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Social integration mechanisms to strengthen absorptive capacity in agricultural advisory service organisations

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ABSTRACT

Purpose: To explore the structures and processes within agricultural advisory organisations that may enhance absorptive capacity (AC) and determine how organisations develop their AC.

Design/methodology/approach: A qualitative explorative case study of advisory services in Norway, which are structured as farmer cooperatives. Interviews, document analysis, and internet information are applied.

Findings: Strong social mechanisms are needed to realise the potential AC in an organisation. Advisory organisations with incorporated research and development (R&D) can translate findings from both their own research projects and external sources, which increases their absorptive capacity and boosts service innovation. Further, systematic emphasis on continuous learning strengthens AC, as do networking and internal communications.

Practical implications: By improving the incorporation of R&D, continuous learning and networking, advisory service organisations can benefit from the Agricultural Knowledge and Innovation System (AKIS). Ultimately farmers can receive more updated and relevant services for their farms.

Theoretical implications: Incorporation of R&D, continuous learning and networking are significant social integration mechanisms that can improve a firm's AC.

Originality/value: Previous studies on AC have shown that it is important for innovation. This paper sheds additional light on how AC can be improved.

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1. Introduction

Advisory service organisations (ASOs) play a crucial role in providing farmers with advice on new technologies and innovations and thereby enhance the sector's ability to meet major societal challenges (Klerkx and Leeuwis 2008; Knierim et al. 2017). Therefore, how organisations structure and develop themselves to strengthen their contribution is important.

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Knowledge is stored within individuals, created through interactions among people and normally embedded in organisations. This interaction occurs both within organisations and between associates and their environment as a part of the Agricultural Knowledge and Innovation System (AKIS). No organisation innovates in isolation, and the ability to recognise and exploit relevant external information has been emphasised in studies focusing on how advisory services generate and incorporate new knowledge (Klerkx and Proctor 2013; Labarthe and Laurent 2013a). To exploit information and knowledge from, e.g. research institutions, a firm needs relevant experience in research activity and the use of scientific knowledge (Bastesen 2015). Such experience enables a mutual communicative platform between the organisations and external actors. A common language enables knowledge sharing within the professional community and communication between advisors and research institutions (Klerkx and Proctor 2013). However, it is not yet thoroughly understood which activities and structures within ASOs enable recognition and utilisation of external information, specifically research-based knowledge.

The purpose of this research is to increase knowledge on how agricultural ASOs strengthen absorptive capacity (AC), a concept that was introduced by Cohen and Levinthal (1990) in the field of learning and innovation. Later the concept was incorporated in various aspects in the field of knowledge creation and transfer, while the Cohen and Levinthal approach remained the most dominant according to Zahra and George (2002). We follow the definition given by Cohen and Levinthal (1990, 128) as they regard absorptive capacity as ‘the ability of a firm to recognise the value of new, external information, assimilate it, and apply it to commercial ends’. AC is critical to the innovative capabilities of a firm (Tsai 2001; Yönkül and Ünlü 2022). The concepts of capability and capacity may be considered synonymous, as seen when Cohen and Levinthal collectively label capabilities to constitute a capacity. However, this can be disputed. Capacity can also be regarded as the potential of a system, while capability is more concerned with how this potential is exploited. We follow the strategy of Cohen and Levinthal.

Similarly, Greve and Salaff (2001) argue that a firm’s ability to innovate depends on high levels of AC together with strong access to social capital through social relations with external actors. Interacting with research and educational institutions is associated first and foremost with firms that have analytical capabilities, but also with firms that have highly educated employees, large companies and those that are integrated into clusters (Asheim 2007).

Innovation and AC are interlinked. Thus, a company’s capability to innovate depends on, inter alia, its ability to recognise the value of new, external information, assimilate it and apply it practically, often commercially. Ultimately, this will shape their competitive advantage in the market (Gluch, Gustafsson, and Thuvander 2009; Cohen and Levinthal 1990; Gellynck et al. 2015; Micheels and Nolan 2016). Innovation capacity is built from a mix of various resources and capabilities, including absorptive capabilities (Boly et al. 2014). ‘Capabilities constitute capacity’, as Turner et al. (2017, 505) state. As AC is also based on capabilities, we discuss some of these in this research. For variation we apply the terms *firm*, *company* and *organisation* synonymously, and by that we mean the organisational aspects of firms and companies.

Many studies of AC have applied quantitative methods and measure R&D intensity, technology, patents, etc. However, qualitative studies explore how this is done in practice,

how it is organised and the social processes (Vasconcelos et al. 2019). Hence, there is a need to know more about how AC is operationalised and what strategies are applied.

Enhancing AC involves both internal and external organisational perspectives (Lewin, Massini, and Peeters 2011). Empirical studies have shown that qualified human capital and high R&D efforts increase a firm's capability to maintain collaborations with universities, technology centres and other firms (Muscio 2007). Further, a diversified advisory service system with heterogeneous functions has better learning capabilities because advisors may have access to different knowledge from various sources (Klerkx and Proctor 2013). Service organisations' back-office activities are important in developing and validating knowledge applied in the front-office, i.e. in services for farmers (Labarthe and Laurent 2013a, 2013b). The impact of AC is made visible when it is turned into innovation. However, how this is done by learning and various strategies has not yet been fully answered. Hence, there is a need for more qualitative studies that explore the 'how' questions and processes this involves (Sancho-Zamora et al. 2022; Mokhlis et al. 2020).

In this study, we emphasise the development of new services in the agricultural advisory sectors, i.e. service innovation, and how this takes place in organisations. Networking, relations to R&D, and emphasis on learning are crucial elements in stimulating the development of AC, and we elaborate on this in the conceptual framework. The ASOs are part of the AKIS (EU SCAR 2015). This study provides new insight into AKIS perspectives by exploring how ASOs interact with other actors in the system and assimilate external information and knowledge for their own benefit. From this, we add new elements to AKIS to understand it more dynamically and comprehensively than the often structural and formal perspective. The concept of AKIS is undergoing transformation due to some criticisms and new contributions (Klerkx 2020; Sutherland et al. (under review)).

There are some published papers on agriculture and AC, but to the best of our knowledge, there is no previous research that explores how ASOs build AC. This is an empirical paper on the management of AC and adaption to stimulate the strengthening of AC.

Our research question is as follows:

How are social networks, incorporated R&D and learning practices within advisory service organisations applied to build absorptive capacity?

We present an analytical approach based on a review of the existing research and use this for a discussion of the findings from a qualitative case study, which was carried out at four agricultural advisory organisations in Norway.

2. Theory and previous research

As firms face rivalry, demand for innovation and time-to-market pressures, AC has become imperative for business success (Lane, Koka, and Pathak 2006). Likewise, it is relevant for innovation in agriculture (Fahim and Baharun 2016; Micheels and Nolan 2016; Gellynck et al. 2015). It is critical to achieve innovative capability, and sources outside the firm, e.g. networks of other firms, are often important for innovation (Fahim and Baharun 2016; Micheels and Nolan 2016; Gellynck et al. 2015).

Zahra and George (2002) designed a model where acquisition, assimilation, transformation and exploitation are linked as basic factors that build AC. This seminal

work, which developed the approach to AC, has become one of the most cited works in the field. *Acquisition* refers to a firm's capability to identify and acquire critical knowledge from external sources, which includes the ability to recognise external information. *Assimilation* indicates a company's routines and processes for analysing, interpreting and understanding the obtained information. *Transformation* denotes a firm's capability to customise and internalise the acquired and assimilated knowledge in the existing operation routines. *Exploitation* is the application and implementation of the acquired knowledge that is assimilated and transformed. This is the organisation's capability to build new or adapt existing competencies by incorporating the latest knowledge into operational routines. The emphasis is on building routines and structures for acquisition, assimilation, transformation and exploitation that allow a firm to utilise new information, which is a fundament for building and maintaining a competitive advantage (Zahra and George 2002).

Access to external knowledge sources is a key antecedent for AC, and experience with former information searching will influence the locus of knowledge search, as firms are more prone to look for information where they have had past successes (Zahra and George 2002; Zou, Ertug, and George 2018). This logic is also referred to as a *natural trajectory* to explain technology development (Nelson and Winter 1982).

AC has both an individual and an organisational aspect. It is not simply the sum of its members' absorptive capacities; rather, it depends 'on the links across a mosaic of individual capabilities' (Cohen and Levinthal 1990, 133). A firm's AC is formed from an overlap between individual members' knowledge structures and the transfer of knowledge across and within organisational subunits (Roberts et al. 2012). To promote this transfer of knowledge across subunits and through cross-functional project teams may, therefore, increase an organisations' absorptive capacity. Such activities are often referred to as *social integration mechanisms*. This notion embraces the sharing of knowledge among the members of the organisation and indicates how the flow of ideas and knowledge can be facilitated formally and informally. Such mechanisms are basic in all relationships (Zahra and George 2002; Zou, Ertug, and George 2018) and may embrace several aspects. According to Zahra and George, 'social integration contributes to knowledge assimilation, occurring either informally (e.g. social networks) or formally (e.g. use of coordinators)' (Zahra and George 2002, 194). The next step is to review what research indicates as relevant social integration mechanisms.

An organisation's capability in networking influences AC (Tepic et al. 2012; Greve and Salaff 2001). Internal and external networks are needed to share knowledge. Networking capability is important both to trigger the need for new knowledge and to acquire it. Thus, there is a positive relation between sharing knowledge that strengthens AC and innovation success (Ben Arfi et al. 2019; Alegre, Sengupta, and Lapidra 2013). Contact with stakeholders, for example, may be an activation trigger that encourages or compels a firm to intensify its efforts to seek external knowledge.

There are several sources of knowledge for firms, for example, research and development (R&D) activities, external knowledge (i.e. customers and suppliers) and spillovers from competitors. Investment and activity in R&D (e.g. through establishing a R&D department) is one way to increase the firm's absorptive capacity. Relevant experience with R&D activities may be sufficient to create a mutual communicative platform for research-based knowledge (Bastesen 2015) and can be achieved by employing former

researchers to the staff. However, how research activities are organised may vary from an internal R&D department to systematic interaction with external research, for example, in R&D projects. Hence, we deem this *incorporated R&D competence*, a resource available for the organisation. In the context of advisory service, these R&D activities are often seen as back-office activities, defined as ‘technology monitoring, accumulating technical references (building and using databases, etc.) and even the production of original knowledge (through experimentation and R&D)’ (Labarthe and Laurent 2013a, 21). Internal communication is important to the sharing of a common understanding of the knowledge (Steinmo and Rasmussen 2018). A common platform is needed where participants can share and develop a common language and codes for the information.

Another element is learning, which involves both organisational and individual properties. Organisational routines contribute to a company’s development (Nelson and Winter 1982). Its ability to generate new knowledge is based on the existing stock of accumulated knowledge and the method of generating new knowledge. Routines to search for and implement research-based knowledge are important, i.e. routines for acquisition. Organisational learning involves the ability to break established routines, produce new knowledge and establish new routines.

To understand how to strengthen learning we use the dichotomy of individual and organisational learning (Cohen and Levinthal 1990). Organisational learning assumes collective structures and cultures that create shared mental models. An example of this is the extraction of experiences from actions through systematic evaluations (Amin and Cohendet 2004). This concerns how the back-office is continuously updated and the efficacy of communication between the back-office and front-office, i.e. to learn what works and what does not.

At the individual level, learning depends on what people already know; new information connects to existing knowledge so that people can interpret and put this data into an existing frame of reference (Weick 1979, 1995). While an organisation can absorb knowledge from the outside (which relates to the first aspect, networking), it will do so only if its knowledge repositories and individual members are receptive to that information based on existing knowledge. By investing in internal research programmes, they are better able to appropriate new technology from other firms into their products or processes (Cohen and Levinthal 1990), which also relates to incorporated R&D.

3. Analytical approach and working hypotheses

The literature indicates that *networking, incorporated R&D competence and a practice of continuous learning* are three important social integration mechanisms that influence AC. Our analytical approach based on these three elements of social integration mechanisms is presented in Figure 1. This list of elements is not exhaustive; our review demonstrates that there are multiple issues influencing AC in the ASOs. However, we apply working hypotheses to indicate coherence. A working hypothesis is ‘a hypothesis or a statement of expectation that is tested in action’ (Casula, Rangarajan, and Shields 2021, 1709). The test implies an exploration of how real cases may be interpreted in light of the hypothesis and not a traditional formal hypothesis testing that rejects or fails to reject. The working hypothesis provides a bridging function between the

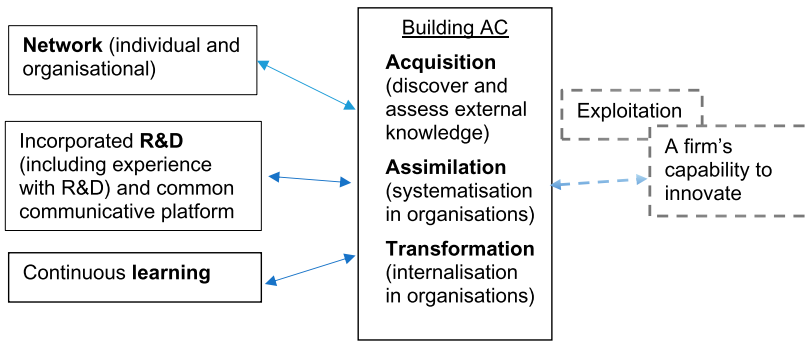


Figure 1. Our analytical approach to study social integration mechanisms for developing absorptive capacity (AC). Dotted lines illustrate aspects that are not included in our study.

theory and data, and the value can be measured in the degree to which it can enlighten the research question. If possible, the theory can also be strengthened or adjusted by this approach, but this is not the main purpose.

We formulate three working hypotheses on social integration mechanism based on the review: (1) Active and widespread external networks, both individual and at the organisational level including routines for searching information from external sources, will strengthen AC; (2) Dedicated and incorporated resources and access to R&D will strengthen AC; and (3) Established and systematic routines for continuous learning will strengthen AC. These elements primarily influence the capabilities to discover and assess external knowledge, to acquire external knowledge and systematise and assimilate it in the firm, resulting in increased AC. In the following, we present our method and findings in a case study of ASO. Compared with the definition and the model of building AC (Cohen and Levinthal 1990; Zahra and George 2002), we concentrate on the first stages of building AC rather than the exploitation aspect of creating commercial business for ASO.

4. Methods

This study is an example of deductive exploratory research (Casula, Rangarajan, and Shields 2021). Our theoretical basis is the concept of absorptive capacity and the three social integration mechanisms appearing from the previous review. This constitutes the working hypotheses that we explore empirically to answer the research question. By describing situations or cases in a qualitative form, we may find indications of support to our working hypotheses. This can be a basis for further research, either qualitative to deeper explore the issue or quantitative to test traditional formulated hypothesis. Others have argued that a working hypothesis is an acceptable starting point for further research (Taylor 2022).

To carry out this deductive exploratory research we apply pragmatism when choosing methods. Pragmatism does not, ‘... require a particular method or methods mix and does not exclude others. It does not expect to find unvarying causal links or truths but aims to interrogate a particular question, theory, or phenomenon with the most appropriate research method’ (Feilzer 2010, 13).

To conduct this explorative study we apply qualitative methods within the frame of four cases. Four of the most significant ASOs in Norway are included as cases. According to Yin (2014), this design is the most appropriate for a multiple embedded case study. It is not a comparative case study nor a sample of cases but a replication of cases to strengthen the exploration of the working hypotheses.

This explorative case study is based on a total of 22 interviews, document analysis, and internet information from the agricultural business cooperatives of Tine, Nortura, and Felleskjøpet (FKA) and the advisory services cooperative, Norwegian Agricultural Extension Service (NAES). It is a mixed-method where we apply interviews both at the holistic organisational level and with individual advisors operating at the front-office level, i.e. embedded (Yin 2014), together with the other sources of qualitative data. Five advisors and middle-level managers from the advisory service departments in the four cooperatives were interviewed by phone in 2015. The interviews were open but structured and related to the kind of services they offered and the interviewees' experiences with these services. The conversations further involved how they evaluated their experience, internal routines for learning and increasing competence, new services, challenges and their strategies. Additionally, in 2016 we performed face-to-face interviews with five dairy advisors from the Tine dairy cooperative, four advisors on beef production with suckler cows from the Nortura meat cooperative, four advisors from FKA, and four advisors from NAES, for a total of seventeen interviews. Although we asked interviewees about different aspects of agriculture, the focus of this study was on how advisors kept up-to-date on new information in their field. The records and notes were transcribed and analysed with the software NVivo. We also examined advisory service brochures and webpages describing the services offered.

5. Results

5.1. *The Norwegian context and the four cases*

The Norwegian AKIS has transformed from a governmental-driven strategy with an emphasis on farming and public goods into a commercialised business focusing on farmers. This transition to a more pluralistic system has led to an increasingly private role where the four farmers own private agricultural cooperatives. Tine, Nortura, Felleskjøpet Agri (FKA), and Norwegian Agricultural Extension Service (NAES) represent the main advisory organisations for farmers in Norway today. These organisations beyond NAES, include both upstream and downstream industries that offer dedicated staff for advisory services linked with selling input or buying output. These represent what Klerkx and Jansen (2010) term, 'embedded private actors', i.e. their services are coupled with selling input or buying output. NAES is a non-embedded advisory organisation, which specialises in agronomy. In addition, there are independent private consultants in accounting, banking, ICT, and so forth (Klerkx et al. 2017). Increased demands for sustainable agriculture and adaptation to climate challenges have led to an increased need for innovation at the farm level and farmers' need for advice. This is a rather new situation and advisory organisations face a challenge in adapting to such a transition, which demands an adjustment of their organisational structure, culture and activities to meet farmers' needs for innovation (Kvam and Stræte 2018).

Thus, advisory organisations need to reassess their capabilities, practice and skills as they respond to new demands (Eastwood, Klerkx, and Nettle 2017).

Data from these cases are summarised in Table 1. There are many similarities, but there are also differences related to how the R&D is organised and advisory services are funded and provided. As their missions are different and their position in the value chain varies, they also have diverse positions for the development of AC and innovation. Tine and Nortura are in the value chain and buy products from farmers and offer services to improve the products and strengthen the farmers' position. FKA is also in the value chain, but the company is partly a buyer (grain) and partly a supplier for farming needs. NAES is not in the value chain but has a mission to support farmers with independent advice.

Table 1. Advisory services in the four cooperatives, 2017.

Provider of advisory service	Tine	Nortura	FKA	NAES
All organisations are farmer cooperatives	Dairy (embedded advice). National cooperative	Meat and egg (embedded advice). National cooperative	Input supply and buy grain from farmers (embedded advice). National cooperative	Specialised advisory service (independent). 11 regional cooperatives and one national
Farmer members	10,586	18,314	44,000	29,011
Number of employees	5418	5329	1758	329
Number of advisory service staff (consultants/sellers)	281 (TINE Advisory Service – separate department)	150 (membership services and advisory services)	267 (Concentrate and plant: 101; Machines: 65; In-house: 101)	Except for administrative staff, all are providing advisory services
Number of research staff (relevant for advisory service, i.e. not product development for consumer market)	17 as a part of the department	No research on advisory service in the cooperative, but in Animalia, a joint company doing service and R&D for the whole meat business sector (65 employees)	Felleskjøpet Fôrutvikling is a subsidiary of FK and has 14 employees in product development, testing feed and growth	2 persons with 50% positions in research institute
Type of advice	Dairy farm management, animal feeding, animal health, milk quality, economy, buildings, strategy	Meat production, feeding, animal health, economy, buildings, management	Advice directed toward different production and supplier equipment to production of fertiliser, pesticides, machinery, concentrate etc.	Plant production, soil, organic, economy, strategy, buildings, machinery, landscape
Advisory methods used	One-on-one, experience groups, meetings for members, packages of advisory services for specific issues, website	One-on-one, meetings for members, introducing packages, website	One-on-one, meetings, day-courses on specific topics, experience groups, website, product catalogue	One-on-one, field show, groups, packages of advisory services on specific issues
Specific advisory service shown in this study	Key advisory service for dairy farmers	Advisory service for beef suckler cows	Advisory service on concentrate, mentoring, young farmers	Advisory service on dynamic strategy and on vegetables
Total number of interviews	6	5	6	5

We have identified network-included information searching, incorporated R&D and learning as three relevant factors to develop AC (Figure 1). In the following, we present the importance of these three social mechanisms in the four cases.

5.2. Findings: networks and search for external information

In the four cases, we have identified three kinds of external networks for advisors and ASOs. First, for the advisors to develop both internal and external personal networks is largely considered an *individual responsibility* and effort. The organisations may risk a lower input of knowledge for acquisition. However, some examples exist where the organisation facilitates the development of a network. In some cases, the advisors are co-located with other ASOs. Some advisors mention this positively, as it lowers the threshold to cooperate on activities for farmers and ask for help. Other advisors often do not cooperate even if they are co-located. This kind of network is not primarily oriented at obtaining access to new research-based knowledge but can indirectly contribute, as it opens new channels and sources of information and knowledge. Thus, the value of a large network and weak ties for access to external information is well known (Granovetter 1973).

Second, regional departments or units of ASOs *systematically involve external networks*. For example, in mid-Norway, a regional programme, Green Research, has been formed to stimulate research based on actual needs identified by the agricultural sector in the region. Green Research has established programmes, such as regular workshops and annual seminars for advisory services, research and farmers. They identify challenges that need additional research. This also involves being updated on present research results and activities, and improved acquisition follows.

Third, we found several examples of *organisational structured networking* at the national level. For example, NAES staffs two coordinators who communicate between advisory services and research. The coordinators are employed both in the ASO and in a research institute (NIBIO). The purpose is to coordinate communication and activities between the two organisations on specific topics. As one advisor said, ‘The coordinators shall keep themselves updated and share knowledge with all the advisors in the organisation and units.’ This structural phenomenon is also considered a subsystem (Klerkx et al. 2017). However, NAES also has seven other employed coordinators on specific topics including the search for new research results. There are in total nine forums at the national level, to which the coordinators are linked. The coordinators are responsible for updating and spreading new information within the organisation.

There are, of course, other updated sources of research-based knowledge, such as articles in journals, magazines, newspapers, and the internet. Furthermore, many subscribe to newsletters from research institutes. We also observed that natural trajectories are followed in the search for new knowledge. For example, in the case of FKA, the organisation is very oriented towards sales, and less on advising. The organisation searches for information that can improve the effect of the feed they are selling, rather than strengthening other aspects through advisory services for farmers. Some advisors observe this and educate themselves in coaching to be better advisors as they also regard advising to be important.

5.3. Findings: ASOs and incorporated R&D

How the relation to research is organised and whether common communicative platforms exist are significant in recognising new information and being able to incorporate it into the organisation.

In the case of FKA, a subsidiary company with 14 researchers exists, FK Fôrutvikling (FKF), which is owned by FKA and another farmer cooperative in the same sector. FKF runs their own research projects and collaborates with Norwegian and international research projects on feed and nutrition (e.g. sustainable feed development) for farm animals and pets. The staff at the research unit review current journals and keep themselves updated, disseminating relevant information.

All feed advisors at FKA regularly join internal meetings with FKF to remain updated on results from their own research and international research. Furthermore, advisors and researchers meet every other week to discuss how to improve the feed concentrate. In general, the advisors are satisfied with this system, and we see this as a facilitation that improves the assimilation of new knowledge and makes the process of transmission easier. One of the advisors, who hold a Ph.D. and a former position at FKF, also reviews journal articles to keep updated.

The cooperative Nortura collaborates on research with the research institute NIBIO and the Norwegian University of Life Sciences (NMBU). Nortura conveys most producer-relevant research through a research company, Animalia, which serves the entire meat sector. Animalia is owned by Nortura and other companies in the slaughter industry. Nortura acquires relevant experience with R&D as a partner in research projects and through their participation in reference groups, boards, etc. The research is carried out by Animalia or research institutes. At the advisory level, there is no *regular* direct contact between advisors and researchers, only ad hoc meetings when there are special needs. Nortura has managers for each professional unit of advisors, specific to each type of farm animal. These managers serve as a link between the advisors and the researchers.

Tine is an example of integrated research in the advisory service department. There is a specific research department with seventeen combined researchers and developers, seven of whom have a Ph.D. They all conduct research, review other ongoing research, and provide advisors with knowledge, ICT-tools and input on services that can improve dairy farming.

The R&D department at the national level in the Tine Advisory Service has the responsibility and resources to search for new information and transform and implement this into practice in their cooperative. Our study indicates that informants in cooperatives other than Tine, regard Tine as an innovative and powerful ASO that rapidly implements new services throughout the organisation. This indicates a rather top-down approach regarding innovation and implementation. However, the internal communication has similarities with other cooperatives in terms of regular internal meetings with advisors. This communication is important to transfer farmers' situations and needs to the R&D unit and to gain feedback from the implementation of innovations (i.e. new advisory services).

NAES has no specific research department, nor do they employ researchers. However, they have a close relationship with researchers, especially NIBIO, and share two joint coordinators of crop production and grass production. These coordinators are

knowledge brokers between research and advisory services, and as such, they systematically extend the network for NAES.

Another way of obtaining experience with research and development is to host field experiments. Research institutes, especially NIBIO, outsource some of their practical fieldwork to NAES. This is a paid service where the advisors carry out the work on fields owned by their farm members. This networking increases the interest in research among both advisors and farmers, and one side effect may be a better dissemination of more research results.

5.4. Findings: routines for continuous learning in ASOs

In the case of FKA, advisors are encouraged to increase their competence based on their own initiative, e.g. enrolling in courses arranged by other professionals. For new employees, there is a mandatory sales course. However, according to the advisors, this course is not relevant, because they act more as a facilitator or coach for farmers than a salesperson.

FKA advisors emphasise that they primarily learn from farmers and colleagues and use this knowledge to develop their own advisory skills. For example, in the specific service, Young Farmer, advisors act as mentors, but there is no training to become a mentor. It is for the advisors themselves to gain knowledge about how to perform the service. Further, the advisors do not have training in how to communicate as an advisor. Evaluation of the services is poor, and there is no formalised learning from the advisors' work experiences. This does not appear to stimulate the transmission of recognised information.

However, an informal exchange of experience takes place both in formal organised meetings and ad hoc meetings. As one advisor from FKA said:

And we have meetings all the time. We the professional consultants, and the chief executives and so on; we are on the spot. We have a telephone meeting once a month and some physical gatherings each year you can say. So, we learn a lot there.

However, to be aware of new information is not sufficient in learning how to assimilate and transform it into the organisation. At Nortura, new advisors must attend internal education and training. While pedagogic competence is not a required qualification for employment, there is a separate module on advisory competence in the introductory programme. The fundamentals of the training are internal knowledge sharing and competence transfer from senior advisors to the novices. There is also an annual meeting involving knowledge sharing for all advisors.

In general, there seems to be little or no contact between advisors and education and research communities in Nortura. One advisor expressed his dissatisfaction. When asked if he felt that the advisors were sufficiently updated professionally, he replied:

There could have been much better plans internally in Nortura when it comes to training our advisors towards being professional. We must improve. But a course in which we are presented with news and become more educated, I feel is simply missing.

Not all advisors were satisfied with the development of their competences. This may indicate a need to improve assimilation and transmission to improve the AC. Regarding training, an option exists, but it is questioned how useful it is. As one advisor said:

We have been informed that we must acquire new knowledge where we can. We must get it where it is, and those who feel the need for it, must pick it up when it's available. We follow courses and such that are arranged here and there. But in an everyday life where we are few and it's busy, you're not thinking of this or taking the time to do it. Rarely anyway. (Advisor Nortura)

In the dairy cooperative Tine, new employees receive internal training locally and are required to attend start-up programmes in coaching advisory styles and sales programmes at the national level. Further, at the national level, various courses are offered, most often of short duration, typically for one or two days. As one Tine advisor said:

It's different, we have plenty of courses and programs from Tine centrally. But that is most often a lot of online meetings and updates through them. It is such drips of knowledge that go on a regular basis. It's an hour phone conference.

Another advisor confirmed that there were regular short meetings with professional input on phone conferences, most often once a month. The organisation creates groups of advisors on the same topic to facilitate an exchange of experiences and learning. The participants interact with each other as needed and share experiences and ask questions immediately when necessary. This group communication is advisor driven and not controlled by the management.

In addition, networking at the national level is extremely important for knowledge sharing. Typically, advisors within a subject gather physically at least two days a year to share experiences and update themselves professionally. At these gatherings, professionals from other organisations are often invited to give presentations. Advisors from all regions also gather regularly on Skype to share experiences and update each other in addition to regional gatherings.

In NAES, the recruitment of new advisors has become more challenging in recent years, especially in the field of plant science. Therefore, there is an increasing need for internal education and training of new staff members. Newly employed advisors must complete an education programme called The NAES School. Each employee is assigned a mentor recruited from the senior advisors. These organisational system efforts most probably improve the assimilation and transformation of information.

Internal networking and having a common platform for sharing are also important for advisors to obtain access to the latest news, and organisations organise this systematically. One advisor from Nortura responded to a question as to whether they systematically exchange experiences:

Yes, we really do it during the meeting we have every other month. Plus, in the month we do not meet physically, we have a regular Skype meeting. And at these meetings, we discuss and inform each other about different topics. We do a round-table where we talk to each other and tell a little about what we are doing and give each other input. So, we really have that [exchange of experiences].

TINE also has arenas where experience is systematically shared. For example, in one region economy advisors meet digitally about every second month, in addition to physical meetings once or twice a year. This group is managed by the advisors themselves (agenda, chairing, presentations, discussions). The organisation and managers allow the advisors to spend work hours on this activity, as it is an efficient way to become

updated and distribute knowledge and experience throughout the organisation as well as externally. NAES advisors participate as partners or reference persons in research projects in cooperation with research institutions. They also arrange field trips and excursions and join conferences on relevant expert subjects. Once a year the advisors gather during 'course week' (in practice three-days), an extensive programme covering a wide range of topics, both generic and specific.

Learning is not only about education and training. Advisors report that they receive a lot of input, especially practical knowledge, from farmers, and they spread this knowledge to other farmers. In turn, farmers, especially the young ones, challenge the advisors. For example, an advisor in FKA in eastern Norway was contacted by a farmer about the production of rye. He wondered whether this could be used for pig fodder. Rye has traditionally been used for cows and human consumption, but not for pigs due to its quality. FKF responded by developing a pre-mix with rye used for slaughter pigs in later stages (phase 2-fodder), where feed quality is less important. This would not have happened if FKA had not received this inquiry from the beginning; the inquiry was a trigger. It is an example of how interplay between farmers, advisors and research can stimulate innovation.

5.5. Summary of results

Table 2 summarises how the ASO performs in social integration mechanisms, such as external network, research incorporated in the organisation and learning.

From Table 2 we can see common findings from all four cases from the ASOs. There is a high degree of individual responsibility in search of external knowledge. In addition, they are all partners in external R&D activities, and they all, to some degree, facilitate training. We can also see there are differences between the cases. Networking varies in degree of centralisation and how the internal communication is organised. The systematisation and flow of knowledge vary between the cases. There is also variation in the systematised facilitation of organisational learning.

6. Discussion

6.1. Network

This study indicates that access to external relevant information and research results is important in strengthening the ability to recognise new external information, which, corresponding to the findings of Zahra and George (2002), Zou, Ertug, and George (2018) is part of the AC. According to Cohen and Levinthal (1990, 34), when an organisation 'develops a broad and active network of internal and external relationships, individuals' awareness of others' capabilities and knowledge will be strengthened. As a result, individual absorptive capacities are leveraged all the more, and the organisation's absorptive capacity is strengthened'. Thus, it is likely that the more organisation employees are exposed to external knowledge, the more they will reflect upon how this knowledge can be applied in their own organisation. In all four cases, formal agreements at the organisational level exist with research communities. However, our study shows that internal networks for communication to secure assimilation and transformation of the external information are equally as important. Through internal communication the

Table 2. Main findings in social integration mechanisms in the case study.

Integration mechanisms	Common for all	Tine	Nortura	FKA	NAES
<i>External network</i>	General network and agreements with externals at national level but various practice locally and regionally (include R&D projects; cooperation on advisory services; and knowledge exchange)				
Responsibility for searching external knowledge	High degree of individual responsibility	Centralised coordination	Mainly regional coordination; divided into specific productions	Centralised coordination	Mainly national coordinators
Internal communication	Systematic internal networking, which opens for diffusion of external input	Centralised information. Regional groups and topics specific to dairy farming	Centralised information. Regional groups and groups for specific productions.	Centralised information and bottom up. Regional groups for advisors on specific topics (cattle, pigs, grain).	Divided into centralised and regional information. Regional groups and a few national groups on topics
<i>Incorporated R&D</i>	All are partners in external R&D projects	Own R&D department	No R&D, but associated R&D organisation	No R&D, but associated R&D organisation	R&D coordinators involved in external R&D
Organisational incorporation with research actors					
Organisational systematisation of knowledge	Varies	Systematised. Own research strategy and priorities.	Communicate with associated R&D organisation	Systematised research on corporate level. Communicative platform with associated R&D organisation.	R&D coordinators and national level responsibility
<i>Continuous learning</i>	All have training programme for new advisors but less for follow-up	Education programme for new advisors	Introduction course	Introduction course	Education programme for new advisors
Formal programme					
Individual responsibility	Yes, to keep updated	Yes, but some services need obligatory courses.	Yes	Yes. Some services need certifications.	Yes, but managers are responsible for updating advisors. Some services need certification.
Facilitation for organisational learning	Organise formal meetings and arrangements and invite their advisors	Annual individual competence and development plans	Organise and invite	Organise and invite	Organise and invite

firms can strengthen their cognitive social capital as well as their research collaborations at the organisational level (Steinmo and Rasmussen 2018). Thus, network and facilitation of networking are social mechanisms that are intertwined with organisational learning.

It is important that the organisation systematically facilitates and supports networking with external knowledgeable communities, e.g. academic institutions, suppliers, other specialised ASOs, companies etc. Several of the case organisations do so, for example, by holding regular meetings between advisors and researchers, which is important

because this type of information exchange is less frequent than informal exchanges between advisors (Klerkx and Proctor 2013). These communities are most often parts of, but not limited to the AKIS. Our study shows that this is possible even when the research units are external and not a department in the organisation.

It has been found that the most common and effective way to gain access to research-based knowledge for advisors is through networks (Grande et al. 2014). Norway is a relatively small country with a mainly transparent academic research activity. Many people gain much of their knowledge through talks with researchers and as participants in reference groups, management boards and research projects. This underpins that networking is still very important, even though access to information in text, video and audio have never been more readily available than it is today.

Our first working hypothesis is relevant for this part of the study and our findings indicate support of the hypothesis. Network configurations vary both within and between AOS, as our study indicates. However, active networks that also have external links indicate more updated knowledge and a greater capacity to absorb.

6.2. Incorporated R&D

A relationship between the ASO and research exists in all four cases in our study, even though some have more experience with research and knowledge communities than others (see Table 1 and summary in Table 2). Most cases reveal systematic communication with research even if the research unit is external. However, our study indicates that the cases with a close relation to the research data, like Tine and partly FKA, have a larger reservoir from which to search and manage knowledge, i.e. a higher level of AC. Subsequently, this may stimulate innovation and yield a competitive advantage. This is in line with studies related to back-office activities (Labarthe and Laurent 2013a). The back-office is important for gathering, validating and supplying advisors with knowledge (Labarthe and Laurent 2013a).

Our study indicates that service innovation rests on the interplay between research, advisory service, and to some degree, farmers, especially through the advisors. A dedicated research group may be a driver for innovation, but it risks becoming too top-down in its approach. It is very important to make use of the experience the advisors acknowledge in encounters with farmers. This supports the finding that stakeholders exert pressure for improving AC (Ingenbleek and Dentoni 2016).

We also observed that internal experience with research activities is advantageous when using research results, i.e. transforming results into practice. This is especially true when reading scientific text and comprehending what it means in an advisory context, which includes limitations and assumptions. This requires some research experience or research education. All in all, our study indicates that the basic knowledge and a closer relation to R&D provides more input and increases the AC. This is in line with Cohen and Levinthal's argument that states, 'The ability to evaluate and utilise outside knowledge is largely a function of the level of prior related knowledge' (Cohen and Levinthal 1990, 128).

Our second working hypothesis is relevant for this part of the study and our findings indicate support of the hypothesis. The AOS organise their research activity and connections in different ways. Our study indicates that the more R&D resources is connected into AOS services, the greater capacity they have to absorb new knowledge.

6.3. Continuous learning

All four ASOs have a formal introduction programme for new employees. However, in general, there seems to be a lack of well-developed organisational routine for continual learning.

When learning is an individual issue and responsibility, it complicates the improvement of the absorptive capacity in an organisation. Less organisational learning indicates a shortage of collective structures such as systematic evaluations (Amin and Cohendet 2004). Good communication between the back-office and front-office is crucial if the ASOs are to meet the needs of the farmer of the future. This has been emphasised in recent research on digital technology where back-office activities must be developed to ensure the capacity to analyse large datasets from the farms (Eastwood et al. 2019).

From this research, we have observed that routines for organisational learning are twofold. Firstly, there are routines for acquisition, assimilation and transformation of new knowledge. Secondly, learning is about how new knowledge leads to the development of new or improved advisory services, and develops routines that facilitate efficient production of new services. Evidence exists that knowledge acquired from collaboration with external R&D partners has been utilised to improve existing services. An example is how Tine utilised research knowledge from collaboration with an external research partner to improve the advisors' approach to and interaction with the farmers. Thus, examples from successful encounters and less successful ones have been presented at gatherings for advisors. Another example is how Nortura collaborated with a research institution to facilitate a digital group advisory service and tested various digital platforms. A third example is that Tine and NAES cooperated in a development project for improving the quality of grass for feed, and external researchers evaluated their working method to later improve upon these.

However, our study also indicates that several ASOs tend to emphasise improving production routines of new services, while ignoring building routines for acquisition, assimilation and transforming new research-based knowledge, which may lead to poor or less relevant services. Structured incorporation of R&D can be a driver for developing such routines. For ASOs both production routines and knowledge management routines are needed. Offering efficient services is important, but if these services are not updated or relevant, the farmers will receive insufficient advice and stop making use of them.

It has been indicated that in an organisational perspective of learning, it is important that individuals act more or less independent within the organisational structure, without organisational control. This 'may increase the efficiency and effectiveness of the routines and processes from which an organisation's AC is derived' (Hart, Gilstrap, and Bolino 2016, 3987). The individual role here is termed *organisational citizenship behaviour*. In our study, we found examples in which there was individual freedom and a high degree of communication on internal common platforms such as groups. These platforms are needed; individual freedom combined with an organisational attitude of 'letting things drift' will not work.

To stimulate organisational responsibility for continuous learning, there is a need to balance organisational structural adaption and individual latitude. The rule of conduct should be as little structure as needed and as much latitude as possible. A culture of inquiry, openness and trust is a good simulation of organisational learning (Popper

and Lipshitz 1998; Steinmo and Rasmussen 2018; Bastesen 2015; Cooke and Morgan 1998).

It follows that management must allocate resources and facilitate processes that stimulate the desired culture. Boly et al. (2014) argue, 'By investing in certain (research or other capability-building) activities, firms can improve their ability to identify, value, assimilate and apply (or exploit) knowledge that is developed outside of the firm.' However, the passive term 'by investing' hides which actors are important and responsible for making things happen. Even though all employees in the organisation have responsibility, there must be a task for managers to take initiatives and allocate resources (Noblet, Simon, and Parent 2015).

Our third working hypothesis is relevant for this part of the study and our findings indicate support of the hypothesis. Organisational structure and incentives for continuous learning seem to strengthen the capacity of absorbing new knowledge.

6.4. Practical implications

Based on our findings, to increase the AC in an advisory organisation, we recommend facilitating a regular knowledge exchange between advisors, e.g. stimulate bottom-up driven communities of practice. Additionally, it is important to develop routines for regular communication between advisors and researchers on common platforms to assure that advisors gain the most updated information and knowledge in their field. As we experienced from the study, R&D staff does not need to be internal, but to develop mutual trust is crucial. Thus, there is a need to established routines that incorporate R&D in the ASO. Continual learning, which is decisive for innovation, should not only be the individual advisor's responsibility as findings show. ASOs must be more involved, for example, by applying annual individual competence development plans. Developing skills in facilitating innovation processes is an important activity that will strengthen the realisation of AC in ASOs. For all recommendations, it is the responsibility of ASO management to implement efforts to improve AC, but public authorities should encourage and provide support to increase the focus on different aspects of AC.

6.5. Policy implications

Competence is the basis for the social integration mechanisms in developing AC. In Norway, no specific education for advisors exists. A common policy initiative from public authorities and ASOs should be considered to fill this educational gap. Further, a policy for advisory services including a strategy to strengthen innovation among ASOs seems to be needed, given the challenges facing farming and the AKIS in the years to come. To stimulate policy development, we recommend a regular meeting area for ASOs in the Norwegian AKIS. Finally, a more explicit policy on bridging the gap between research and ASO can be developed and improved. Dissemination of research is a part of this but is not sufficient. As our study shows, there are structural and organisational adjustments that can be done to stimulate bridging the gap. As this involved both intra- and inter-organisational issues, there is a need for strategies that embrace the AKIS. An appropriate policy for this can strengthen AC.

6.6. Limitations and further research

This study is explorative and not representative of advisory services in general due to the small sample size and the varied services each cooperative offers. Thus, we cannot comment on AC development trends throughout all cooperatives and accurately compare the cases. However, this study helps identify factors that may influence the absorptive capacity of ASOs and how this is accomplished.

Further, we have not systematically identified the innovative levels of the ASOs. We noted that they had all launched new advisory services within a couple of years before the study and were all concerned about improving their existing services. This means we regard them as somewhat innovative, but we cannot rank them according to innovativeness.

Since this is an explorative study, at least three questions can be raised for further research. Firstly, we recommend that future surveys include a larger number of advisors to facilitate statistical assessments and secure representativeness. Secondly, additional studies to examine how innovation occurs and its relation to different organisational structures and AC should be undertaken. Such studies can provide insight into performance related to various AC in ASOs. This leads to a third question, namely whether strategies for exploiting AC should be different from strategies for building AC. The dichotomy between exploration and exploitation in organisational learning (March 1991) can be employed to examine which networking and learning activities are appropriate for internal strategies towards different knowledge sources. Exploring and building AC requires flexibility and creativity, while exploiting AC depends more on control and stability, and this can create a tension that must be handled by the ASOs.

7. Conclusion

From this study, we conclude that in addition to external information and research as mechanisms for improving AC, internal networks for communication within the organisation to secure assimilation and transformation of the external information are equally as important. Internal networks and facilitation for organisational learning will stimulate development of AC. Internal networks for communication and common platforms are also important for securing a bottom-up approach in problem solving.

Most cases in our study reveal networking between the ASO and R&D and demonstrate examples of systematic communication with research even if the research unit is not internal. However, a kind of partnership exists that indicates R&D is incorporated into the advisory service. Further, the literature (Klerkx and Proctor 2013; Labarthe and Laurent 2013a; Cohen and Levinthal 1990; Zahra and George 2002) and our case studies indicate that organisations that are able to access competent resources possess a larger reservoir of measures to search and manage information. In particular, ASOs with staff dedicated to research activities are better able to translate findings from both external sources and their own research projects. This, in turn, may cause them to realise their absorptive capacity and boost innovation.

A dedicated research group may be a driver for innovation, but there is also a risk that the company will become too top-down in its organisation. Common platforms to share information and mental models related to the knowledge create organisational advantages like increased competitiveness and innovation.

Participation in courses is appreciated in the ASOs, but the initiative and responsibility to do so are usually left to the individual advisor. Finally, learning from farmers is also important for advisors and for developing new service innovations, and their organisations may benefit from systematising this knowledge.

Interaction between the participants in an AKIS is important as external inputs may lead to innovations and improvements from other participants. This study emphasises the internal processes, but there is a strong relation between intra-organisational and inter-organisational issues in a knowledge and innovation system. To meet the needs of organisational interaction, a policy for advisory services including a strategy to strengthen innovation among ASOs is recommended.

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Stræte has conducted interviews in advisory organisations of Tine, NAES and Nortura, has written in all parts of the paper and edited the work. Hansen has written parts of the framework and theory, and has supplemented some information about Tine. Ystad has written parts of the framework and theory, and has conducted interviews at Nortura and NAES. Kvam has done interviews at FK Agri, Tine and NAES and has contributed to the text in the results section. All four authors have contributed to the paper and are equally responsible. The order of authors reflects the work done. Hansen is an employed researcher at TINE SA, one of the cases studied. He has written this paper as a researcher with the necessary academic independence. Ystad was working in NIBIO, a research institute that have a strategic research cooperation with NAES, one of the case studies. Ystad was not involved in this cooperation. The other authors have no competing interests.

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