. The significant challenges for the actors in the farming

system are located. A categorisation of diversification strategies is furthermore proposed with illustrative examples collected in Switzerland.

Additionally, this study looks into existing networks and platforms that bring actors in the farming sector together and analyses their potential to overcome the adoption and practice challenges for diversification. The needs of stakeholders are identified and recommendations elaborated in a transdisciplinary setting, in order to increase the impact of support from institutional and multi-stakeholder platforms.

Method

In addition to literature research, this study uses a transdisciplinary approach in accordance with Aeberhard & Rist (2009): "A transdisciplinary mode of knowledge co-production implies that problem solving strategies have to be based on a close interaction between scientists and other involved actors, whereby it overcomes the pitfalls of a one-dimensional and linear interconnection between science and society, which neglects to address concepts of complexity and plurality."

In a first step, desk research allowed to identify initiatives, networks and groups that are active in the promotion of diversification strategies to farmers. This desk research had the purpose to i) list recurrent example of niches and categorize possibilities of diversification that are relevant for Switzerland and ii) identify actors that can play a potential role in the adoption and diffusion of diversification strategies. The desk research was supplemented with active immersion in fairs, events and agricultural networks.

The second step constituted in telephone or face-to-face interviews with 24 key stakeholders identified previously that represented a variety of domains including innovative and diversified producers, market actors and institutions in the agricultural sector. These interviews allowed to identify i) the potential of niche products, ii) specific barriers for diversification and innovation in farm production, including the needs for support, technical information and linkages to overcome these barriers and finally to iii) study the potential of multi-stakeholder platforms to provide this support. The existing online platforms in central Europe, to which actors in Switzerland are likely to find access, were listed and grouped into categories according to their goal and target (e.g. marketing platform, LINSAs or others). In the results, only the ones corresponding to some kind of LINSAs and contributing to diversification are analysed in respect of potential success factors.

A third step consisted of a workshop where 33 other key persons could exchange and comment on the interviews' results and elaborate collaboratively on the multi-stakeholder platform's form, users, and content. In this way, the group of actors involved was further enlarged. The participants to the workshop and their stakeholder group as well as their primary language (FR for French and DE for German) are shown on figure 2. A large group of Swiss stakeholders from the different linguistic regions and from all sectors (research, extension, farming, etc) were invited and approximately a fifth accepted to participate in the workshop, resulting in a balance of all actors (see figure 2). Their specific potential roles in future platforms are elaborated in the discussion.

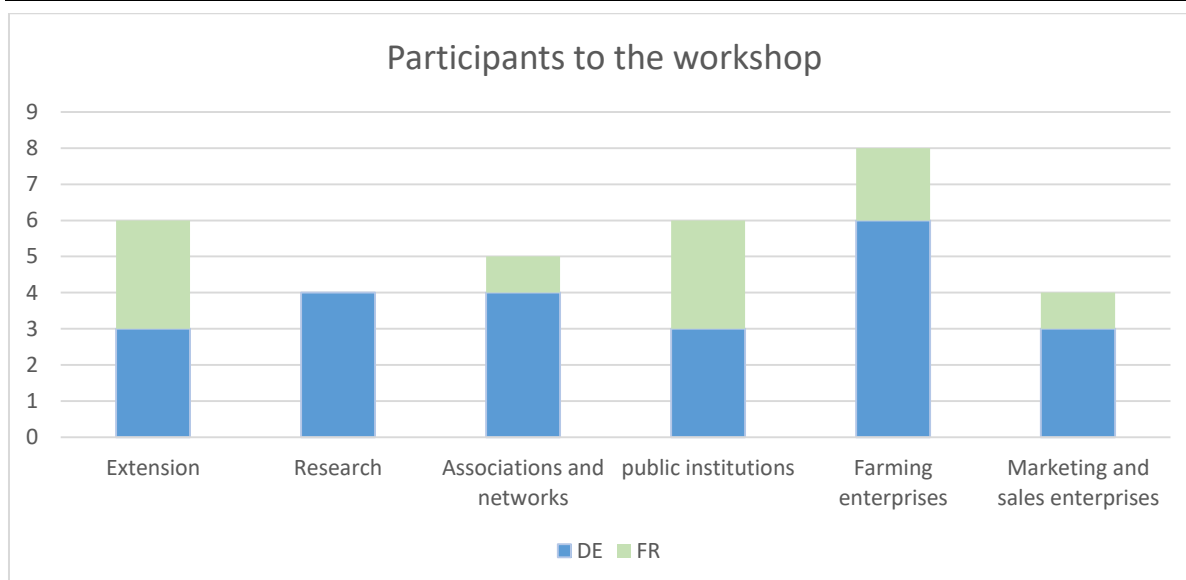


Figure 2. The type of participants in the stakeholder workshop

The results of these three steps are reported below following the points listed and recommendations for the development of exchange platforms are summarized in the discussion.

Results

Potential of alternative and innovative agricultural products in Switzerland

Examples of alternative farming strategies (e.g. not mainstream practices belonging to niche markets), and innovative farming include agricultural production as well as leisure and services on farms. Categorising agricultural practices has followed, in literature, the functions of Agriculture, or 6 F's: Food, feed, fiber, fuel, fun and flowers (Aerts, 2012) and the categorisation of the diversification strategies (vertical, horizontal or lateral).

Examples collected during interviews were divided in our own seven different diversification categories: animal products, crop products, transformation of agricultural raw materials, value-adding on farm's products and competencies, environmental services, social services and leisure activities on farms. Table 1 lists the examples gathered during the field study in 2017 in Switzerland in the seven categories. It can be noted that some producers also combine examples together and thus apply multiple strategies at the same time, for example the production of sheep's milk and transformation on farm into sheep milk's ice cream or yoghurts.

During the 20 preliminary interviews, experts in the Swiss food market agreed that there is a major trend towards regional and local products in the food sector, even though the interviewees work in different sub-sectors (meat, milk, herbs...). Sustainably produced, natural products, regional specialties and products in the higher price segment (like truffle mushrooms) are in demand and trendy on Swiss food markets.

Within niche products, three main trends exist: the first is the interest for new super foods – products from elsewhere that are introduced into Swiss eating practices like insects, kale, quinoa, or shrimps that could be produced in Switzerland instead of being imported. Consumers interested in such food favour local foods in order to reduce environmental impacts associated with long transports. The second trend is the renewed interest for old varieties from Switzerland or elsewhere, such as cereals containing less gluten or old tomato varieties rich in vitamins. Third, consumers are in high demand for traditionally and regionally processed farm products like jams, cheeses, and breads. Also, new ideas from a few

individual farmers building their own markets for products such as farm beer, hops-derived products or sheep milk ice creams are promising.

Table 1. Categories, strategies and examples for farms' diversification in Switzerland

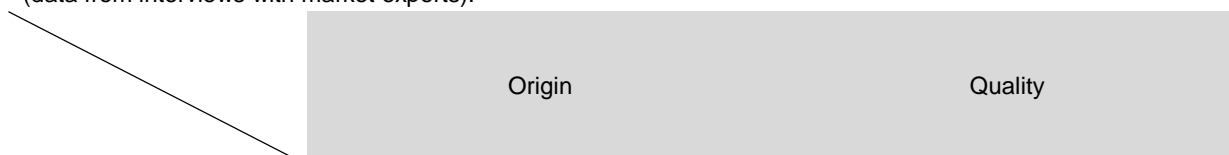
Diversification category	Diversification strategy	examples
Animal products	Horizontal diversification	Meat & milk products from rare breeds or sheep, goats, buffalos... Seafood, shrimps (saltwater aquaculture) and freshwater fish

		Lamas, sheep etc, for wool and other uses
		Edible insects
Crop products	Horizontal diversification	Berries and other rare fruits
		Gourmet mushrooms, truffle
		Herbs, spices and blossoms, medicinal plants
		Tropical plants (Quinoa)
		Algae's
		Oil plants, legumes
Transformation of agricultural raw materials	Vertical diversification	Beer brewing and alternative hop products
		Silkworm breeding
		Meat & milk specialities, smoked & dried meat, cheese, ice cream
		Preparations and packing in liquid forms: Sauces, soups, drinks, jams, liquors
Adding value on farm's products and competencies	Vertical diversification	Farm shop, direct sales, community supported agriculture, e-sales
		Renting or use of the farm's equipment on others' farms
		Consultancy for other farms (management, finances, logistics, export, etc)
		Valorisation of other edible parts of crops (roots, stems, flowers) or valorisation as bio-energy or feed
Environmental services	Lateral diversification	Production of renewable energy on farm (biogas, solar, wind)
		Care of forests and agro-forestry, sales of wood
		Care of wetlands
		Composting of green waste, management and sales of soil
Social services	Lateral diversification	Care farming, green care (old or disabled people working on farm)
		Hosting or leisure for marginal groups on farm (refugees, troubled youth, disabled people)
		Education on farm, (pre-) kindergarden / school
		Educational trails, courses and seminars on farm
On-farm Leisure activities	Lateral diversification	Gastronomy on farm, farm-to-tanle
		Agrotourism, farm holidays,
		Events / exhibitions / concerts / theatre
		Excursions and trekking with animals (goats, cows, dunkeys) or horse-carts

Table 2 summarizes the characteristics of agricultural products and goods with high potential on the food market according to the field study interviews in Switzerland (Schwab, 2017). The key words in table 2 primarily refer to the main aspects of the demanded product characteristics according to interviews in the retail sector. Locally produced food can be seen as mega trend in the Swiss food industry lately and can also be observed in the big Swiss retailers. The regional origin of a product is an important selling point. For example, in the cheese sector the trend goes “back to the roots”, and high quality, transparency and traceability are characteristics customers are looking for.

The trend towards natural ingredients and sustainably produced goods cannot only be observed in the food sector, but also in the area of cosmetic products, drinks and textiles. The used raw materials should be as natural as possible and are therefore organically produced, wherever possible. In the Swiss cosmetic industry there is also a potential for exotic plants produced in Switzerland, for example Aronia berries or figs. The cosmetic industry struggles to find enough Swiss producers which fulfil their requirements.

Table 2. Chances and potential of diversified products and niches for farmers and for consumers in Switzerland (data from interviews with market experts).



Production	Regional origin and locally produced food as trust-mark and strong marketing argument	Natural ingredients, high quality natural raw materials
	Direct sales, farmers markets Partnerships with communities and public procurement	Diverse ecological functions
Consumption	Transparency, traceability, authentic specialities, seasonality “Back to the roots” / homemade style products Local rarities	Innovation and exotic trend, Superfood Organic label
	“Swissness” and regional Labels Trademark „made in Switzerland“	Variety and unique character, taste Diversity, Exceptional ingredients Culinary delights and experience

The gastronomy sector is also in high demand for specialty or rare products. Customers want to enjoy a culinary experience with local rarities and exceptional ingredients. The ingredients and dishes can be exotic and innovative, as guests are looking for variety and unique character of the food. Also, demand for transparency about the origins of the raw materials and ingredients is increasing. The potential for niche products, both as traditional products or novelties from Swiss agriculture, is therefore high in the gastronomy sector.

One expert interviewed expressed however that some exotic products, like edible insects, will have difficulties to become established, as most people in Switzerland tend to be sceptical by nature. The food market predicts that edible insects will contribute to the culinary variety of our country in the future, but maybe one more generation is needed for a broad acceptance for this kind of food. Also, there is a lack of information about insect breeding and there is as of yet few research and knowledge in the product development.

Labels in general are not seen as very important for Swiss products according to the market interviewees, especially not for niche products. Transparency and a high quality and continuity are more important. The big retailers agree that the only label that has a significant impact on the customers is the organic label. For most consumers, though, it is sufficient that the product (for example meat) is made in Switzerland and the second criterion for the buyer lies on the price. The added value of a label is often not visible for the average customer as there are so many labels in the area of Swiss food products.

A niche product also takes into account the cultural aspects of a region and its terroir, which makes it hard to copy from other regions or countries. For this reason, niche products are suitable for export, as the Swiss trademark signals a high quality and safe product for customers all over the world. Product differentiation can thus provide an added value and is a source for strong selling argument. An example would be the marketing of fruit juices of fruits derived specifically from traditional orchards.

Challenges and difficulties for the development of niche products in Switzerland

Challenges in production

The previous section showed the promising results on the market side, which tend to show a huge potential for niche products.

In this part, results from the interviews of innovative farmers are shown. Nine innovative producers of niche products in Switzerland, as well as two experts for agro-tourism and green care, were interviewed in the field study. During the field work, promising niches and innovations were found in all categories of table 1 and contributed to list the examples.

The following result section is about challenges for innovative producers regarding the technical and personal requirements, requirements for the location, cultivation, expenditure and marketing as well as about challenges for providing services linked to agriculture.

Niche products are often less-known varieties or species which are more challenging to produce, as the knowledge and the experiences are not readily available. Sometimes, necessary resources for production, such as seeds, are not available in the demanded quality and quantity. It is often the case that special varieties of vegetables are not suited for mechanisation or industrialisation, which makes it harder to produce at low costs. Low levels of mechanisation is, however, highly compatible with organic production.

The most basic requirement is to have or to find a suitable location to produce the niche product or to realise the project. The suitability of a location has not only to be taken into consideration due to habitat preferences of crops or life stock, the right spot is also a key element in realising projects in the field of agricultural tourism and gastronomy as well as direct marketing in a farm shop. Topography and climatic factors are the limiting factors for which crops can be produced on a farm. Nevertheless, demand on the market has to be clarified first before choosing a new product or project, which would suit the location. Sometimes, investments in infrastructure like processing rooms or machinery are necessary. The recruitment of extra staff can be challenging but can also be an additional contribution of innovative projects to multi-generational work on the farm.

From a financial point of view, it could be worth considering a cooperation with other producers in the sector of niche products and innovative projects; for example the common usage of rooms and machinery as well as joint marketing of the end products.

Concerning the adoption of agricultural niche products, a re-thinking of the entire farm and marketing has often had to take place. For the interviewed farmers, it was difficult and time consuming to gain sufficient knowledge about the production of niche products. Often, there is only limited advice and the lack of experience is challenging. Producers have to actively gather information, oftentimes even in foreign countries. An existing broad network of peers is of advantage, but an outgoing personality is then necessary. Especially at the beginning of an innovative project, various specific personality traits and skills are an advantage for being successful during the project implementation.

The following personality traits and soft skills were identified from the interviews with farmers:

- High motivation, enduring willpower, strong conviction
- Communication and networking skills
- Professionalism, seeking expert advice in order to correctly assess the risks
- Fascination, passion and enthusiasm for the product / the project
- Flexibility, pioneering spirit
- Spirit of sacrifice and a high risk tolerance (especially at the beginning)
- Good self-assessment, awareness of own strengths and weaknesses

Diversification also often means a higher workload and demands longer presence. This is especially the case in the sector of agricultural tourism and gastronomy and those related to social services. The extra workload often requires hiring some additional (seasonal) workers.

Producing unknown varieties and species is also risky as producers lack knowledge and experience, which increases the production costs and often requires to deal with high market uncertainty. Depending on the product, the initial investments can be high, posing a challenge. A detailed and professional business plan with a holistic planning is required for the new operation branch of the farm. Many legal requirements and standards have to be understood and met when starting with an innovative product or a new operation brand. All these technical, financial and planning steps at the beginning of a new activity on farm constitute tangible obstacles. Risks and investment requirements tend to be lower in horizontal diversification and the highest in lateral innovations.

During interviews, farmers working in the field of social services, for example on farms with care for people with physical or mental handicap, revealed that even though these services

are challenging, they are above all a source of personal enrichment. The motivation to offer such care places can be to attempt to support those people on their way towards the first labour market or simply towards more independency. From the farmers offering such services it demands a high level of openness to integrate a stranger on the farm and into their own family. An important aspect for families offering social services is thus the ability to maintain their privacy and to keep sufficient space for themselves, which can be achieved through good organisation and clear rules. The places most suitable for care farming are specialised producers, where a lot of manual labour is required, for example herb production, where horizontal and lateral innovations are optimally combined. Producers, however, have to stay flexible concerning the workload the patients can handle, as it is often hard to predict the efficiency and reliability of their work. They should never be calculated as fulltime workers.

Marketing challenges

During the preliminary interviews done with experts of the food market, experts agreed on several reasons why the development of niche products can be challenging. Product marketing is a challenge for niches and the choice of the best sales channel is a key point when entering the niche market. A traditional product made according to the original recipe sets the consumers-expectations for that product. If a product is industrialised or even just scaled-up, chances are high that producers do not stick to the original recipes any more. This may be due to higher costs, the introduction of mechanisation instead of manual processing, or to save time. Thus, a fine balance has to be found between available time and skill resources, profitability and quality of the relevant quantity.

Consumer trends are also playing a role when talking about niche products. Market experts explained that this is for example the case with meat delicacies like lamb's loin or roast goose (Schwab, 2017). These delicacies sell well seasonally, though it is not a product that consumers are looking for throughout the whole year. Limiting factors are the price and the usage of only certain parts of the animal. Sometimes the customers are demanding a specific product of a certain animal species, whereas other parts of the animals are largely discarded (valid also from some plants, of which other parts could also be eaten). For example, the demand of goat milk is increasing in Switzerland, despite the fact that goat meat is not demanded much. Such problems need collaboration throughout the entire value-chain in order to sustainably produce products which are demanded by customers, generate added value and do not contribute to the issue of food waste. Recently, a trend called "nose-to-tail" can be spotted also in Switzerland. However, what may be nice to enjoy in a restaurant is not automatically what customers are willing and able to do at home. The preparation of a rare piece of meat, for example innards, often demands a lot of time and knowledge. Therefore, convenience products will continue to dominate the meat sector. Investments in the product development would be of great value to support specialities, in addition to offering support in the bridging of these producers with outlets that are in demand of such specialities and can add value to them, like specialty restaurants.

Existing digital platforms and tools

Since the beginning of online social media, more and more online communities and networking platforms are emerging. These developments can also be observed in the agricultural sectors and offers new opportunities. In order to gain an overview on the existing platforms that could contribute to diversification and support of farmers, we present here the results of an online research of examples focusing on Switzerland and neighbouring countries where relevant. The examples found are targeting different user groups and can be roughly divided into two groups: Marketing platforms and platforms for information and knowledge transfer. The latter are either interested in promoting sustainability in agriculture (e.g. LINSAs), others want to promote innovation and exchange without direct links to sustainability, and then there are communities of interest, which primarily promote exchanges within a specific area of interest and sector. The marketing platforms serve either to link producers and the gastronomy sector or producers and end-consumers. One example

of an initiative trying to bridge the gap between specialty producers and local restaurants is the platform *Diversitas Forum*. It is using mainstream social media (facebook) allows farmers to market specialty products directly to gastronomy (*Diversitas.ch*).

In the category of LINSAs, the distinction must be understood in an approximative way as LINSAs corresponding to this exact concept almost do not exist. In the end, nine online platforms and five offline networks were analysed in more details to extract success factors and potentials of such platforms. The platforms are analysed following five factors for success as proposed by Martini et al. (2011, p. 397):

1. “Consistent look & feel of all components: same user interface, colour schemes etc. even if several components of the platform are built using different software tools.
2. Easy navigation: includes a site map and avoiding broken links and dead ends. Rough navigation like “back to start page” must be possible from each component.
3. Download: easy and direct access to released documents and software using static and human-readable links to not only allow for browser but also for automated scripts and download managers to handle retrieving of files.
4. Search: full text and keyword directed search for content on platform web pages and in documents.
5. Categorisation and tagging of content: to make it more easily accessible, allow for support in navigation and searching and simplify querying. The expected outcome are better matching results.”

In addition, it was evaluated which of the most common functionalities and contents are offered by the platforms. Table 3 below summarizes the results for four platforms that are the closest to a LINSAs that would foster diversity. Green means it fulfils the success factors of Martini et al. (2011) (or offers the functionality, respectively) and red not, with factor 4 and 5 evaluated together. The evaluation shows quite clearly that three of the four examples (all except OK-NET arable) fulfil most of the criteria and offer most of the important functionalities and could be taken into consideration as models of platforms for the diffusion of innovations.

Table 3: Short evaluation of online platforms for diversification (white ticks mean the criteria are fulfilled and a cross means they are either absent or not easily usable).

		Bio-aktuell.ch	OK-NET arable	OSAÉ	Mein Hof – mein Weg
Functions	Contacts	√	×	√	√
	Technical information	√	√	√	×
	Network events	√	×	√	√
	News	√	×	√	√
	Case studies	×	×	√	√
	Forums/ exchanges	×	√	×	√
	Marketing place	√	×	×	×
Success factors	Consistent look and feel	√	×	√	√
	Easy navigation	√	×	√	√
	Downloads	√	×	×	×
	Search function and categorisation	√	√	√	√

From this online analysis of existing platforms, it can be concluded that platforms for the networking between actors in the agricultural sector are a global theme, but that platforms which seek exchange with the explicit goal of diversification do not really exist yet and the existing platforms can only serve as best-practice examples.

Discussion: Potential of multi-stakeholder platforms to support diversification initiatives

The market experts interviewed and consumers trends showed a real interest for niche products. However there are significant barriers for producers to diversify their production. The interviews revealed farmers' needs for more accessible extension services and support concerning know-how, financial aspects, information about current laws and regulations, workload and marketing support regarding their specific product and/or services. A stakeholder workshop also revealed the wishes of actors to have access to better networking structures for contacts with peers and experts within and across sectors. The analysis of existing platforms showed that they at the moment do not fulfil the actual needs for bridging the gaps in information and networking. Some online platforms respond to both needs for information and contacts but they are based abroad and miss Swiss specificities to truly fulfil this role and this is why we explored the potential of creating a new platform in a transdisciplinary way. The use of online platforms by farmers is a central element towards multi-stakeholder collaborations and was the focus of this paper it does not exclude offline complementary networks and events (Kapma & Wielinga, 2009). Most examples of exchange for the diffusion of niches and innovations happen within communities of practice or groups of interest. These platforms can be differentiated between LINSAs (as some examples analysed before) or marketing platforms. Farmers' associations typically group innovative farmers in communities of interest grouped for specific crops or breeds. These

associations are present online but organize most exchange offline and need a critical mass to operate. Some emerging LINSAs, on the contrary, are more present online and include the provision of information via articles or fact sheets and exchanges via forums or individual advertisements (For example OSAE) .

Given the low presence of the above platforms at the moment, most innovative exchanges take place within the category of marketing and sales communities. There are community-supported agriculture and vegetable baskets and also relatively new initiatives that combine e-commerce with an offline farmers' market (marktschwaermer.ch). One example of a mixed marketing and LINSAs platform is the community organised around the NGO and label "ProSpecieRara", where producers can learn about rare breeds, order seeds and post advertisement for exchanging rare farm animals (prospecierara.ch). To find information about marketing and market tendencies was also a great need of producers and it seems that combining marketing aspects, information and exchanges between peers would be the needed combination of services for such online platforms.

In this section, the optimal roles that stakeholders could play for the implementation of successful online platforms are discussed, but also challenges and barriers they face. We focus on the four stakeholder-groups of i) science and extension ii) communities of practice, iii) technology and iv) policy, which are explored and illustrated in the current situation with a few examples of existing platforms. The roles of these four entities are summarized in figure 3.

The role of actors from research and extension is crucial in providing the technical and agronomic information concerning location, climatic and physiological requirements for crops and animals as well as for transformation of raw products. This information is largely already existing, but access is decentralized and for specific products or processes difficult to access. The interviewed farmer's new preferred sources of information are Google, Wikipedia and online forums. The science community could thus highly benefit from online multi-stakeholder platforms for diffusing knowledge, but also to evaluate research needs in so far un-explored areas. Partnerships between farmers and researchers or extension agents exist but mostly work on a bilateral, rather off-line, basis. For an illustration of the Swiss agricultural knowledge-transfer system, see Buess et al. (2011).

Policy actors are thus far rather absent from existing platforms, although supporting some field-specific innovation projects. The future agricultural policy is, however, intended to increase support for innovations and other actors' needs would be that the state provides better access to new technologies and knowledge developed by research through state extension services.

Communities of practice are the only ones so far that have been using new ICT tools to overcome challenges for the diffusion of diversification strategies in Switzerland. This answers their need for connection between peers. Other barriers, like the lack of technical information or financial support, would also benefit from a more active integration of research and policy actors into exchange platforms. The role of research and science is precisely to test new crops, for example, and thereafter to provide the information. Online platforms are tools to diffuse information at low costs, in the best case in open access, and represent a facilitation of the link between science and practice. The role of extension services is to make the best use of this link, with support of technology. The last role belongs thus to Technology actors, who are responsible to provide accessible and intuitive tools, developed in collaboration with communities of practice.

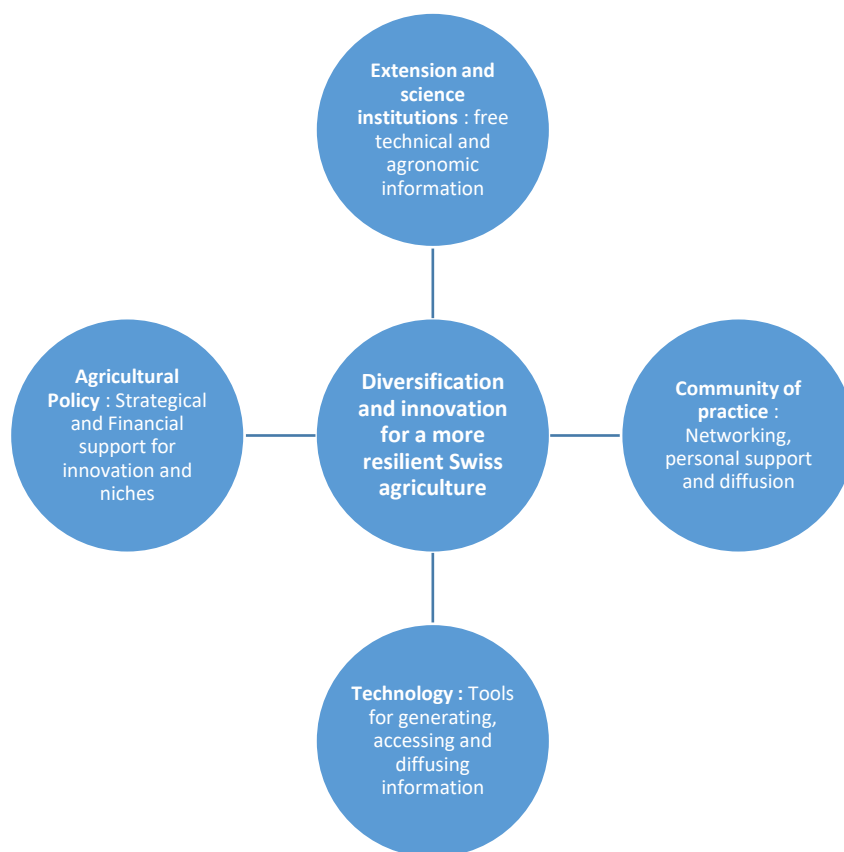


Figure 3. The role and potential of stakeholder groups into the diffusion of diversification strategies

Conclusion

This paper concludes that niche production and diversification strategies in the field of Swiss agriculture have a high potential for sustainability and resilience and that digital platforms may facilitate the way to reach this goal. The existing platforms in Switzerland and other countries do not specifically address this goal yet and we would argue for their improvements. In Switzerland and other countries where they do not yet exist, we would encourage the development of new platforms that integrate multiple stakeholders, allowing for a participative process from the stage of conception and pay attention to acknowledged success factors. Such digital platforms could be a solution to identified current challenges for farmers that seek to diversify: better networking along the value chain and between innovative farmers, access to market and technical information as well as advice on risk management and marketing. This type of platforms should integrate content from multiple sources (crops information, marketing or juridical tips, etc) and a multi-stakeholder process in their development, which represents an enormous challenge.

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