
articles

Innovation in Family Farms: The Roles of the Market, the Family, and Farm Performance

Elena Fuetsch¹ ^a

¹ Research Institute for Family Business, Vienna University of Economics and Business

Keywords: family business, family farming, innovation, market orientation, family generations in management, farm performance

<https://doi.org/10.53703/001c.31714>

Journal of Small Business Strategy

Vol. 32, Issue 2, 2022

Most farms are struggling with aggravating economic, social and ecological conditions. If family farms want to survive in the long run, they need to develop innovation strategies. In line with the resource-based view, this paper argues that market orientation and multiple family generations in management are valuable resources of a family farm, which can contribute to innovation by facilitating the development of innovative ideas. This paper also explores the role of farm performance as a moderator. Since small- and medium-sized businesses in rural areas tend to lack growth orientation, it is assumed that family farms do not feel a strong urge to make use of their innovation potentials unless their performance falls to a critically low level. A regression analysis is conducted to test the relationships with a sample of 690 Austrian family farms. The results confirm the positive effect of both market orientation and multiple generations in management on innovation. As expected, farm performance moderates this relationship negatively. The findings are discussed against the backdrop of the family business, innovation and farming literature and suggestions are made how family farms can make best use of the market and the family as two important potential innovation sources.

Agricultural businesses make indispensable contributions to both the economy and society. Farmers are not only the main suppliers of agricultural goods, they also conserve the soil to prevent erosion (Gould et al., 1989), preserve the cultural landscape, maintain the rural infrastructure, create space for tourism and leisure and cultivate the rural cultural heritage (Nolten, 2010). Families play a major role in fulfilling these tasks. In Europe, more than 95% of all agricultural businesses are family farms in the sense that they are managed and operated by a household, which supplies the largest amount of the farm labor (Eurostat, 2016). Many of these families are struggling to keep their farms alive. The number of farms in the European Union has decreased by almost 30% between 2005 and 2016 (Eurostat, 2020). The market exits are often due to aggravating economic, social and ecological conditions (Darnhofer et al., 2016): food safety standards are tightening, consumer demands and market prices are volatile, global competition is intensifying and climate change causes floods, water shortages, hail damage and so forth. Additionally, the decrease in governmental support (e.g. in the form of CAP direct payments) exposes small and medium farms to free market forces, challenging their customary ways of business (H. McElwee & Bosworth, 2010).

Innovativeness is an important entrepreneurial trait that implies finding successful solutions in changing environ-

ments (De Wolf et al., 2007). Therefore, the development of innovation strategies is crucial if family farms want to survive in the long run. Innovation, which is a continuous process of searching, exploring and learning that results in something that is new to the farm (adapted from Lundvall, 1995 and Zaltman et al., 1973), can help to improve the production, processing, marketing and distribution of agricultural goods (A. M. Smith et al., 2021). As a result, it can substantially contribute to profit and growth independent from the overall economic development (Trott, 1998). The creation of a competitive advantage through innovation (Testa et al., 2014) and a positive influence of entrepreneurial behavior (including innovativeness) on business performance has also been confirmed for farming businesses (e.g. Grande et al., 2011; Läßle & Thorne, 2019; Verhees et al., 2011).

Yet little is known about the drivers of innovation in the agricultural context. Since a number of factors, e.g. market regulations and the traditional character of the sector, cause special conditions for innovation, findings from general management or innovation research might not hold true for the context of family farming. Thus, studies focusing specifically on the innovation behavior of family farms are urgently needed. Research on innovation in family businesses can serve as a starting point.

A recent article by Gottschall & Woods (2020) shows that in small family businesses the family plays the central role

for innovation activities. Family human capital, i.e. the “aggregation of individual family members’ knowledge, skills, and abilities”, can bring advantages for innovation (p. 4). However, when family influence is strong, innovation impulses from outside the family, e.g. from non-family employees, external experts or market participants, might be ignored. The article points out that despite the importance of family human capital for innovation, family businesses should not forget to make use of non-family innovation sources as well. Taking up the recent findings by Gottschall & Woods (2020), this article takes a closer look at the market and the family as two important innovation sources in family farms. More specifically, it investigates the role of market orientation and multiple family generations involved in management for innovation, based on a sample of 690 Austrian family farms.

In line with the resource-based view, this paper argues that market orientation and multiple family generations involved in management are valuable, rare and inimitable resources of a family farm, which can create a competitive advantage by supporting the development of innovative ideas. Market orientation is a cultural trait that enables the business to generate market intelligence, disseminate it across the business and create superior customer value from it. Market intelligence can be gathered by scanning the market on a regular basis and engaging with market participants such as customers or competitors (Narver & Slater, 1990). This knowledge helps family farms to understand and anticipate consumer needs, to identify opportunities and to develop innovative ideas, which can create a competitive advantage. For instance, family farms can learn how to renew products and processes to make them more attractive and efficient (Grinstein, 2008; Hunt & Morgan, 1995; Mirzaei et al., 2016). Through the interplay of multiple generations in management, a great variety of family human capital such as individual perspectives, experiences and knowledge comes together (Chirico et al., 2011; Nahapiet & Ghoshal, 1998). This provides an ideal basis for the creative exploitation of opportunities (Sciascia et al., 2013), which can also result in a competitive advantage.

Furthermore, this paper also explores the role of farm performance in these relationships. Since small- and medium-sized businesses in rural areas are known to be less growth-oriented, because business owners tend to have greater lifestyle-based ambitions than ambitions to develop their business (Galloway & Mochrie, 2006), it is assumed that family farms will not feel a strong urge to innovate unless their performance falls to a critically low level. Thus, performance is expected to moderate the relationship between market orientation, as well as multiple generations involved in management, and innovation negatively, so that high performance will hamper the transformation of innovative ideas into actual innovation measures.

This paper makes a number of important contributions: While innovation has been an intensively investigated topic in general management research over the past years, only little research exists about innovation in the specific context of family farms (Suess-Reyes & Fuetsch, 2016). Due to the idiosyncrasies of the agricultural sector, findings from general management research might not hold true for family farms. By investigating the innovation behavior of family

farms, this paper does not only advance the understanding of this business type but also bridges several independent research fields (namely agricultural research, innovation research and family business research) and contributes to a cumulative progress of knowledge. Furthermore, in previous management research, business performance has mostly been regarded as an output variable. Thus, many studies explain business performance through other variables such as innovation. Despite a number of reasonable arguments that point to a reciprocal relationship between innovation and performance, a predictive role of farm performance has almost never been considered in quantitative research. This study takes an innovative approach in investigating farm performance as a moderator.

The structure of this paper is organized as follows: In section 2, the theoretical background of the study is laid out. The section discusses the specifics of the Austrian agricultural sector and the farming as well as family business context for innovation and develops the hypotheses from the literature. Section 3 describes the research method. Section 4 presents the results and section 5 concludes with the main findings, discusses them against the backdrop of the literature, derives a number of practical implications, summarizes the theoretical and practical contributions of the paper and provides an outlook to future research.

Theoretical background

Innovation in farming: a special context that requires special attention

Innovation is a continuous process of searching, exploring and learning that results in new procedures, products, marketing methods, supply sources and/or organizational models (Lundvall, 1995). In dynamic markets, being ahead of others with innovation is key to create a competitive advantage (Hsiao et al., 2017). Agriculture is a central pillar of the “old economy”, which is characterized by production, mechanization and vocational education. Thus, family farms are usually rather traditional businesses and the first- or early-mover strategy is rare among them. Most farms seem more comfortable with observing innovations in the market for a while before adopting them in their own farm (Long et al., 2016). As the agricultural sector is not an overly dynamic environment, it is most suitable for the context of this study to take a less restricted approach to what is regarded as “new”. Thus, based on Zaltman et al. (1973), innovations are defined as procedures, products, marketing methods, supply sources and/or organizational models that are perceived to be new by the family farm.

In the farming context, innovation usually takes the form of mechanical innovations (e.g. new devices and machines), biological innovations (e.g. new seed varieties or animal breeds), chemical innovations (e.g. new fertilizers), agromonic innovations (e.g. new management practices), biotechnological innovations (e.g. transgenic crops), and informational innovations that rely mainly on computer technologies (Sunding & Zilberman, 2001). Some innovations even imply a change of the entire production system, e.g. the conversion to organic farming. These are particularly complex, which is often perceived as an innovation barrier (Lamine & Bellon, 2009; Padel, 2001).

Family farms that are able to overcome the barriers to innovation and manage its complexity well can achieve significant improvements in various regards. With its help farms can increase their yield, reduce costs, improve quality, reduce risk, increase environmental protection, prolong the durability of products and so on (Sunding & Zilberman, 2001).

Although traditional businesses are typically seen as being the opposite of innovative, tradition and innovation are not necessarily contrasts excluding each other, even though bringing them together and managing the duality between them makes innovation in the agricultural sector a particularly challenging task (A. M. Smith et al., 2021). It is important to realize that the traditional character of family farms also harbors a potential for innovation in the sense that traditional knowledge can constitute a resource, if a farm is able to interiorize and reinterpret it. An example of a so-called “innovation through tradition” in farming is the conversion of a conventional farm to an organic farm (De Massis et al., 2016). It requires a lot of traditional knowledge, e.g. about crop rotation or biological pest and disease control (Padel, 2001), which might have been forgotten over generations and needs to be (re)learned by the current farm operator(s).

Innovation in the agricultural sector, in general, requires diverse knowledge, ranging from a basic technological, biological and chemical understanding to management skills and market knowledge such as up-to-date information about the technologies available. The lack of this knowledge constitutes a common barrier to innovation in farming (Lockeretz & Madden, 1987; Padel, 2001). This is probably one of the reasons why farmers who work on the farm alone find it particularly difficult to innovate (Caffaro & Cavallo, 2019). The risk associated with innovation can also hamper its development (Lockeretz & Madden, 1987; Padel, 2001). If the farmer or the farming family feels overwhelmed by the complexity of an innovation, professional advice can be helpful, e.g. to prepare oneself for possible (side) effects (Le Gal et al., 2011). This can reduce risk and make innovation better manageable.

Apart from the problem of complexity, innovation can also be cost-intensive. A lack of financial resources, often the case in smaller farms, can hinder the implementation of innovative ideas (Sunding & Zilberman, 2001). Furthermore, external factors such as market regulations can lead to situations in which the positive effects of innovations are restricted and pursuing it seems no longer attractive (Diederer et al., 2003).

These idiosyncrasies of the agricultural sector constitute a special context for innovation, which requires special attention. Thus, this study investigates innovation in family farms.

The family in the family farm: Why it makes a difference

Since in family businesses the family always has a certain degree of influence on the decisions in the business (c.f. familiness in Frank et al., 2017), family farms most likely differ from non-family farms in terms of their behavior. Furthermore, from the interplay of the family and the farm,

a couple of idiosyncratic resources can arise. According to the resource-based view (RBV), resources can create value by enabling a business to spot and utilize opportunities or avert threats. If these resources are unique and difficult to imitate and the family business organizes them in a way that allows it to make use of their potential, the family farm can achieve a competitive advantage (Barney, 1991). The inimitability of the resources is often characterized by the fact that they are path-dependent and technically or socially complex so that they cannot be developed in a short period of time (Barney, 1991; Dierickx & Cool, 1989). Family businesses are typically long-term oriented (Lumpkin et al., 2010) and have strong social ties with their stakeholders (Cooper et al., 2005), which gives them an advantage regarding the development of such resources.

In small family businesses, which family farms mostly are, the family plays the central role for innovation-adoption activities. The knowledge, skills and abilities that family members bring into the business (i.e. family human capital) are valuable resources for innovation (Gottschall & Woods, 2020). Furthermore, the strong and trusting social networks with customers, suppliers and competitors that family businesses typically possess (Cooper et al., 2005) can be conducive for the acquisition of valuable information and innovative ideas (Bennedsen & Foss, 2015). Additionally, particularly small-scale family businesses are known for quick decision-making and flexibility thanks to a low degree of formalization, flat organizational structures and direct communication between the family members (Daily & Dollinger, 1992). These traits are helpful for the implementation of innovative ideas. Moreover, their typical aspiration to hand the business over to the next generation in order to maintain the family heritage may induce them to make far-sighted investments instead of looking for short-term profit opportunities (Le Breton-Miller & Miller, 2006), which can be key for the development of successful innovations. Due to a typically strong identification of the family and stakeholders with the family business, their loyalty and commitment tends to be higher than in non-family businesses (Bennedsen & Foss, 2015). This can have a positive effect on the pursuance of innovative ideas as well as on the number and effectiveness of working hours. Furthermore, a collective entrepreneurial spirit paired with a collective entrepreneurial skill set of the farming family (ideally with family members of different age and/or gender) equips family farms uniquely well for innovative advances (De Rosa et al., 2019). The family can act as an incubator for innovation by providing a “safe realm” where innovations can develop and ripen without disturbances from the outside world (Frank et al., 2010). Due to the typically central role of the family in family farms because of e.g. concentrated ownership and central decision-making within the family, it is particularly well suited to function as an incubator (Suess-Reyes & Fuetsch, 2016).

However, the interesting and complex social aspects that the family brings into play cannot only be a source of inspiration, creativity and motivation but also one of inertia, risk-aversion and conflict. For example, family businesses are typically long-term oriented (Lumpkin et al., 2010) and strive for family business continuity through intra-family succession (Habbershon et al., 2010). Risky projects can en-

danger these goals (Gomez–Mejia et al., 2014). Moreover, families have often invested large parts of their wealth in the business (Sciascia et al., 2015). As family businesses do not want to put the family heritage at stake, they tend to be risk-averse (Gomez–Mejia et al., 2014). This is particularly true for small family businesses (Casillas et al., 2010, p. 2011; González et al., 2012) and probably even more for small family farms due to the very strong interdependence of the business and the household (Heady, 1952). Consequently, this also concerns the majority of Austrian family farms, which are mostly small businesses. As innovations are always accompanied by risk because of new and unknown situations they bring along, family businesses are often skeptical towards innovations and prefer to stick to family and business traditions instead (Miller & Le Breton-Miller, 2005). Furthermore, while the family can act as an innovation incubator, a strong family influence carries the danger that innovation impulses from family-external sources such as non-family employees, external experts, customers or competitors are ignored without being evaluated (Gottschall & Woods, 2020). That way, entrepreneurial opportunities might be forfeited. This could also happen when family businesses are reluctant to raise other external resources such as debt capital, which they sometimes tend to do because they do not want to restrict the independence of the family or the family's influence on the business (Garcia & Calantone, 2002; Poutziouris, 2001). Therefore, this paper argues that family farms need to remain open to family-external resources, e.g. information from market participants, and use these for innovation as well.

Taken together, although family businesses are theoretically often well equipped with human capital resources needed for innovation, socioemotional (non-financially motivated) issues can impede their willingness to innovate. This phenomenon is known as the “ability-willingness-paradox” (Chrisman et al., 2015). Empirical investigations show that family businesses usually invest less money in R&D than non-family businesses (Chen & Hsu, 2009; Chrisman & Patel, 2012; Duran et al., 2016; Gomez–Mejia et al., 2014; Kotlar et al., 2014; Nieto et al., 2015). Yet, taking a closer look, family businesses were found to invest small amounts of money more frequently (Classen et al., 2014). This investment behavior allows for continuous incremental innovation with reduced risk, which is, in the long term, essential for the survival of the business (Banbury & Mitchell, 1995).

Hypotheses development

Market orientation as a source of innovation

Narver & Slater (1990) describe market orientation as a cultural trait enabling the business to generate market intelligence, disseminate it across the business and create superior customer value from it. Market intelligence is defined as information about variables that indicate which offerings are attractive in the present and will be attractive in the future (Grunert et al., 1995). Businesses with a proactive market orientation identify customer needs before they are explicitly expressed by the customers themselves and are therefore able to create new market opportunities. Reactive

market-oriented businesses, on the other hand, use market information that is easily and explicitly available. They are thus not able to create new opportunities but to recognize and exploit existing ones (Narver et al., 2004). Both approaches can be combined.

Market orientation constitutes a resource in the sense of the RBV because, as a cultural trait, it develops over a long period of time under the influence of the business' history. It is a complex social phenomenon that pervades the business as a whole and requires it to adjust its goals, plans, products, processes and monitoring of the outcomes accordingly (Abafita et al., 2016; Gebremedhin & Jaleta, 2012; Kahan, 2013; Yaseen et al., 2018). Therefore, it is difficult to understand and control and almost impossible for competitors to imitate (Hunt & Morgan, 1995). Furthermore, market orientation supplies the business with valuable market intelligence that other businesses do not possess. With this market intelligence, businesses can create a competitive advantage. Indeed, market-oriented businesses were found to be more profitable because market intelligence helps them to save costs and create products and services that meet customer needs (Narver & Slater, 1990). In the context of this study, it is argued that family farms who actively engage in the market and observe it are better informed about opportunities and better able to develop and implement innovative ideas.

Previous studies investigating the relationship between market orientation and innovation in other contexts than family farms indicate that market-oriented businesses are usually more innovative than others (e.g. Beck et al., 2011; Küster & Vila, 2011; Sciascia et al., 2006). By scanning the market on a regular basis, they gather valuable information that they can use for innovation. In the context of farming, this can be information about the most marketable products (Gebremedhin & Jaleta, 2012), the best and cheapest input factors, the most suitable sales channels (Mirzaei et al., 2016) or newly available technologies. It helps farmers to create innovative ideas, make informed choices and transfer their ideas into actual innovations (Dobni & Luffman, 2000; Grinstein, 2008; Hunt & Morgan, 1995; Mirzaei et al., 2016). Valuable market information can be gathered through customer orientation on the one hand, and competitor orientation on the other hand (Narver & Slater, 1990). This means that farmers can derive innovative ideas by observing customer preferences (Verhees et al., 2012) as well as strategies and decisions of competitors (Frambach et al., 2003; Im & Workman, 2004).

Taken together, this paper argues that market-oriented farms possess valuable information about the market that helps them to create innovative ideas and transfer these ideas into actual innovation measures. This assumption leads to Hypothesis 1:

H1: Market orientation is positively related to the implementation of innovations in family farms.

Family generations in management as a source of innovation

Since one of the most important goals of family businesses is intra-family succession (Chua et al., 2003), the formation of multigenerational teams during (often pro-

longed) succession phases is a frequent constellation. Multiple generations in management can constitute a valuable resource in the sense of the RBV because through the involvement of multiple generations, the farm has access to a broad human capital basis. The diversity of experience, knowledge, views and capabilities due to age differences between the generations can lead to a competitive advantage (Chirico et al., 2011; Nahapiet & Ghoshal, 1998). Furthermore, socially complex tacit knowledge, which is difficult to explicate and imitate (Nelson & Winter, 1982), can be passed on from one generation to the next and remain a resource across generation changes.

While some studies show no significant effect of multiple generations in management on the innovation of family businesses (e.g. Kellermanns & Eddleston, 2006), other studies find evidence that generational involvement fosters entrepreneurial behavior (e.g. Kellermanns et al., 2008; Zahra, 2005). All of these studies were conducted with samples containing family businesses from several industries. This paper argues that, in the context of farming, the presence of both the old and the young generation will most likely have a positive effect on innovation since farming requires a lot of traditional knowledge but must also depart from traditional patterns of thinking in order to be able to adapt to the changing environment. A study investigating innovation barriers in farming businesses shows that working on the farm alone and a low education level of the farmer are perceived as main reasons why innovations are often not adopted (Caffaro & Cavallo, 2019). When, however, several family members work together, innovation can become easier, particularly when they are from different generations.

Older generations usually possess a lot of traditional knowledge, which is often tacit and cannot be explicated but passed down from one generation to the other by applying and observing it repeatedly (Litz & Kleysen, 2001). Tacit knowledge can be particularly valuable when farms want to return to traditional farming techniques as well as old and more resilient animal species and crops, which turns out to be a successful strategy in response to climate change (Altieri & Nicholls, 2017). However, older persons who have managed the business for a long time are typically known to become inert, risk-averse and resistant to change over time (Miller, 1991; Romanelli & Tushman, 1994). They tend to be committed to past decisions, focus on their current skills and knowledge base and hold on to the tried and trusted (Sydow et al., 2009). This behavior corresponds to exploitation, which is associated with the improvement of quality and efficiency (Lavie et al., 2010) or the aiming for expected outcomes through a focus on the business' core competences (Goel & Jones, 2016; March, 1991; Shane & Venkataraman, 2000).

Younger generations, on the other hand, often tend to be opener to new things and more willing to take risks than older generations (Kepner, 1991). Therefore, it is often them who break open established patterns and strive for new ways of doing things (Litz & Kleysen, 2001). Furthermore, they bring new resources in the form of skills, knowhow, information or social capital into the business (Aldrich & Cliff, 2003). Involving younger generations can thus drive exploration in family farms. Exploration involves a depar-

ture from the business' core competences, and aiming for new opportunities, technologies, market expertise and co-operation networks (Goel & Jones, 2016; Lavie & Rosenkopf, 2006; W. K. Smith & Tushman, 2005).

A balanced approach of exploration and exploitation is important for the development of new products (Shere-mata, 2000). A generational mix can foster both exploration and exploitation at the same time. While the younger generation pushes to explore new avenues that might be associated with high risk, the use of core competences promoted by the older generation ensures an efficient use of resources providing a stable basis that can be used for the development of innovations and to cushion potential failures (Frank et al., 2019). Furthermore, the great diversity of individual perspectives, experience and knowledge coming together when multiple generation manage the farm (Chirico et al., 2011; Nahapiet & Ghoshal, 1998), provides an ideal ground for the "effective identification and assessment of opportunities as well as creative approaches to exploit them" (Sciascia et al., 2013, p. 5). The collaboration between generations can lead to so-called "innovation trough tradition", where traditional knowledge is interiorized and reinterpreted, to make something new from something old (De Massis et al., 2016). Thus, family firms often experience innovative thrusts in the succession phase (Brines et al., 2013), where family members of different age and experience typically work together until succession is completed (Handler, 1994).

In the light of the above, this paper argues that family farms with multiple generations involved in management possess a greater human capital basis, which makes them more efficient in generating innovative ideas and implementing them. Thus, hypothesis 2 is as follows:

H2: Multiple generations in management are positively related to the implementation of innovations in family farms.

The moderating role of farm performance

In the literature, there are numerous studies that investigate how innovation affects business performance (e.g. Forsman & Temel, 2011; Gunday et al., 2011; Lee et al., 2019). Yet the analyses in these studies are based on correlation, which does not provide evidence for linear causality (De Waal & Goedegebuure, 2017). Consequently, it is possible that a reciprocal relationship exists, meaning that innovation also depends on the level of business performance. Moreover, moderating effects of business performance on the relationship between innovation drivers, such as market orientation or multiple generations in management, and innovation are possible. Although studies investigating business performance as a predictor are scarce in innovation research, other variables that are closely related to business performance and have been studied more intensively with regard to their role for innovation indicate that farm performance could have a moderating effect on the relationship between market orientation, as well as multiple generations in management, and innovation.

For instance, financial slack, which refers to financial resources that are in excess of the minimum necessary to produce a given level of output (Nohria & Gulati, 1996), is a

concept that is closely related to business performance and can serve as an indicator. Having slack resources for investments in business opportunities available can be regarded as one criterion (among others) of performing well since these investments are important for a business' long-term survival.

Nohria & Gulati (1996) supply evidence for an inverted U-shaped relationship between financial slack and R&D investments in multinational businesses. The inverted U-shaped relationship signifies that both low and high levels of financial slack are negatively associated with R&D investments, while a medium level is conducive to innovation. This finding is explained by the room to maneuver that financial slack creates for the experimentation with projects of uncertain outcome, which innovations are, on the one hand (Cyert & March, 1963; Nohria & Gulati, 1996) and the flipside of financial slack, on the other hand. As innovation is often a strategy to develop the business and improve its performance (Boyd et al., 1993; Nohria & Gulati, 1996), too much comfort through permanent availability of resources can make businesses lazy in terms of developing and implementing innovative ideas. Another study that focuses on publicly listed businesses (which most likely excludes SME) found a positive relationship between financial slack and innovation in family businesses (Kim et al., 2008). The authors explain this effect with the typical long-term orientation of family businesses that motivates them to invest in innovation, which they hope will pay off in the future.

Looking at the general entrepreneurial attitude of small-scale rural businesses, which family farms mostly are, supports the notion that high performance levels could impede the generation and implementation of innovative ideas: It was found that the majority of small-scale rural businesses lack ambition to grow (Galloway & Mochrie, 2006) because they tend to be lifestyle-oriented rather than entrepreneurially oriented (Deakins & Freel, 2003) and regard themselves as disadvantaged in terms of entrepreneurial opportunities in rural areas (Mochrie et al., 2006). From a family business research point of view, it could be argued that this lack of ambition to grow could stem from the typical myopic risk aversion of family businesses (Hiebl, 2014). Only when performance is lower than aspired, long-term goals such as safeguarding the survival of the business become a priority and encourage the business to increase innovation investments to prevent failure (Chrisman & Patel, 2012). Thus, this could mean that family farms are not motivated to transfer innovative ideas generated from the market or the family into actual innovations unless their performance drops to a critical level that endangers the survival of the farm. When that happens, they may use other financial resources such as bank loans, family savings or revenues from asset sales to innovate rather than slack.

Summarizing, it can be assumed that high performance can discourage family farms from using the market and the family as innovation sources, thus weakening the positive relationship between market orientation, as well as multiple generations in management, and innovation, whereas lower levels of farm performance strengthen the relationship. This leads to the following hypotheses:

H3: Farm performance moderates the relationship between market orientation and the implementation of in-

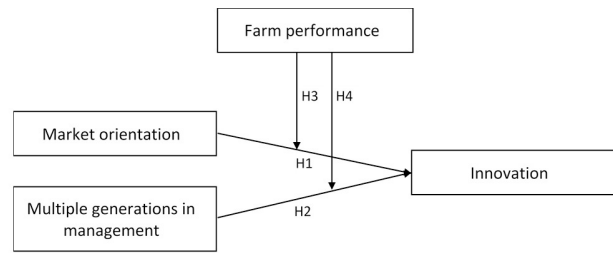


Figure 1. Research Model

novations in family farms negatively, so that the effect is weakened when farm performance is high.

H4: Farm performance moderates the relationship between multiple generations in management and the implementation of innovations in family farms negatively, so that the effect is weakened when farm performance is high.

The research model is depicted in [Figure 1](#).

Research method

Data collection

The data set was collected between November 2015 and January 2016. A random sample of 4,500 farms was taken from a data base which contains all Lower Austrian farms that have received subsidies in the past, provided by Agrarmarkt Austria. These farms were precontacted telephonically to explain the relevance of the study and invite the farmers personally to fill out the online questionnaire. This procedure has proved itself to increase the response rate (Dillman et al., 2014). Albeit 90% of all farms in Austria are family-managed (Bundesministerium für Nachhaltigkeit und Tourismus (Federal Ministry for Sustainability and Tourism), 2019b), the telephone call was also used to ensure that the farms were indeed family farms. Only when they defined themselves as a family farm were they invited to participate in the survey. Out of the 4,500 farms, 2,617 were reached and 1,813 agreed to take part.

The farms that agreed to participate in the survey received an email with a cover letter and a link to an online questionnaire. The cover letter assured the respondents' anonymity. After one week, two weeks and three weeks, farmers who had not yet filled out the questionnaire received reminder emails. In total, 954 online questionnaires were completed. This corresponds to a response rate of 36.5 % which is considerably higher than the average response rate in family business surveys of 21 % (Pielsticker & Hiebl, 2020). In order to improve the data quality even further, only questionnaires filled out by farm operators were used for the analysis. The final sample thus amounts to 690 family farms.

Sample description

The data was collected in the Austrian province of Lower Austria. Lower Austria contributes the largest amount to the total agricultural production in Austria. It almost covers the food product demand for the entire Austrian population (Amt der Niederösterreichischen Landesregierung

Abteilung Landwirtschaftsförderung (Office of the Federal Government of Lower Austria Department Agricultural Development), 2019). Furthermore, the Lower Austrian landscape is diverse, ranging from plains to mountainous regions. Its significance and diversity offer multiple opportunities for innovation, which makes Lower Austria an ideal area of research for this study.

The sample contains farms with different production foci, occupation types (sideline vs. main occupation) and sizes:

The most prevalent production foci are animal husbandry and cash-crop farming, which are pursued by 56 %, respectively 55 % of the farms, followed by forestry (37 %), forage production (19 %), viticulture (16 %), fruit and vegetable growing (11 %) and energy production (10 %). Around 8 % offer accommodation and/or hospitality. Looking at the basic population of Austrian farms, livestock production makes up 47 %, plant production 44 %, farm-related services 3 % and inseparable off-farm activities 6 % of the total contribution to the GDP of the agricultural sector. Incomes from farm-related services often arise from agritourism; 7.3 % of the agricultural businesses offer services in this regard (Bundesministerium für Nachhaltigkeit und Tourismus, 2019b). The main agricultural goods produced in Austria are dairy products (18 %), cattle, beef and pork meat (22 %), crops (11 %), vegetables and horticultural products (9 %) and wine (9 %; Statistik Austria, 2019). Due to different measuring units, the numbers of the sample are difficult to compare to the numbers of the basic population. However, they exemplify that livestock and plant production are more or less equally important and viticulture is also highly developed in Austria. Thus, the collected sample represents the basic population well.

Regarding occupation type, 63 % of the farms in the sample are run as main occupation, while 37 % are sideline businesses (meaning that the farm manager receives additional income from an off-farm occupation). Compared to the basic population of Austrian farms, where more than half of the farms are sideline businesses, in the sense that the farming family has additional sources of income unrelated to the farm (Bundesministerium für Nachhaltigkeit und Tourismus (Federal Ministry for Sustainability and Tourism), 2019b), this is a relatively low share of sideline businesses. A possible reason for the underrepresentation is the deviating definitions of a sideline business. Since the definition used in this study is more restricted regarding the recipient of the additional income compared to the definition of the Bundesministerium für Nachhaltigkeit und Tourismus (Federal Ministry for Sustainability and Tourism) (2019b; farm manager vs. farming family), the number of farms that qualify as sideline businesses may be lower in the sample. To check for a possible influence of sideline businesses on innovation, which could distort the results of the analysis due an underrepresentation in the sample, the occupation type is included as a control variable in the regression analysis.

Regarding farm size, the smallest farm in the sample consists of one hectare and the largest of 230 hectares of land. The average farm size amounts to 48.39 hectares, which corresponds more or less with the average farm size of the basic population in Austria, which is 45 hectares

(Bundesministerium für Nachhaltigkeit und Tourismus (Federal Ministry for Sustainability and Tourism), 2019b). Although the average farm size is increasing, Austrian farms are still relatively small in international comparison (Bundesministerium für Landwirtschaft, Regionen und Tourismus (Federal Ministry of Agriculture, Regions and Tourism), 2020). Alongside divided inheritance of land, which is common in many regions in Austria (Groier et al., 2018), the small-sized structure is mainly due to topographical reasons. Austria is one of the most mountainous countries in Europe – 70 percent of its surface and 58 percent of the arable land is mountain area (Hovorka & Bundesanstalt für Bergbauernfragen, 2011). Since the mountainous farmland is difficult to cultivate (Sinabell, 2004) and arable farmland has decreased in the previous decades (Bundesministerium für Nachhaltigkeit und Tourismus (Federal Ministry for Sustainability and Tourism), 2019a), the quantities of agricultural goods that Austrian farms produces are small in comparison to international competitors. As small market participants Austrian farms are increasingly under pressure of international mass producers and other big market players (Bundesministerium für Nachhaltigkeit und Tourismus (Federal Ministry for Sustainability and Tourism), 2019a). Specializing on crops or animal species outside the classic mainstream (e.g. old and more resilient species) or applying innovative farming practices (e.g. permaculture) are possible strategies to turn landscape- and size-related conditions into opportunities. Undoubtedly, the small-scale structure of the Austrian agricultural sector constitutes a special context for innovation. Thus, farm size is controlled for in the regression analyses.

In sum, the sample represents the basic population of Austrian farms well.

Measurements

In this section the dependent, independent, moderating and control variables are described. More detailed descriptions about the measurements are disclosed in the appendix.

Dependent variable

Innovation measures refer to concrete product and process innovations implemented by the farm. They comprise new machines, new or remodeled agricultural buildings, new supplies and equipment, new processes and new crops and breeds, where new is meant in the sense of “new for the farm”. Farmers were asked to estimate how many innovation measures they implemented in the respective areas in the last five years measured against comparable farms on a 6-point scale ranging from 1 = many less to 6 = many more. Subjective relative measurement is widely used when objective indicators (e.g. patents) are not available or useful (Ritala et al., 2015). Cronbach’s alpha of 0.72 indicates good reliability of the scale (Hair et al., 2007).

Independent variables

The *market orientation* scale is based on Kohli & Jaworski (1990; adapted to family firms c.f. Frank et al., 2012), on the one hand, and Narver et al. (2004), on the other hand,

in order to include both responsive and proactive forms of market orientation. Since the original scales consist of items that are difficult to answer for family farmers, these scales were summarized and adapted to the context of family farms. The adapted scale measures to what degree family farms analyze the market situation, gather market information, and proactively shape the market by creating new marketing opportunities. While accounting for responsive as well as proactive market orientation, the scale also includes items concerning both customer and competitor orientation. For instance, the items ascertain to which degree family farms observe market developments and react to them, to which degree they actively search for new customers and to which degree they actively compare their offerings with those of their main competitors. The items were measured on a 6-point scale. The reliability of the scale was evaluated by conducting an exploratory factor analysis. All items loaded on one factor. Furthermore, Cronbach's alpha of 0.89 indicates very good reliability of the measurement (Hair et al., 2007).

In order to find out if there are *multiple generations in management*, farmers were asked if one, two or three generations participate in the management of the farm. For the analysis, the categories two and three generations were consolidated, resulting in a categorical variable with the two options "one generation in management" and "multiple generations in management". The condensation of two and more generations is expedient because family farms with three generations in management are very rare in the sample (19 cases).

Moderator variable

To assess *farm performance* farmers were asked to estimate on a 6-point scale ranging from 1 = strongly disagree to 6 = completely agree whether they performed better in terms of four criteria than comparable farms. The four criteria were economic returns, efficiency, availability of financial resources and quality produced in the area of the farm's production focus. Cronbach's alpha of 0.86 for the 4-item scale indicates very good reliability (Hair et al., 2007).

Control variables

The analysis includes four control variables: farm size in hectares, occupation type (sideline or main occupation), age of the farm operator, and availability of a successor. As argued in section 2.1., *farm size* constitutes a specific context for innovation since it can be a disadvantage and opportunity alike. Thus, it is reasonable to include farm size as a control variable. According to the literature, farm size is positively associated with innovation (e.g. Laple & Thorne, 2019). Furthermore, the occupational type might also influence the innovativeness of the farm. Farms that are run as *sideline businesses* were found to be less innovative than full-time farms (Daberkow & McBride, 2003). The *age of the farm operator* (who filled out the questionnaire), by contrast, might have a negative effect on innovation since there is evidence that older managers tend to lose their innovative spirit over time (Daberkow & McBride, 2003). Clearly, the succession situation can influence the innovativeness of a farm as well. When there is definitely *no*

successor available to take over the farm, investments might be reduced to a minimum (Inwood & Sharp, 2012; Wheeler et al., 2012) leading to fewer implementations of innovation measures.

Statistical method

After evaluating the measurement properties, the hypotheses were tested using a regression analysis. By using hierarchical regression, the effect of the control variables, the main effects and the moderation effects were tested separately: In Model 1, the effects of the control variables farm size, sideline business, age of the farm operator and no successor were tested. In Model 2, the independent variables market orientation and multiple generations in management were included in the regression. In Model 3, the moderator farm performance and the interaction terms were included. The differences in R^2 between the models give an indication about the size of the tested effects. Before calculating the interaction term, all metric variables were centered in order to avoid problems with multicollinearity (Dawson, 2014). The analysis was run with SPSS 25.0.0.1.

[Table 1](#) shows the means, standard deviations, and minimum and maximum levels of all variables used in the regression analysis.

The bivariate correlations among all variables are shown in Table A1 in the appendix. All coefficients for correlations between independent variables are below 0.4. According to Hair et al. (2010), correlation coefficients below 0.5 are of no concern. Furthermore, in order to check for multicollinearity, the variance inflation factors (VIF) were calculated. All VIFs (before including the interaction terms) are smaller than 1.6, indicating that multicollinearity is not a problem.

Results

The results of the hierarchical regression are shown in [Table 2](#).

Model 1 includes the control variables. The farm size in hectares is significantly and positively related to innovation measures ($\beta = .207, p < .001$). The age of the farm operator ($\beta = -.103, p < .01$) and the unavailability of a successor ($\beta = -.190, p < .001$) are significantly and negatively associated with innovation measures. Being a sideline business does not have a significant effect. R^2 of Model 1 is .118 and highly significant ($p < .001$), which means that the control variables explain 11.8 % of the variance of the dependent variable.

Model 2 additionally tests the main effects between market orientation and innovation measures ($\beta = .362, p < .001$) and multiple generations in management and innovation measures ($\beta = .072, p < .05$). Both effects are significant and positive, supporting Hypotheses 1 and 2. Model 2 is highly significant ($p < .001$) and yields an R^2 of .253. A comparison of Model 2 to Model 1 shows a change in R^2 of .135, which signifies that the main effects explain 13.5 % of the variance of the innovation measures.

To test Hypotheses 3 and 4, which predict that farm performance moderates the relationships between market orientation and innovation, as well as multiple generations

Table 1. Descriptive Statistics of all Variables

Variable	Mean	SD	Min.	Max.
Innovation	3.25	1.08	1.00	6.00
Market orientation	3.25	1.41	1.00	6.00
Multiple generations in management	1.20	.40	1.00	2.00
Farm performance	3.58	1.10	1.00	6.00
Farm size in hectares	48.39	39.77	1.00	260.00
Sideline business	.37	.48	.00	1.00
Age of farm manager	44.62	9.38	20.00	70.00
No successor	.05	.21	.00	1.00

Table 2. Results of the Regression Analysis

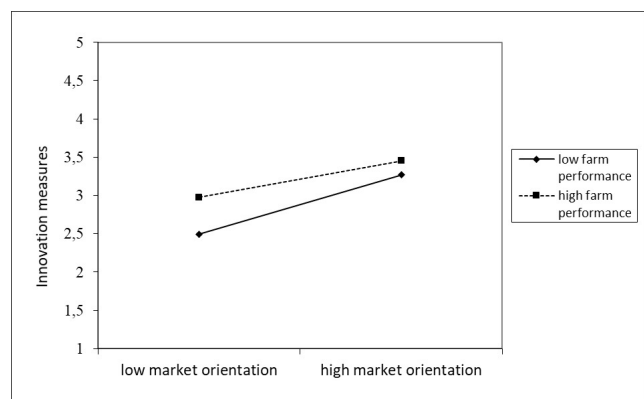
Independent variable	Model 1: control variables		Model 2: incl. indep. variables		Model 3: incl. interactions	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Farm size in ha	.207	.000	.199	.000	.147	.000
Sideline	-.073	.059	-.024	.499	.001	.983
Age of farm manager	-.103	.005	-.084	.012	-.081	.013
No successor	-.190	.000	-.141	.000	-.108	.001
Market orientation			.362	.000	.289	.000
Multiple generations in management			.072	.031	.077	.017
Farm performance					.153	.124
Market orientation * farm performance					-.074	.022
Multiple generations in management * farm performance					.098	.320
R ² (sig. of F-test)	.118	(.000)	.253	(.000)	.311	(.000)
Adjusted R ² (sig. of F-test)	.113	(.000)	.247	(.000)	.302	(.000)
Δ R ² (sig. of change in F)	.118	(.000)	.135	(.000)	.057	(.000)

Dependent variable: innovation; n = 690

Standardized regression coefficients are displayed in the table.

All VIFs (before including the interaction terms) < 1.6 → no problem with multicollinearity

in management and innovation, negatively, the moderator variable and the interaction terms were added in Model 3. Model 3 is highly significant ($p < .001$). The change in R² amounts to .057 ($p < .001$) and indicates a significant increase of 5.7 % in explanatory power. As predicted, farm performance has a significant negative effect on the relationship between market orientation and innovation measures ($\beta = -.074$, $p < .05$). Thus, Hypothesis 3 is supported. To facilitate the interpretation of the significant moderation effect, the interaction is plotted in Figure 2. The moderation effect of farm performance on the relationship between multiple generations in management and innovation measures is not significant. Thus, Hypothesis 4 is not supported. Furthermore, comparing Model 3 to Model 2 shows that the main effect of multiple generations in management remains almost the same when including the moderator in the regression ($\beta = .072$ vs. $\beta = .077$), while the main effect of market orientation decreases ($\beta = .362$ vs. $\beta = .289$). This emphasizes the unaffectedness of multiple generations in management by farm performance and indicates that, although multiple generations in management have a rather


Figure 2. Significant Interaction Between Market Orientation and Farm Performance; Dependent Variable: Innovation measures

small effect on innovation measures ($\beta = .077$), this effect is powerful.

Figure 3 shows that farm performance cannot cause a significant change in the effect of multiple generations in management on innovation measures.

Conclusion and discussion

Summary and interpretation of the findings

In view of the aggravating conditions for farming businesses due to e.g. increasing global competition and climate change, creating competitive advantages through innovation can be key to long-term farm survival. Drawing on a recent article by Gottschall & Woods (2020), which argues that despite the importance of family human capital for innovation, small family businesses should not forget to make use of non-family innovation sources as well, this article investigated the market and the family as two important innovation sources.

The main goal of this paper was to discover the role of market orientation and multiple generations in management for innovation in family farms. According to the RBV, market orientation and multiple generations in management can constitute valuable resources for the development and implementation of innovative ideas, which can lead to a competitive advantage vis-à-vis competitors. Although the effects of market orientation (e.g. Beck et al., 2011; Küster & Vila, 2011; Sciascia et al., 2006) and generational involvement in management (e.g. Kellermanns et al., 2008; Kellermanns & Eddleston, 2006) on innovation have already been investigated, the special context of agriculture, which is a rather traditional sector (A. M. Smith et al., 2021) with a relatively high intensity of market regulations (Diederer et al., 2003), required an investigation of its own. The results show that even in traditional and highly regulated markets like the agricultural sector, the market and the family constitute valuable sources of innovation: market-oriented farms and farms with multiple generations involved in management were found to be more innovative than others.

The significant effect of market orientation on innovation measures in family farms indicates that family farms can achieve advantages from engaging actively in the market. Market intelligence can help them to identify opportunities and to develop and implement innovative ideas. This emphasizes the importance of social capital, which results from close social relationships with important stakeholders, e.g. customers and competitors, (Cooper et al., 2005) and provides access to different kinds of resources such as market intelligence (Lin, 2000). The more social capital a family farm has, the better is its access to valuable market information through these social relationships. Family farms have a particularly high potential of generating market intelligence through market orientation since they typically possess a large amount of family social capital (Salvato & Melin, 2008). The social capital of the family contributes to the social standing of the family business and increases the goodwill of the business community and customer loyalty (Sorenson et al., 2009). As family social capital can tremendously support a business' relationships with market participants, it facilitates the development of market intelligence through market orientation (Cabrera-Suárez et al., 2011). Thus, family businesses have a particularly high po-

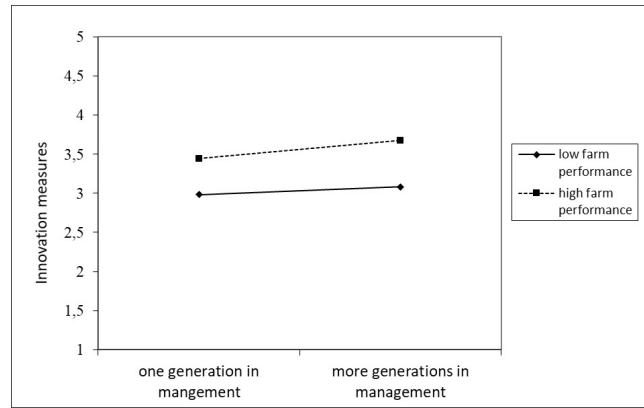


Figure 3. Non-significant Interaction Between Multiple Generations in Management and Farm Performance; Dependent Variable: Innovation Measures

tential of generating innovative ideas through market orientation.

Regarding the positive role of multiple generations in management, the diversity of knowledge resources seems to be an essential success factor. The old generation typically possesses tacit traditional knowledge, e.g. about traditional farming techniques, old and more resilient animal species and crops, or the local soil and weather conditions, from their longstanding experience in the family farm. The young generation has often acquired technical and scientific knowledge through formal education and work experience in other jobs inside or outside farming (Woodfield & Husted, 2017). Although tacit knowledge can be of great value for innovation in farming, relying on it exclusively can create path dependencies and hamper change (Chirico & Salvato, 2008; Hirsch-Kreinsen, 2008). A combination of tacit and explicit knowledge can lead to alternative approaches and drive innovation (Ingram, 2008). However, an important prerequisite that family members are able to “recognize, understand and exploit each other’s knowledge”, is a good relationship quality (Chirico & Salvato, 2016, p. 206-207). Relationship conflicts between family members might reduce this ability.

Another goal of this paper was to investigate the moderating role of farm performance in the relationship between market orientation, as well as multiple generations in management, and innovation measures. Previous studies showed that small-scale rural businesses, which family farms mostly are, lack ambition to grow (e.g. Galloway & Mochrie, 2006). Thus, their general motivation to innovate tends to be rather low. Only when performance is lower than expected, family farms are urged to innovate in order to safeguard the survival of the business (Chrisman & Patel, 2012). High performance levels, on the other hand, could slow down innovation due to the absent need to improve the status quo (e.g. Nohria & Gulati, 1996). Based on the literature, it was hypothesized that high farm performance would negatively affect the transformation of innovative ideas generated from the market and the family into actual innovations.

The results confirm the negatively moderating effect of farm performance on the relationship between market orientation and innovation. This means that the positive effect of market orientation on innovation is weakened when farm performance is high. As predicted, it seems that high performance reduces the perceived necessity to achieve competitive advantages through innovation, which is why innovative ideas developed from the market will less likely be transformed into innovation measures when the farm is financially well off. As stated by Lueger (1997), success can have an affirmative effect, leading to the belief that decisions and measures that were successful in the past will be successful in the future. Thus, good performance may tempt the farm operator to rely on previously successful ways of farming without overthinking them critically against the backdrop of a changing environment. This attitude may inhibit farm operators from making use of valuable market information and push innovation to achieve sustainable success. This way, yesterday's success can turn into tomorrow's failure. The finding underlines the importance to think of farm performance not only as a desired outcome variable but also as an impact factor that can react upon other variables and affect a business' (innovation) behavior. Existent studies have not done that to a sufficient extent.

The predicted moderation effect of farm performance on multiple generations in management and innovation was not confirmed. The non-significant moderation effect and the unchanged main effect of multiple generations in management, when including the moderator in the model, indicate that generational involvement is a powerful predictor of innovation measures. While farm performance can moderate market orientation, it cannot overpower the effect of multiple generations in management. This confirms the central role of family human capital for innovation suggested by Gottschall & Woods (2020).

The control variables reveal that farm size, the farmer's age and the succession situation also play a significant role for innovation in family farms. The findings suggest that larger family farms implement more innovation measures than smaller farms, which confirms the results from previous studies that farm size is positively related to innovation (e.g. Läßle & Thorne, 2019) and is probably due to the general lack of ambition to grow among small-scale rural businesses (Galloway & Mochrie, 2006). The better availability of financial resources in larger farms may also be a possible explanation. Furthermore, with increasing age of the farm operator, the innovativeness of the farm decreases. This result supports previous findings showing that technology awareness in agricultural businesses diminishes with the operator's age (Daberkow & McBride, 2003) and that entrepreneurs who have managed a business for a long time tend to become inert and risk averse (Miller, 1991; Romanelli & Tushman, 1994). Furthermore, regarding the succession situation, the results of this study indicate that innovation becomes less likely when there is no potential successor available. Since family businesses are usually long-term oriented and strive to maintain the family legacy over generations, they are motivated to achieve a certain level of innovativeness to survive (Diaz-Moriana et al., 2020; Lumpkin et al., 2010). The absence of a potential successor, however, diminishes the chance of the continuance of the family

legacy, which might lead to resignation on part of the farm operator and hamper innovation. This also shows how important intra-family succession is for family farms and how disappointing the unfulfilled desire can be. The intention for transgenerational ownership is typical for family businesses and often used as a defining criterion (Chua et al., 1999). This intention may be particularly strong in family farms due to the strong interdependence of the farm and the household (Heady, 1952), which makes family farms an archetype of family businesses. Whether a farm is run as a sideline or a main occupation business does not have an influence on innovation according to the findings of this study. The overrepresentation of main occupation businesses in the sample can thus not distort the results.

Practical implications

The findings of this study have several practical implications for family farms in particular and small family businesses in general. The often observed lack of entrepreneurship among small-scale rural businesses often stems from a feeling of powerlessness (Galloway & Mochrie, 2006). However, this study has shown that, despite certain restrictions to their maneuverability (due to market regulations and the market power of big players), farmers can shape the future of their family farm actively by using the market and the family as knowledge resources that facilitate the development and implementation of innovative ideas. Recognizing their possibilities may lift at least part of the feeling of powerlessness of small-scale rural businesses.

Furthermore, the finding that market orientation can facilitate innovation emphasizes that it is key for family farms to engage actively in the market and to observe market participants closely in order to generate market intelligence and create products and services that meet customer needs. A possible way to do that could be direct selling. Not only can direct selling reduce the increasing pressure from mass food markets on farm income but it can also help to build trustful relations with market participants (Campbell, 2014). These relationships can facilitate the access to valuable market information. Direct selling can take place through face-to-face contact, e.g. farmers markets, farm shops, home deliveries, etc., or through proximate short food supply chains such as farm shop groups, consumer cooperatives, "dedicated" retailers, restaurants or catering for institutions (Renting et al., 2003). Currently, a little bit more than one fourth of Austrian farms sell directly to consumers, while only 13% generate a significant share of their income from direct selling (KeyQuest & Landwirtschaftskammer Österreich, 2016). These numbers show that many family farms could make better use of this opportunity. Furthermore, innovation could be facilitated through collaboration and exchange with other farms or other actors in the supply chain (Hermans et al., 2015). Collaboration can support creativity and provide the farm with valuable knowledge and information, e.g. about available technologies (Ramirez, 2013).

In order to exploit the full potential of diverse knowledge resources that arise from multiple generations in management, family farms require a good relationship quality between their family members. Thus, family farms need to

manage their family relationships carefully. Formal or informal family governance measures could be suitable ways to ensure open communication and trust, to align goals and to mitigate and resolve conflicts among family members (Suess, 2014).

Moreover, the findings of this study call attention to the potential danger that high performance may prevent family farms from transforming innovative ideas generated from the market into actual innovation measures. In order to avoid lost opportunities, it is important for family farms to recognize that innovation is a cyclical process of discovering, developing and delivering and that only through repetition of this cycle businesses can learn and develop (Kahn, 2018). Innovation is a mindset that permeates a business as a whole. It induces it to take risks, to be open to new and divergent ideas, to change established patterns and to learn continuously (Jin et al., 2019; Kahn, 2018). The finding underlines how important it is that farmers think of themselves as entrepreneurs and proactively take initiative to identify opportunities and to adapt their farm to ongoing developments (De Rosa et al., 2019; G. McElwee, 2006). Since agricultural goods were historically produced in the households which were not part of the commercial economy (Friedmann, 1980), some family farms still need to develop an entrepreneurial identity. Policy makers should support them by setting incentives, offering management consultation and granting farming businesses enough room to maneuver by reducing over-regulation.

The positive effect of farm size on innovation measures is particularly relevant for the Austrian agricultural sector since Austrian farms are relatively small in international comparison. The findings suggest that small farmers are particularly challenged to innovate. However, the small farm size and the rich biodiversity in Austria can also constitute potentials for innovation. It is all the more important that (Austrian) small-scale family farms develop awareness of these potentials and make use of them. For instance, they can engage in alternative farming techniques, such as permaculture, which is ideal for small farms (Ferguson & Lovell, 2017).

Since the farmer's age was found to be negatively related to innovation, it is all the more important that operators involve their children early in the farm business to benefit from the positive effect of multiple generations in management and to keep the innovativeness of the family farm alive.

The findings also show that the absence of a successor can hamper innovation. In order to counteract this tendency, innovation measures should be taken proactively throughout the entire lifecycle of the farm to make it financially and emotionally attractive to potential family (or non-family) successors. Furthermore, including potential successors at a young age in the farm might increase their identification with it and farming in general and give them a perspective to continue the family legacy before they chose a different career path, making family succession more likely.

Contributions

Theoretical contributions

This paper contributes to research in the following ways: In the light of the important economic and societal contributions of family farms and their specific context of operation (e.g. traditional sector, highly regulated market), an in-depth investigation into the innovation behavior of family farms was long overdue. By bridging several independent research fields (agricultural research, innovation research and family business research), this paper enhances the theoretical knowledge on family farms in general and offers valuable explanations why some family farms are better innovators than others.

Furthermore, this study takes a leap in exploring the predictive role of farm performance for innovation, which has rarely been considered in previous quantitative studies. Up to date, business performance has mostly been regarded as an output variable in management research; however, reciprocal relationships between business performance and innovation are much more likely than unidirectional effects. This study has taken an innovative approach in investigating farm performance as a moderator.

Practical contributions

This paper also makes important practical contributions: First, this study has shown the importance of generational involvement for innovation in family farms and small family businesses in general. Diverse knowledge resulting from multiple family generations working together can lead to superior levels of innovation. In fact, generational involvement has such a powerful effect on innovation that, opposite to market orientation, the effect of multiple generations in management is not dependent on the level of performance. This speaks for a unique influence of family social capital on innovation and emphasizes the importance of sharing and creating new knowledge across generations to achieve a competitive advantage in small family businesses.

Furthermore, this paper has shown that even in a strongly regulated market like agriculture, the market and the family can provide valuable knowledge resources, which can be effectively used for the development of the family farm via innovation. In the light of the frequent lack of entrepreneurship caused by a feeling of powerlessness among small-scale rural businesses (Galloway & Mochrie, 2006), these findings may make family farms feel more empowered and convince them that they can shape their future actively. The findings of this study will hopefully raise awareness about the great potential of the market and the family as innovation sources. Due to the typically large social (e.g. personal relationships with market participants) and human capital endowments (e.g. tacit knowledge), family farms have a particularly high potential to use the market and the family as innovation sources. However, the ability and willingness to innovate often fall far apart (Chrisman et al., 2015). This paper presented a number of suggestions how the innovation sources of market and family can be turned

into actual value, which will hopefully encourage family farms to close the ability-willingness gap.

Moreover, based on the findings of this article, policy-makers can design appropriate incentives and support measures to stimulate family farms' market orientation and to facilitate multigenerational management. This could create better conditions for family farms to innovate and improve their ability to tackle external challenges. When designing subsidy policies for agricultural businesses, policy makers should bear in mind that high farm performance can impede the exploitation of the market for innovation purposes. Since subsidies make up one third of the agricultural income of farms in Austria, untargeted subsidizing systems can be counterproductive. As the major share of these subsidies are provided by the European Union, the significance of this study's results reaches far beyond Austrian borders.

Limitations and future research

Notwithstanding its diligent methodical approach, this study is not without limitations. It is based on a large heterogeneous sample of Austrian family farms. Depending on their particular production focus or foci, these farms might be faced with different market and operating conditions (e.g. stricter or less strict regulations). These conditions could have an influence on the generation and implementation of innovative ideas. Thus, future studies might distinguish between production foci to draw a more differentiated picture of family farms' innovation behavior. Furthermore, although the scale for innovation measures used in this study was particularly designed for the context of farming and contains a broad range of different innovation measures in its items, it is possible that other innovation measures exist that are not considered in the scale. For instance, this could be the case for innovation measures at very specialized farms. Since this study investigated heterogeneous farms, a pragmatic selection of the most common innovation measures had to be made. When investigating farms with specific production foci, the scale might need to be adapted. Moreover, this study is based on the assumption that innovation increases the chance of farm survival. Entrepreneurship research has pointed out the importance of environmental dynamics for the effect of innovation on business survival. While in dynamic environments, entrepreneurship has shown a positive effect on firm perfor-

mance (e.g., McDougall et al., 1994), other studies indicate that this effect might not exist in markets with low competitiveness (e.g. Snow & Hrebiniak, 1980; Veidal & Flaten, 2014). Thus, the impact of innovation on the long-term survival of family farms with production foci that underlie particularly high regulations might be limited. This issue could be the content of a future study with relevant implications for policymakers.

Additionally, the findings of this study open up new avenues for future research: The significant negative effect of the unavailability of a successor on innovation measures suggests that intra-family succession is particularly important for family farms. Thus, future studies might dig deeper into the question what role the succession situation plays for the innovation behavior of a farm and also how innovation might affect the attractiveness of the farm for potential successors. Understanding these relationships can help to develop strategies that enhance the willingness of potential successors to take over the family farm and increase the likelihood of long-term farm success.

Finally, since a good relationship quality between family members is a prerequisite for the recognition, understanding and exploitation of each other's knowledge, another interesting question for future research could be, how relationship conflict affects the exploitation of family human capital for innovation purposes.

Funding

The data for this work was collected with the financial support of Amt der Niederösterreichischen Landesregierung/Abteilung Wissenschaft und Forschung, Gutsverwaltung Hardegg and Erste Bank.

Author Correspondence

Correspondence concerning this article should be addressed to Elena Fuetsch, Research Institute for Family Business, Vienna University of Economics and Business, Welthandelsplatz 1, Building D1, 1020 Vienna, Austria, Email: elena.fuetsch@wu.ac.at.



References

- Hiebl, M. R. W. (2014). Risk aversion in the family business: The dark side of caution. *Journal of Business Strategy*, 35(5), 38–42. <https://doi.org/10.1108/jbs-09-2013-0087>
- McDougall, P. P., Shane, S., & Oviatt, B. M. (1994). Explaining the Formation of International New Ventures: The Limits of Theories from International Business Research. *Journal of Business Venturing*, 9(6), 469–487. [https://doi.org/10.1016/0883-9026\(94\)90017-5](https://doi.org/10.1016/0883-9026(94)90017-5)
- Abafita, J., Atkinson, J., & Kim, C. S. (2016). Smallholder Commercialization in Ethiopia: Market Orientation and Participation. *International Food Research Journal*, 23(4), 1797–1807. [http://www.ifrj.upm.edu.my/23%20\(04\)%202016/\(60\).pdf](http://www.ifrj.upm.edu.my/23%20(04)%202016/(60).pdf)
- Aldrich, H. E., & Cliff, J. E. (2003). The Pervasive Effects of Family on Entrepreneurship: Toward a Family Embeddedness Perspective. *Journal of Business Venturing*, 18(5), 573–596. [https://doi.org/10.1016/s0883-9026\(03\)00011-9](https://doi.org/10.1016/s0883-9026(03)00011-9)
- Altieri, M. A., & Nicholls, C. I. (2017). The Adaptation and Mitigation Potential of Traditional Agriculture in a Changing Climate. *Climatic Change*, 140(1), 33–45. <https://doi.org/10.1007/s10584-013-0909-y>
- Amt der Niederösterreichischen Landesregierung Abteilung Landwirtschaftsförderung (Office of the Federal Government of Lower Austria Department Agricultural Development). (2019). *Der Grüne Bericht 2019. Bericht über die wirtschaftliche und soziale Lage der Land- und Forstwirtschaft 2019*. https://www.noef.v.at/noef/Landwirtschaft/Der_Gruene_Bericht_2019.pdf
- Banbury, C. M., & Mitchell, W. (1995). The Effect of Introducing Important Incremental Innovations on Market Share and Business Survival. *Strategic Management Journal*, 16(S1), 161–182. <https://doi.org/10.1002/smj.4250160922>
- Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Beck, L., Janssens, W., Debruyne, M., & Lommelen, T. (2011). A Study of the Relationships between Generation, Market Orientation, and Innovation in Family Firms. *Family Business Review*, 24(3), 252–272. <https://doi.org/10.1177/0894486511409210>
- Bennedson, M., & Foss, N. (2015). Family Assets and Liabilities in the Innovation Process. *California Management Review*, 58(1), 65–81. <https://doi.org/10.1525/cm.2015.58.1.65>
- Boyd, B. K., Dess, G. G., & Rasheed, A. M. A. (1993). Divergence Between Archival and Perceptual Measures of the Environment: Causes and Consequences. *Academy of Management Review*, 18(2), 204–226. <https://doi.org/10.5465/amr.1993.3997514>
- Brines, S., Shepherd, D., & Woods, C. (2013). SME Family Business Innovation: Exploring New Combinations. *Journal of Family Business Management*, 3(2), 117–135. <https://doi.org/10.1108/jfbm-01-2012-0002>
- Bundesministerium für Landwirtschaft, Regionen und Tourismus (Federal Ministry of Agriculture, Regions and Tourism). (2020). *Grüner Bericht. Die Situation der österreichischen Land- und Forstwirtschaft*. <https://gruenerbericht.at/cm4/jdownload/send/2-gr-bericht-terr-eich/2167-gb2020>
- Bundesministerium für Nachhaltigkeit und Tourismus (Federal Ministry for Sustainability and Tourism). (2019a). Data, Facts and Figures 2019/2020. *Data, Facts and Figures*.
- Bundesministerium für Nachhaltigkeit und Tourismus (Federal Ministry for Sustainability and Tourism). (2019b). *Grüner Bericht*. <https://gruenerbericht.at/cm4/jdownload/send/2-gr-bericht-terreich/2007-gb2019>
- Cabrera-Suárez, M. K., de la Cruz Déniz-Déniz, M., & Martín-Santana, J. D. (2011). Familiness and Market Orientation: A Stakeholder Approach. *Journal of Family Business Strategy*, 2(1), 34–42. <https://doi.org/10.1016/j.jfbs.2011.01.001>
- Caffaro, F., & Cavallo, E. (2019). The effects of individual variables, farming system characteristics and perceived barriers on actual use of smart farming technologies: Evidence from the Piedmont region, northwestern Italy. *Agriculture*, 9(5), 111. <https://doi.org/10.3390/agriculture9050111>
- Campbell, J. (2014). Cooperate or Compete: The Relationship of Strategic Orientation and Firm Performance for Farmers' Market Vendors. *Journal of Small Business & Entrepreneurship*, 27(1), 27–42. <https://doi.org/10.1080/08276331.2014.932965>
- Casillas, J. C., Moreno, A. M., & Barbero, J. L. (2010). A Configurational Approach of the Relationship Between Entrepreneurial Orientation and Growth of Family Firms. *Family Business Review*, 23(1), 27–44. <https://doi.org/10.1177/0894486509345159>
- Chen, H. L., & Hsu, W. T. (2009). Family Ownership, Board Independence, and R&D Investment. *Family Business Review*, 22(4), 347–362. <https://doi.org/10.1177/0894486509341062>
- Chirico, F., & Salvato, C. (2008). Knowledge Integration and Dynamic Organizational Adaptation in Family Firms. *Family Business Review*, 21(2), 169–181. <https://doi.org/10.1111/j.1741-6248.2008.00117.x>
- Chirico, F., & Salvato, C. (2016). Knowledge Internalization and Product Development in Family Firms: When Relational and Affective Factors Matter. *Entrepreneurship Theory and Practice*, 40(1), 201–229. <https://doi.org/10.1111/etap.12114>
- Chirico, F., Sirmon, D. G., Sciascia, S., & Mazzola, P. (2011). Resource Orchestration in Family Firms: Investigating How Entrepreneurial Orientation, Generational Involvement, and Participative Strategy Affect Performance. *Strategic Entrepreneurship Journal*, 5(4), 307–326. <https://doi.org/10.1002/sej.121>

- Chrisman, J. J., Chua, J. H., De Massis, A., Frattini, F., & Wright, M. (2015). The Ability and Willingness paradox in Family Firm Innovation. *Journal of Product Innovation Management*, 32(3), 310–318. <https://doi.org/10.1111/jpim.12207>
- Chrisman, J. J., & Patel, P. C. (2012). Variations in R&D Investments of Family and Nonfamily Firms: Behavioral Agency and Myopic Loss Aversion Perspectives. *Academy of Management Journal*, 55(4), 976–997. <https://doi.org/10.5465/amj.2011.0211>
- Chua, J. H., Chrisman, J. J., & Sharma, P. (1999). Defining the Family Business by Behavior. *Entrepreneurship Theory and Practice*, 23(4), 19–39. <https://doi.org/10.1177/104225879902300402>
- Chua, J. H., Chrisman, J. J., & Sharma, P. (2003). Succession and Nonsuccession Concerns of Family Firms and Agency Relationship with Nonfamily Managers. *Family Business Review*, 16(2), 89–107. <https://doi.org/10.1111/j.1741-6248.2003.00089.x>
- Classen, N., Carree, M., Van Gils, A., & Peters, B. (2014). Innovation in Family and Non-Family SMEs: An Exploratory Analysis. *Small Business Economics*, 42(3), 595–609. <https://doi.org/10.1007/s11187-013-9490-z>
- Cooper, M. J., Upton, N., & Seaman, S. (2005). Customer Relationship Management: A Comparative Analysis of Family and Nonfamily Business Practices. *Journal of Small Business Management*, 43(3), 242–256. <https://doi.org/10.1111/j.1540-627x.2005.00136.x>
- Cyert, R. M., & March, J. G. (1963). *A Behavioral Theory of the Firm*. Prentice-Hall.
- Daberkow, S. G., & McBride, W. D. (2003). Farm and Operator Characteristics Affecting the Awareness and Adoption of Precision Agriculture Technologies in the US. *Precision Agriculture*, 4(2), 163–177. <https://doi.org/10.1023/a:1024557205871>
- Daily, C. M., & Dollinger, M. J. (1992). An Empirical Examination of Ownership Structure in Family and Professionally Managed Firms. *Family Business Review*, 5(2), 117–136. <https://doi.org/10.1111/j.1741-6248.1992.00117.x>
- Darnhofer, I., Lamine, C., Strauss, A., & Navarrete, M. (2016). The Resilience of Family Farms: Towards a Relational Approach. *Journal of Rural Studies*, 44(April), 111–122. <https://doi.org/10.1016/j.jrurstud.2016.01.013>
- Dawson, J. F. (2014). Moderation in Management Research: What, Why, When, and How. *Journal of Business and Psychology*, 29(1), 1–19. <https://doi.org/10.1007/s10869-013-9308-7>
- De Massis, A., Frattini, F., Kotlar, J., Petruzzelli, A. M., & Wright, M. (2016). Innovation through Tradition: Lessons from Innovative Family Businesses and Directions for Future Research. *Academy of Management Perspectives*, 30(1), 93–116. <https://doi.org/10.5465/amp.2015.0017>
- De Rosa, M., McElwee, G., & Smith, R. (2019). Farm Diversification Strategies in Response to Rural Policy: A Case from Rural Italy. *Land Use Policy*, 81(February), 291–301. <https://doi.org/10.1016/j.landusepol.2018.11.006>
- De Waal, A., & Goedegebuure, R. (2017). Investigating the Causal Link Between a Management Improvement Technique and Organizational Performance. *Management Research Review*, 40(4), 429–450. <https://doi.org/10.1108/mrr-03-2016-0058>
- De Wolf, P., McElwee, G., & Schoorlemmer, H. (2007). The European farm entrepreneur: A comparative perspective. *International Journal of Entrepreneurship and Small Business*, 4(6), 679–692. <https://doi.org/10.1504/ijesb.2007.014979>
- Deakins, D., & Freel, M. (2003). *Entrepreneurship and Small Firms* (3rd ed.). McGraw-Hill.
- Diaz-Moriana, V., Clinton, E., Kammerlander, N., Lumpkin, G. T., & Craig, J. B. (2020). Innovation Motives in Family Firms: A Transgenerational View. *Entrepreneurship Theory and Practice*, 44(2), 256–287. <https://doi.org/10.1177/1042258718803051>
- Diederer, P., Van Meijl, H., & Wolters, A. (2003). Modernisation in Agriculture: What Makes a Farmer Adopt an Innovation? *International Journal of Agricultural Resources, Governance and Ecology*, 2(3/4), 328–342. <https://doi.org/10.1504/ijarge.2003.003975>
- Dierickx, I., & Cool, K. (1989). Asset Stock Accumulation and Sustainability of Competitive Advantage. *Management Science*, 35(12), 1504–1511. <https://doi.org/10.1287/mnsc.35.12.1504>
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. John Wiley & Sons.
- Dobni, C. B., & Luffman, G. (2000). Market Orientation and Market Strategy Profiling: An Empirical Test of Environment-Behaviour-Action Coalignment and its Performance Implications. *Management Decision*, 38(8), 503–522. <https://doi.org/10.1108/00251740010378255>
- Duran, P., Kammerlander, N., Van Essen, M., & Zellweger, T. (2016). Doing More with Less: Innovation Input and Output in Family Firms. *Academy of Management Journal*, 59(4), 1224–1264. <https://doi.org/10.5465/amj.2014.0424>
- Eurostat. (2016). *Farm Structure Survey*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agriculture_statistics_-_family_farming_in_the_EU&oldid=467588
- Eurostat. (2020). *Agriculture, forestry and fishery statistics*. <https://ec.europa.eu/eurostat/documents/3217494/12069644/KS-FK-20-001-EN-N.pdf/a7439b01-671b-80ce-85e4-4d803c44340a?t=1608139005821>
- Ferguson, R. S., & Lovell, S. T. (2017). Livelihoods and Production Diversity on US Permaculture Farms. *Agroecology and Sustainable Food Systems*, 41(6), 588–613. <https://doi.org/10.1080/21683565.2017.1320349>
- Forsman, H., & Temel, S. (2011). Innovation and Business Performance in Small Enterprises: An Enterprise-Level Analysis. *International Journal of Innovation Management*, 15(03), 641–665. <https://doi.org/10.1142/s1363919611003258>

- Frambach, R. T., Prabhu, J., & Verhallen, T. M. M. (2003). The Influence of Business Strategy on New Product Activity: The Role of Market Orientation. *International Journal of Research in Marketing*, 20(4), 377–397. <https://doi.org/10.1016/j.ijresmar.2003.03.003>
- Frank, H., Güttel, W. H., & Weismeier-Sammer, D. (2010). Ambidexterity in Familienunternehmen: Die Top-Management-Familie als Innovationsinkubator. In G. Schreyögg & P. Conrad (Eds.), *Organisation und Strategie: Managementforschung 20* (pp. 183–222). Gabler.
- Frank, H., Kessler, A., Bachner, C., Fuetsch, E., & Suess-Reyes, J. (2019). Principles for Innovation Management in Family Firms. *Journal of Family Business Management*, 9(3), 319–348. <https://doi.org/10.1108/jfbm-09-2018-0049>
- Frank, H., Kessler, A., & Korunka, C. (2012). The Impact of Market Orientation on Family Firm Performance. *International Journal of Entrepreneurship and Small Business*, 16(4), 372–385. <https://doi.org/10.1504/ijesb.2012.047607>
- Frank, H., Kessler, A., Rusch, T., Suess-Reyes, J., & Weismeier-Sammer, D. (2017). Capturing the Familiness of Family Businesses: Development of the Family Influence Familiness Scale (FIFS). *Entrepreneurship Theory and Practice*, 41(5), 709–742. <https://doi.org/10.1111/etap.12229>
- Friedmann, H. (1980). Household Production and the National Economy: Concepts for the Analysis of Agrarian Formations. *The Journal of Peasant Studies*, 7(2), 158–184. <https://doi.org/10.1080/03066158008438099>
- Galloway, L., & Mochrie, R. (2006). Entrepreneurial Motivation, Orientation and Realization in Rural Economies: A Study of Rural Scotland. *The International Journal of Entrepreneurship and Innovation*, 7(3), 173–183. <https://doi.org/10.5367/0000006778026617>
- Garcia, R., & Calantone, R. (2002). A Critical Look at Technological Innovation Typology and Innovativeness Terminology: A Literature Review. *Journal of Product Innovation Management*, 19(2), 110–132. <https://doi.org/10.1111/1540-5885.1920110>
- Gebremedhin, B., & Jaleta, M. (2012, August 24). Market Orientation and Market Participation of Smallholders in Ethiopia: Implications for Commercial Transformation [Selected Paper prepared for presentation]. *International Association of Agricultural Economists (IAAE) Triennial Conference, Foz Do Iguacu, Brazil*. <https://ageconsearch.umn.edu/record/125847/>
- Goel, S., & Jones, R. J., III. (2016). Entrepreneurial Exploration and Exploitation in Family Business: A Systematic Review and Future Directions. *Family Business Review*, 29(1), 94–120. <https://doi.org/10.1177/0894486515625541>
- Gomez-Mejia, L. R., Campbell, J. T., Martin, G., Hoskisson, R. E., Makri, M., & Sirmon, D. G. (2014). Socioemotional Wealth as a Mixed Gamble: Revisiting Family Firm R&D Investments with the Behavioral Agency Model. *Entrepreneurship Theory and Practice*, 38(6), 1351–1374. <https://doi.org/10.1111/etap.12083>
- González, M., Guzmán, A., Pombo, C., & Trujillo, M. A. (2012). Family Firms and Financial Performance: The Cost of Growing. *Emerging Markets Review*, 13(4), 626–649. <https://doi.org/10.1016/j.ememar.2012.09.003>
- Gottschall, R. L., & Woods, J. A. (2020). Family human capital and the championing of innovation in small firms. *Journal of Small Business Strategy*, 30(3), 1–15. <https://libjournals.mtsu.edu/index.php/jsbs/article/view/1633/1189>
- Gould, B. W., Saupe, W. E., & Klemme, R. M. (1989). Conservation Tillage: The Role of Farm and Operator Characteristics and the Perception of Soil Erosion. *Land Economics*, 65(2), 167–182. <https://doi.org/10.2307/3146791>
- Grande, J., Madsen, E. L., & Borch, O. J. (2011). The Relationship Between Resources, Entrepreneurial Orientation and Performance in Farm-Based Ventures. *Entrepreneurship & Regional Development*, 23(3–4), 89–111. <https://doi.org/10.1080/08985620903183710>
- Grinstein, A. (2008). The Effect of Market Orientation and its Components on Innovation Consequences: A Meta-Analysis. *Journal of the Academy of Marketing Science*, 36(2), 166–173. <https://doi.org/10.1007/s1147-007-0053-1>
- Groier, M., Machold, I., & Loibl, E. (2018). *Landwirtschaftliche Kleinbetriebe zwischen Nachhaltigkeit und Globalisierung* (No. 71). Bundesanstalt für Bergbauernfragen. <https://www.berggebiete.at/cm3/de/home/20-themen/laendliche-entwicklung/829-fb71-landwirtschaftliche-kleinbetrieb-e-zwischen-nachhaltigkeit-und-globalisierung.html>
- Grunert, K. G., Larsen, H. H., Madsen, T. G., & Baadsgaard, A. (1995). *Market Orientation in Food and Agriculture*. Kluwer Academic Publishers.
- Gunday, G., Ulusoy, G., Kilic, K., & Alpkan, L. (2011). Effects of Innovation Types on Firm Performance. *International Journal of Production Economics*, 133(2), 662–676. <https://doi.org/10.1016/j.ijpe.2011.05.014>
- Habbershon, T. G., Nordqvist, M., & Zellweger, T. M. (2010). Transgenerational Entrepreneurship. In M. Nordqvist & T. Zellweger (Eds.), *Transgenerational Entrepreneurship: Exploring Growth and Performance in Family Firms across Generations* (pp. 1–38). Edward Elgar. <https://doi.org/10.4337/9781849805469.00009>
- Hair, J. F., Black, W., Babin, B., & Anderson, R. (2010). *Multilevel Data Analysis: A Global Perspective*. Pearson Prentice Hall.
- Hair, J. F., Money, A. H., Samouel, P., & Page, M. (2007). Research Methods for Business. *Education + Training*, 49(4), 336–337. <https://doi.org/10.1108/et.2007.49.4.336.2>
- Handler, W. C. (1994). Succession in Family Business: A Review of the Research. *Family Business Review*, 7(2), 133–157. <https://doi.org/10.1111/j.1741-6248.1994.00133.x>
- Heady, E. O. (1952). *Economics of Agricultural Production and Resource Use*. Prentice-Hall.

- Hermans, F., Klerkx, L., & Roep, D. (2015). Structural Conditions for Collaboration and Learning in Innovation Networks: Using an Innovation System Performance Lens to Analyse Agricultural Knowledge Systems. *The Journal of Agricultural Education and Extension*, 21(1), 35–54. <https://doi.org/10.1080/1389224x.2014.991113>
- Hirsch-Kreinsen, H. (2008). “Low-technology”: A Forgotten Sector in Innovation Policy. *Journal of Technology Management & Innovation*, 3(3), 11–20. <https://doi.org/10.4067/s0718-27242008000100002>
- Hovorka, G. & Bundesanstalt für Bergbauernfragen. (2011). Die Berglandwirtschaft in Österreich – Aufgaben, Leistungen und notwendige Rahmenbedingungen. *Journal of Socio-Economics in Agriculture*, 4(1), 111–134. http://archive.jsagr.org/v4/YSA2011_Hovorka.pdf
- Hsiao, Y. C., Chen, C. J., Guo, R. S., & Hu, K. K. (2017). First-mover strategy, resource capacity alignment, and new product performance: A framework for mediation and moderation effects. *R&D Management*, 47(1), 75–87. <https://doi.org/10.1111/radm.12157>
- Hunt, S. D., & Morgan, R. M. (1995). The Comparative Advantage Theory of Competition. *Journal of Marketing*, 59(2), 1–15. <https://doi.org/10.1177/002224299505900201>
- Im, S., & Workman, J. P., Jr. (2004). Market Orientation, Creativity, and New Product Performance in High-Technology Firms. *Journal of Marketing*, 68(2), 114–132. <https://doi.org/10.1509/jmkg.68.2.114.27788>
- Ingram, J. (2008). Are Farmers in England Equipped to Meet the Knowledge Challenge of Sustainable Soil Management? An Analysis of Farmer and Advisor Views. *Journal of Environmental Management*, 86(1), 214–228. <https://doi.org/10.1016/j.jenvman.2006.12.036>
- Inwood, S. M., & Sharp, J. S. (2012). Farm Persistence and Adaptation at the Rural-Urban Interface: Succession and Farm Adjustment. *Journal of Rural Studies*, 28(1), 107–117. <https://doi.org/10.1016/j.jrurstud.2011.07.005>
- Jin, Z., Navare, J., & Lynch, R. (2019). The Relationship Between Innovation Culture and Innovation Outcomes: Exploring the Effects of Sustainability Orientation and Firm Size. *R&D Management*, 49(4), 607–623. <https://doi.org/10.1111/radm.12351>
- Kahan, D. (2013). *Market-Oriented Farming: An Overview*. Food and Agriculture Organization of the United Nations (FAO).
- Kahn, K. B. (2018). Understanding Innovation. *Business Horizons*, 61(3), 453–460. <https://doi.org/10.1016/j.bushor.2018.01.011>
- Kellermanns, F. W., & Eddleston, K. A. (2006). Corporate Venturing in Family Firms: Does the Family Matter. *Entrepreneurship Theory and Practice*, 30(6), 837–854. <https://doi.org/10.1111/j.1540-6520.2006.00153.x>
- Kellermanns, F. W., Eddleston, K. A., Barnett, T., & Pearson, A. (2008). An Exploratory Study of Family Member Characteristics and Involvement: Effects on Entrepreneurial Behavior in the Family Firm. *Family Business Review*, 21(1), 1–14. <https://doi.org/10.1111/j.1741-6248.2007.00107.x>
- Kepner, E. (1991). The family and the firm: A coevolutionary perspective. *Family Business Review*, 4(4), 445–461. <https://doi.org/10.1111/j.1741-6248.1991.00445.x>
- KeyQuest & Landwirtschaftskammer Österreich. (2016). *Landwirte-Befragung zum Thema Direktvermarktung*. https://www.gutesvombauernhof.at/uploads/pics/Oestreich/ChanceDV/PB_Chance_DV-Studie_Kurzfassung_Charts_20160606.pdf
- Kim, H., Kim, H., & Lee, P. M. (2008). Ownership Structure and the Relationship Between Financial Slack and R&D Investments: Evidence from Korean Firms. *Organization Science*, 19(3), 404–418. <https://doi.org/10.1287/orsc.1080.0360>
- Kohli, A. K., & Jaworski, B. J. (1990). Market Orientation: The Construct, Research Propositions, and Managerial Implications. *Journal of Marketing*, 54(2), 1–18. <https://doi.org/10.1177/00222429900540201>
- Kotlar, J., Fang, H., De Massis, A., & Frattini, F. (2014). Profitability Goals, Control Goals, and the R&D Investment Decisions of Family and Nonfamily Firms. *Journal of Product Innovation Management*, 31(6), 1128–1145. <https://doi.org/10.1111/jpim.12165>
- Küster, I., & Vila, N. (2011). The Market Orientation-Innovation-Success Relationship: The Role of Internationalization Strategy. *Innovation*, 13(1), 36–54. <https://doi.org/10.5172/impp.2011.13.1.36>
- Lamine, C., & Bellon, S. (2009). Conversion to Organic Farming: a Multidimensional Research Object at the Crossroads of Agricultural and Social Sciences. A Review. *Agronomy for Sustainable Development*, 29(1), 97–112. https://doi.org/10.1007/978-90-481-2666-8_40
- Läpple, D., & Thorne, F. (2019). The Role of Innovation in Farm Economic Sustainability: Generalised Propensity Score Evidence from Irish Dairy Farms. *Journal of Agricultural Economics*, 70(1), 178–197. <https://doi.org/10.1111/1477-9552.12282>
- Lavie, D., & Rosenkopf, L. (2006). Balancing Exploration and Exploitation in Alliance Formation. *Academy of Management Journal*, 49(4), 797–818. <https://doi.org/10.5465/amj.2006.22083085>
- Lavie, D., Stettner, U., & Tushman, M. L. (2010). Exploration and Exploitation within and across Organizations. *Academy of Management Annals*, 4(1), 109–155. <https://doi.org/10.5465/19416521003691287>
- Le Breton-Miller, I., & Miller, D. (2006). Why Do Some Family Businesses Out-Compete? Governance, Long-Term Orientations, and Sustainable Capability. *Entrepreneurship Theory and Practice*, 30(6), 731–746. <https://doi.org/10.1111/j.1540-6520.2006.00147.x>

- Le Gal, P.-Y., Dugué, P., Faure, G., & Novak, S. (2011). How Does Research Address the Design of Innovative Agricultural Production Systems at the Farm Level? A Review. *Agricultural Systems*, 104(9), 714–728. <http://doi.org/10.1016/j.agsy.2011.07.007>
- Lee, R., Lee, J. H., & Garrett, T. C. (2019). Synergy Effects of Innovation on Firm Performance. *Journal of Business Research*, 99(June), 507–515. <https://doi.org/10.1016/j.jbusres.2017.08.032>
- Lin, N. (2000). Inequality in Social Capital. *Contemporary Sociology*, 29(6), 785–795. <https://doi.org/10.2307/2654086>
- Litz, R. A., & Kleysen, R. F. (2001). Your Old Men Shall Dream Dreams, your Young Men Shall See Visions: Toward a Theory of Family Firm Innovation with Help from the Brubeck Family. *Family Business Review*, 14(4), 335–351. <https://doi.org/10.1111/j.1741-6248.2001.00335.x>
- Lockeretz, W., & Madden, P. (1987). Midwestern Organic Farming: A Ten-Year Follow-Up. *American Journal of Alternative Agriculture*, 2(2), 57–63. <https://doi.org/10.1017/s0889189300001582>
- Long, T. B., Blok, V., & Coninx, I. (2016). Barriers to the Adoption and Diffusion of Technological Innovations for Climate-Smart Agriculture in Europe: Evidence from the Netherlands, France, Switzerland and Italy. *Journal of Cleaner Production*, 112(Part 1), 9–21. <http://doi.org/10.1016/j.jclepro.2015.06.044>
- Lueger, M. (1997). Unternehmenserfolg als Hindernis. Zur sozialen Logik von Entwicklungsbarrieren. *Journal für Betriebswirtschaft*, 47(5), 248–265.
- Lumpkin, G. T., Brigham, K. H., & Moss, T. W. (2010). Long-term orientation: Implications for the entrepreneurial orientation and performance of family businesses. *Entrepreneurship & Regional Development*, 22(3–4), 241–264. <https://doi.org/10.1080/08985621003726218>
- Lundvall, B.-A. (1995). *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. Pinter Publishers.
- March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Organization Science*, 2(1), 71–87. <https://doi.org/10.1287/orsc.2.1.71>
- McElwee, G. (2006). Farmers as Entrepreneurs: Developing Competitive Skills. *Journal of Developmental Entrepreneurship*, 11(03), 187–206. <https://doi.org/10.1142/s1084946706000398>
- McElwee, H., & Bosworth, G. (2010). Exploring the strategic skills of farmers across a typology of farm diversification approaches. *Journal of Farm Management*, 13(12), 819–838. https://www.iagrm.com/content/large/journals/jofm/volume_13/jofm-vol13-no12-pages-819-838.pdf
- Miller, D. (1991). Stale in the Saddle: CEO Tenure and the Match between Organization and Environment. *Management Science*, 37(1), 34–52. <https://doi.org/10.1287/mnsc.37.1.34>
- Miller, D., & Le Breton-Miller, I. (2005). Management Insights from Great and Struggling Family Businesses. *Long Range Planning*, 38(6), 517–530. <http://doi.org/10.1016/j.lrp.2005.09.001>
- Mirzaei, O., Micheels, E. T., Boecker, A., Mirzaei, O., Micheels, E. T., & Boecker, A. (2016). Product and Marketing Innovation in Farm-Based Businesses: The Role of Entrepreneurial Orientation and Market Orientation. *International Food and Agribusiness Management Review*, 19(2), 99–130. <https://doi.org/10.22004/AG.ECON.234958>
- Mochrie, R., Galloway, L., & Donnelly, E. (2006). Attitudes to growth and experiences of growth amongst Scottish SMEs. *International Journal of Entrepreneurial Behaviour and Research*, 12(1), 7–20. <https://doi.org/10.1108/13552550610644454>
- Nahapiet, J., & Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organizational Advantage. *Academy of Management Review*, 23(2), 242–266. <https://doi.org/10.5465/amr.1998.533225>
- Narver, J. C., & Slater, S. F. (1990). The Effect of a Market Orientation on Business Profitability. *Journal of Marketing*, 54(4), 20–35. <https://doi.org/10.1177/002224299005400403>
- Narver, J. C., Slater, S. F., & MacLachlan, D. L. (2004). Responsive and Proactive Market Orientation and New-Product Success. *Journal of Product Innovation Management*, 21(5), 334–347. <https://doi.org/10.1111/j.0737-6782.2004.00086.x>
- Nelson, R., & Winter, S. (1982). *An Evolutionary Theory of Economic Change*. Belknap Press.
- Nieto, M. J., Santamaria, L., & Fernandez, Z. (2015). Understanding the Innovation Behavior of Family Firms. *Journal of Small Business Management*, 53(2), 382–399. <https://doi.org/10.1111/jsbm.12075>
- Nohria, N., & Gulati, R. (1996). Is Slack Good or Bad for Innovation? *Academy of Management Journal*, 39(5), 1245–1264. <https://doi.org/10.5465/256998>
- Nolten, R. (2010). Ziel- und Handlungssysteme von Landwirten – eine empirische Studie aus der Eifelregion. In S. Helmle (Ed.), *Selbst- und Fremdwahrnehmung der Landwirtschaft* (pp. 15–29). Margraf Publishers.
- Padel, S. (2001). Conversion to Organic Farming: A Typical Example of the Diffusion of an Innovation? *Sociologia Ruralis*, 41(1), 40–61. <https://doi.org/10.1111/1467-9523.00169>
- Pielsticker, D. I., & Hiebl, M. R. W. (2020). Survey Response Rates in Family Business Research. *European Management Review*, 17(1), 327–346. <http://doi.org/10.1111/emre.12375>
- Poutziouris, P. Z. (2001). The Views of Family Companies on Venture Capital: Empirical Evidence from the UK Small to Medium-Size Enterprising Economy. *Family Business Review*, 14(3), 277–291. <https://doi.org/10.1111/j.1741-6248.2001.00277.x>
- Ramirez, A. (2013). The influence of social networks on agricultural technology adoption. *Procedia-Social and Behavioral Sciences*, 79, 101–116. <https://doi.org/10.1016/j.sbspro.2013.05.059>
- Renting, H., Marsden, T. K., & Banks, J. (2003). Understanding Alternative Food Networks: Exploring the Role of Short Food Supply Chains in Rural Development. *Environment and Planning A*, 35(3), 393–411. <https://doi.org/10.1068/a3510>

- Ritala, P., Olander, H., Michailova, S., & Husted, K. (2015). Knowledge Sharing, Knowledge Leaking and Relative Innovation Performance: An Empirical Study. *Technovation*, 35, 22–31. <https://doi.org/10.1016/j.technovation.2014.07.011>
- Romanelli, E., & Tushman, M. L. (1994). Organizational Transformation as Punctuated Equilibrium: An Empirical Test. *Academy of Management Journal*, 37(5), 1141–1166. <https://doi.org/10.5465/256669>
- Salvato, C., & Melin, L. (2008). Creating Value across Generations in Family-Controlled Businesses: The Role of Family Social Capital. *Family Business Review*, 21(3), 259–276. <https://doi.org/10.1177/08944865080210030107>
- Sciascia, S., Mazzola, P., & Chirico, F. (2013). Generational Involvement in the Top Management Team of Family Firms: Exploring Nonlinear Effects on Entrepreneurial Orientation. *Entrepreneurship Theory and Practice*, 37(1), 69–85. <https://doi.org/10.1111/j.1540-6520.2012.00528.x>
- Sciascia, S., Naldi, L., & Hunter, E. (2006). Market Orientation as Determinant of Entrepreneurship: An Empirical Investigation on SMEs. *The International Entrepreneurship and Management Journal*, 2(1), 21–38. <https://doi.org/10.1007/s11365-006-7087-6>
- Sciascia, S., Nordqvist, M., Mazzola, P., & De Massis, A. (2015). Family Ownership and R&D Intensity in Small- and Medium-Sized Firms. *Journal of Product Innovation Management*, 32(3), 349–360. <https://doi.org/10.1111/jpim.12204>
- Shane, S., & Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research. *Academy of Management Review*, 25(1), 217–226. <https://doi.org/10.5465/amr.2000.2791611>
- Sheremata, W. A. (2000). Centrifugal and Centripetal Forces in Radical New Product Development under Time Pressure. *Academy of Management Review*, 25(2), 389–408. <https://doi.org/10.5465/amr.2000.3312925>
- Sinabell, F. (2004). Entwicklungstendenzen der österreichischen Landwirtschaft seit dem EU-Beitritt. *Ländlicher Raum*, 6.
- Smith, A. M., Duncan, P., Edgar, D., & McColl, J. (2021). Responsible and Sustainable Farm Business: Contextual Duality as the Moderating Influence on Entrepreneurial Orientation. *The International Journal of Entrepreneurship and Innovation*, 22(2), 88–99. <https://doi.org/10.1177/1465750320944702>
- Smith, W. K., & Tushman, M. L. (2005). Managing Strategic Contradictions: A Top Management Model for Managing Innovation Streams. *Organization Science*, 16(5), 522–536. <https://doi.org/10.1287/orsc.1050.0134>
- Snow, C. C., & Hrebiniak, L. G. (1980). Strategy, Distinctive Competence, and Organizational Performance. *Administrative Science Quarterly*, 25(2), 317–336. <https://doi.org/10.2307/2392457>
- Sorenson, R. L., Goodpaster, K. E., Hedberg, P. R., & Yu, A. (2009). The Family Point of View, Family Social Capital, and Firm Performance: An Exploratory Test. *Family Business Review*, 22(3), 239–253. <https://doi.org/10.1177/0894486509332456>
- Statistik Austria. (2019). *Landwirtschaftliche Gesamtrechnung (LGR): Österreicherergebnisse 2018*. https://www.statistik.at/web_de/statistiken/wirtschaft/land_und_forstwirtschaft/gesamtrechnung/landwirtschaftliche_gesamtrechnung/index.html
- Suess, J. (2014). Family Governance – Literature Review and the Development of a Conceptual Model. *Journal of Family Business Strategy*, 5(2), 138–155. <https://doi.org/10.1016/j.jfbs.2014.02.001>
- Suess-Reyes, J., & Fuetsch, E. (2016). The Future of Family Farming: A Literature Review on Innovative, Sustainable and Succession-Oriented Strategies. *Journal of Rural Studies*, 47(Part A), 117–140. <https://doi.org/10.1016/j.jrurstud.2016.07.008>
- Sunding, D., & Zilberman, D. (2001). The Agricultural Innovation Process: Research and Technology Adoption in a Changing Agricultural Sector. *Handbooks in Economics*, 18(1A), 207–262. [https://doi.org/10.1016/s1574-0072\(01\)10007-1](https://doi.org/10.1016/s1574-0072(01)10007-1)
- Sydow, J., Schreyögg, G., & Koch, J. (2009). Organizational Path Dependence: Opening the Black Box. *Academy of Management Review*, 34(4), 689–709. <https://doi.org/10.5465/amr.34.4.zok689>
- Testa, R., Di Trapani, A. M., Di Sgroi, F., & Tudisca, S. (2014). Economic Analysis of Process Innovations in the Management of Olive Farms. *American Journal of Applied Sciences*, 11(9), 1486–1491. <https://doi.org/10.3844/ajassp.2014.1486.1491>
- Trott, P. (1998). *Innovation Management and New Product Development*. Prentice Hall.
- Veidal, A., & Flaten, O. (2014). Entrepreneurial Orientation and Farm Business Performance. The Moderating Role of on-Farm Diversification and Location. *International Journal of Entrepreneurship and Innovation*, 15(2), 101–112. <https://doi.org/10.5367/ijei.2014.0147>
- Verhees, F. J., Kuipers, A., & Klopčič, M. (2011). Entrepreneurial Proclivity and Farm Performance: The Cases of Dutch and Slovenian Farmers. *The International Journal of Entrepreneurship and Innovation*, 12(3), 169–177. <https://doi.org/10.5367/ijei.2011.0039>
- Verhees, F. J., Lans, T., & Versteegen, J. A. A. M. (2012). The Influence of Market and Entrepreneurial Orientation on Strategic Marketing Choices: The Cases of Dutch Farmers and Horticultural Growers. *Journal on Chain and Network Science*, 12(2), 167–179. <https://doi.org/10.3920/jcns2012.x011>
- Wheeler, S., Bjornlund, H., Zuo, A., & Edwards, J. (2012). Handing Down the Farm? The Increasing Uncertainty of Irrigated Farm Succession in Australia. *Journal of Rural Studies*, 28(3), 266–275. <https://doi.org/10.1016/j.jrurstud.2012.04.001>
- Woodfield, P., & Husted, K. (2017). Intergenerational Knowledge Sharing in Family Firms: Case-Based Evidence from the New Zealand Wine Industry. *Journal of Family Business Strategy*, 8(1), 57–69. <https://doi.org/10.1016/j.jfbs.2017.01.001>

Yaseen, A., Bryceson, K., & Mungai, A. N. (2018). Commercialization Behaviour in Production Agriculture: The Overlooked Role of Market Orientation. *Journal of Agribusiness in Developing and Emerging Economies*, 8(3), 579–602. <https://doi.org/10.1108/jadee-07-2017-0072>

Zahra, S. A. (2005). Entrepreneurial Risk Taking in Family Firms. *Family Business Review*, 18(1), 23–40. <https://doi.org/10.1111/j.1741-6248.2005.00028.x>

Zaltman, G., Duncan, R., & Holbek, J. (1973). *Innovations and Organizations*. John Wiley & Sons.

Appendix

Table A1. Correlation matrix of study variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Innovation	-							
2. Market orientation	.415***	-						
3. Multiple generations in management	.117**	.104**	-					
4. Farm performance	.421***	.361***	.019	-				
5. Farm size in hectares	.247***	.080*	.004	.282***	-			
6. Sideline business	-.151***	-.153***	.029	-.217***	-.360***	-		
7. Age of farm manager	-.126***	-.052	-.062	-.044	.001	-.041	-	
8. No successor	-.225***	-.149***	-.019	-.167***	-.082*	.050	.130***	-

*p < .05. **p < .01. ***p < .001.

All correlations between independent variables < 0.4

Measurements

Market orientation

(based on Kohli & Jaworski, 1990 adapted by Frank et al., 2012 and Narver et al., 2004)

How much do the following statements apply to your farm? (1 - strongly disagree to 6 - completely agree)

- We actively market our products or services.
- We are actively looking for new customers.
- We actively ask our customers about our product or service quality.
- We actively compare our offering with that of the main competitors.
- We observe the market and react to it.

Multiple generations in management

How many generations are involved in the management of the farm? (only one answer allowed)

- One generation
- Two generations
- Three generations

For the analysis, the categories “two generations” and “three generations” were consolidated, resulting in a categorical variable with the two options “one generation in management” and “multiple generations in management”.

Farm performance

How much do the following statements apply to your farm? (1 - strongly disagree to 6 - completely agree)

- Measured against important comparable farms, we achieve higher economic returns.
- Measured against important comparable farms, we operate more efficiently.
- Measured against important comparable farms, we have more financial resources available.
- Measured against important comparable farms, we have a higher quality in areas of our production focus.

Innovation measures

Measured against comparable farms, in the last five years we have implemented innovation measures in the following areas in our farm (1 - much less to 6 - much more):

- new devices/machines
- operations buildings
- new resources adapted to soil conditions (e.g. fertilizers, seeds)
- new procedures (e.g. animal husbandry, irrigation, switch to organic)
- new animal or plant species

Correlations

See Table A1.