

## **THE TRANSFER OF INTERGENERATIONAL FAMILY KNOWLEDGE FOR SUSTAINABLE COMMERCIAL FARMING IN MPUMALANGA PROVINCE OF SOUTH AFRICA: LESSONS FOR EXTENSION**

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### **ABSTRACT**

*This study focuses on intergenerational knowledge transfer in commercial family farms as a tool for sustainable agriculture. The rationale is two pronged; the need for smallholder farmers to learn from the commercial enterprises; and extension professional to assess how these experiences can be integrated into practice. The key research questions addressed are; what key intergenerational knowledge sustains commercial farming? What are the modes of knowledge transfer? What are key learning points for smallholder farmer extension practice? A case study approach was applied and data was collected using a semi structured questionnaire and research on family histories. Key knowledge themes that were identified as critical for intergenerational transfer include; maintaining a business mindset; investment and diversification decisions; planning and implementing operational plans; valuing human resources; genetic preservation; adapting to changing climatic conditions and risk taking. The key modes of knowledge transfer were continuous engagement, discussions and networking. The study concludes that smallholder farmers need to incorporate these lessons in commercialising their enterprises.*

**Keywords:** Intergenerational knowledge, sustainable agriculture, family farms, Mpumalanga

### **1. INTRODUCTION AND BACKGROUND**

Family farms are critical for global food security, poverty reduction, livelihoods and are an engine for economic development in most developing countries. The world has an excess of 500 million family farms producing the bulk of the food (FAO, 2014). South Africa has a skewed family farming structure with about 50 000 large commercial family farmers and approximately 240 000 smallholder family farmers. The smallholder farmers provide a livelihood to more than 1 million of their family members and occasionally employ over 500 000 people while the commercial sector is responsible for over 95 per cent of South Africa's marketed agricultural output (NDA, 2014). Key challenges facing the smallholder agricultural sector include; the need for increasing productivity to contribute meaningfully towards feeding the increasing South African population which is growing at an estimated rate of 2% per annum; and the need for a shift from subsistence towards a commercial market oriented production system. A key aspect of family farming at both the commercial and smallholder levels is the need to practice sustainable agriculture. Sustainable agriculture has potential to provide the long term benefits required to achieve sustainable development and poverty reduction as it balances current social, economic and environmental aspects without compromising the needs for future generations. It emphasizes maintenance of biological production potential, particularly maintenance of land and water quality, and genetic diversity (Dumanski, Terry, Byerlee, & Pieri, 1998).

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There is a growing recognition on the need for increasing the number of smallholder farmers who make a transition into commercial farming. A key concern contributing to this recognition is the dwindling number of commercial farmers in South Africa from about 66,000 fifteen years ago to current figures of an estimated 50,000. Such a scenario calls for a need to commercialise smallholder farming. In this regard, a key issue is on how to capitalise existing knowledge from commercial farmers for the benefit of smallholders. This issue is already getting recognition within the agricultural sector through mentorship programs<sup>13</sup>. In addition, the land restitution programme in South Africa is mainly targeted at families or clans that lost their land through evictions. Such families will likely learn the commercial aspects of farming from experiences in the commercial farming sector. Besides mentorship programs, there is undoubtedly a need to document knowledge from the commercial sector for utilisation by the smallholder sector. Such documentation is at the core of this paper and is explored extensively throughout the proceeding sections.

There is wealth of knowledge within family farmers that continues to evolve within the family structure that is valuable for sustainable commercial farming. Family farmers have transmitted knowledge and skills from generation to generation, preserving and improving many practices and technologies that support agricultural sustainability. Knowledge and skills learnt from the older generation is complimented by new knowledge, skills and innovations by the younger generation through technological advancement. Such learning, particularly lessons from intergenerational knowledge transfer among commercial family farms will likely provide invaluable lessons to smallholder farming with regards to sustainable farming and business orientation. The prime objective of commercial farm families is to pass on control of a sound and improved business to the next generation (Gasson & Errington, 1993). Documented studies on intergenerational learning among commercial family farms in South Africa are scarce. This is understandable as such knowledge forms the comparative advantage of farm business and is normally kept a secret.

Ramos (2008) in Uchiyama, Lobley, Errington & Yanagimura (2008) further asserts that, although sustaining family farm business contributes to the broader sustainability of rural communities, the major concern over time is to ascertain that the transfer of knowledge from one generation to the other is successful. In contrast to many other professions in contemporary society, farming remains a largely inherited occupation and one in which the transfer of business control and ownership to the next generation is arguably one of the most critical stages in the development of the business. Intergenerational succession represents the renewal of the family farm and can potentially act as a helpful corrective process in addressing the apparent increasingly aged population of commercial farmers. The process of transfer often triggers new phases of business development. The new generation of family members may be exposed to the latest development in the industry which may make a different approach as opposed to the traditions of the family. The character of the new leaders may also influence the strategy of the family business from the time of the takeover henceforth.

This paper explores intergenerational knowledge transfers for three commercial farming families in Mpumalanga province of South Africa. The narratives provide experiences that span a period of over three decades to bring out issues on important forms of knowledge transferred over the years and mechanisms for intergenerational knowledge transfer. The

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<sup>13</sup> Examples include the Afgri mentorship program jointly run by Vastfontein Community Transformation, the Land Bank and other commercial role players ([www.afgri.co.za](http://www.afgri.co.za))

analysis was conducted within the framework of the five pillars of sustainable agriculture which are; farming and conservation of production potential, plant and animal production practices, the economic aspects, social acceptability and risk management. The paper also recognises that most learning in smallholder agriculture is based on extension mostly via “model” farmers or village-based field trial plots; social learning or copying from others, and on combinations of both (Collier & Dearcon, 2014:94). It is therefore envisaged that this paper will contribute knowledge to agricultural extension practice that can be transferred to smallholder farmers. The key research questions are; what key intergenerational knowledge sustains commercial farming? What are the modes of knowledge transfer? What are key learning points for smallholder farmer extension practice?

## **2. CONCEPTUAL ISSUES**

### **2.1 Intergenerational knowledge transfer in commercial family farms**

This paper draws from the theoretical constructs of knowledge transfer and succession in family firms. The definition of knowledge is highly contested but in this paper a definition by Hatak & Roessl (2015:10) is adopted, that defines knowledge as; sum of expertise, skills, experiences and abilities applied by individuals in the form of worldviews, theories and actions taken to solve problems. It can include facts and information as well as understanding gained through experience, education, or reason. Henry (2012) argues that business knowledge exists in both explicit (knowledge that is available and easily identified) and tacit forms (knowledge that is not immediately known to all). A family farm’s ability to transfer such knowledge among generations is important for its competitive advantage, innovation, efficiency and the sustainability of the enterprise.

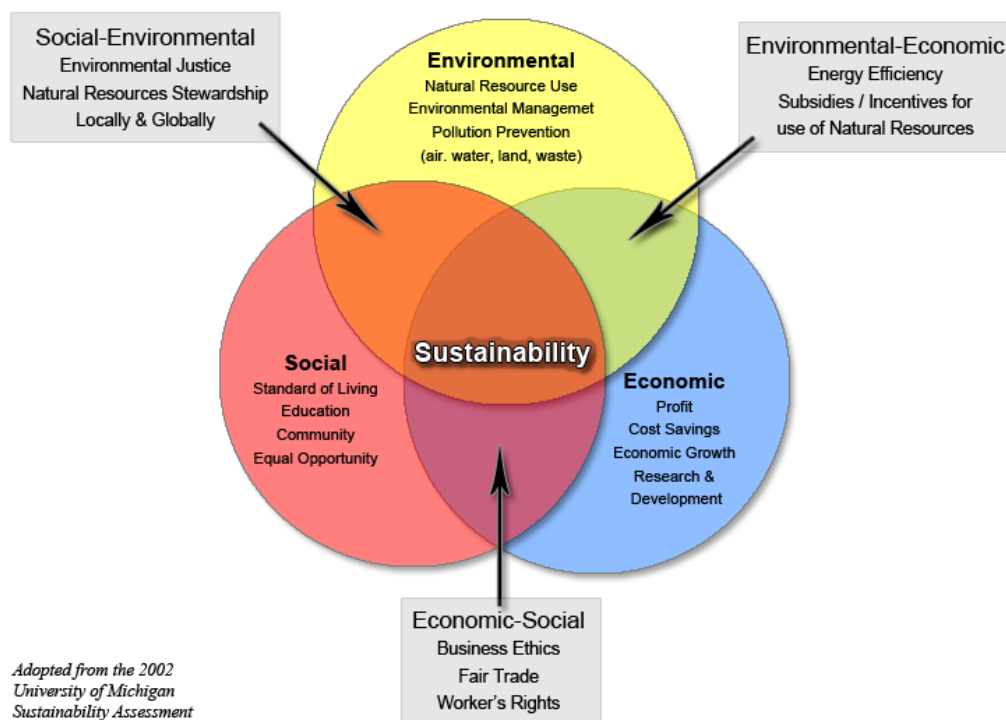
According to Uchiyama *et al* (2008), literature on the process of intergenerational farm transfers focuses on physical assets such as agricultural land, with limited attention on the intergenerational transfer of intangible resources associated with the farm business. Intangible assets such as values, ethics, knowledge, skills, networks and attitudes need to be transferred for sustainability of family farms. These intangible assets are always difficult to observe and quantify yet they have influence on the future performance of the farming business. A focus on intangible resources associated with competencies and knowledge is crucial for the survivability of the farm business. Knowledge and timely information have been identified as serious impediments to the commercialisation of smallholder agriculture in southern Africa (Mashavave, 2013).

Nonaka & Takeuchi (1995) propose four knowledge transfer channels; socialisation, externalisation; combination and internalisation. The first two channels involve transfer of tacit knowledge while the later two involve conversion of explicit knowledge. Socialisation involves transfer of tacit knowledge through sharing experiences, observation, imitation and trial and error. The process of externalisation involves making tacit knowledge explicit and transferred through communication. A critical component is the ability to code the knowledge through narratives, visuals or metaphors (Hatak & Roessl, 2015). Key factors that determine the effectiveness of knowledge transfer include commitment to change; social capital and the relationship between the predecessor and the successor (Hatak & Roessl, 2015, Cabrera-Suarez Saá-pérez, & García-almeida, 2001). Davis & Harverston (1998) identify trust as a competitive advantage in family business. Henry (2012) asserts that trust is key to the process of knowledge transfer in family businesses from one generation to the next. The family embedded trust is resilient and keeps the competitive advantage which is vital to sustainable

farming. Communication and the type of interactions between the predecessor and the successor (family harmony) is another important determinant of knowledge transfer (Michael-Tsabari & Weiss, 2015).

## 2.2 Sustainable Agriculture

Agricultural systems are regarded to be sustainable if they are economically viable, environmentally safe and socially fair (Mnisi & Dlamini, 2012: 4339). Such systems conserve land, water, plant and animal genetic resources; are environmentally non-degrading; technically appropriate; economically viable and socially acceptable. People, economic values and natural resources scopes are interlinked and are an important challenge for family farms. Figure 1 illustrates the interactions among the key pillars for sustainable agricultural development.



**Figure 1: The Three Spheres of Sustainability**  
**Source: Kambewa (2010)**

This study adopts a typology by Dumanski, *et al* (1998) that combines; technologies, policies and activities aimed at integrating socio-economic principles with environmental concerns so as to; simultaneously maintain or enhance production services; reduce the level of production risk; protect the potential of natural resources; be economically viable; and be socially acceptable.

## 3. METHODOLOGICAL ISSUES

### 3.1 Description of Study Area

The research was conducted in Lekwa Local Municipality, in Mpumalanga Province. The three sampled farms are situated in Morgezon between Ermelo and Standerton. These are amongst the oldest commercial farming enterprises in the area with history spanning over a

period of thirty years. Lekwa Local Municipality is one of seven municipalities within the Gert Sibande District Municipality in the Mpumalanga Province. It is located in the south-west of the Gert Sibande District Municipality, with immediate entrances to the KwaZulu-Natal, Gauteng and Free State Provinces. Newcastle, Heidelberg and Vrede are respective immediate entrances. Standerton serves as an urban node, whilst Morgenzon, which is 45km north-east of Standerton, serves as a satellite node. Lekwa is landlocked by Dr Pixley Ka Isaka Seme and Msukaligwa Municipalities on the east, Dipaliseng on the west, and Govan Mbeki on the north. The south edge is adjoined by Mpumelelo Local Municipality, which is in the northern part of the Free State province. The Lekwa Municipality lies on the large open plains of the Highveld region, which is characterised by tall grass, and is transversed by the Vaal River, which flows in a western direction<sup>14</sup>. The municipality is named after the Vaal River, which is commonly known as Lekwa (the Sesotho name for the Vaal River). Main cities are Morgenzon and Standerton while the Main Economic Sectors are agriculture, forestry and fishing, social and personal services and private households.

### **3.2 Data Collection**

The case study approach was adopted as the research design. The key research questions in this study; what key intergenerational knowledge sustains commercial farming? What are the modes of knowledge transfer that required a detailed and intensive study of selected family commercial farms? Yin (1994:23) define case studies as analyses of persons, events, decisions, periods, projects, policies, institutions, or other systems that are studied holistically by one or more methods in a real life context. The strength of the case study approach was its depth descriptive and explanatory analysis of the types of knowledge transferred and the mechanisms of knowledge transfer. The case studies focused on three family farms (whose names will be protected here for ethical reasons) and focused on knowledge transfer though different generations. The selection of the three cases was influenced by four key factors. Firstly knowledge on business is a sensitive subject normally regarded as a secret which enhances comparative advantage. In this regard the researchers had to rely on families that they had previously engaged with and created rapport in prior engagements. Secondly the researchers selected farming families that were regarded as successful business enterprises by the surrounding community. This was regarded as a way of generating valid lessons from successfully proven enterprises. Thirdly, there must be at least two generations at the time of study on the farm. And finally the sample was guided by the concept of saturation (Mason, 2010). The point of saturation was the point when any further interviews would not give new information regarding knowledge transfer but rather just giving different experiences and scenarios. Data was collected using semi structured interviews.

## **4. RESEARCH FINDINGS**

This section provides the research findings. Narratives are given for each of the three family farms. Pseudo-names are given to the enterprises and the people interviewed for ethical reasons. The sections start by giving brief family backgrounds spanning from 1971-2015. This is expected to provide a context that grounds the analysis on intergeneration knowledge transfer in the context of sustainable agricultural production. This is followed by an analysis on the impacts of intergenerational knowledge transfer on sustainable commercial farming.

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<sup>14</sup> [www.localgovernment.co.za](http://www.localgovernment.co.za)

#### **4.1 Brief Family Backgrounds (1971 – 2015)**

##### 4.1.1 Enterprise A

###### **Mr A (Father)**

Enterprise A is a family business that is now in its fourth generation. Mr A, the father is a seasoned farmer with more than 45 years of experience in the Agricultural Sector. Over these years he has held various positions in different Agriculture Related organizations including Agricultural Research Council; Gelbvieh Association and Vleissentraal. He holds a B.Sc. (Agric) from the University of Pretoria Mr A joined a family farming business in 1969 and started his own farm in 1971. He won several accolades within the industry and took part in different Agricultural Shows where his breed won. Amongst his highlights in the cattle farming industry, he imported Gelbvieh breed from Germany in 1987 to establish the breed in South Africa.

###### **Son A**

Son A is one of the sons of Mr A that has taken over some of the farming activities from the father. He grew up on the farm and has more than 20 years' experience in farming. He is currently the Chairman and President of the Gelbvieh Association of South Africa. He is a successful livestock farmer, farming in both cattle and sheep. He is also the Executive Director of Kanjani, a company contracted by the Mpumalanga Provincial Department of Agriculture to provide mechanization for the emerging farmers. He is a successful livestock farmer, farming in both cattle and sheep. He also owns a dealer that provides Agricultural equipment and haulage of large agricultural equipment.

##### 4.1.2 Enterprise B

###### **Mr B (Father)**

Mr B is a second generation after the father bought the farm (150 hectares) in 1946 from funds he acquired through involvement in the Second World War. He joined farming after working at the air force. He lost his father two years after joining the farm. He is currently a Soya and maize farmer and also rears cattle and sheep.

###### **Son B**

Son B is one of Mr B's three sons; he represents the third generation of the family. He has no formal agriculture related post-school qualification. He finished school in 2006 and together with his brother joined their father in farming in 2007. He is currently involved as technical and operations manager. He participates in different commodity organizations.

##### 4.1.3 Enterprise C

Enterprise C is owned and managed by the Family C. The current generation started farming in 1975; growing the farming enterprise from 1,200hectares to 16,000 hectares of land to date. They run four different divisions; Dairy, Beef, Sheep and Crop (Soya, maize and seed potatoes).

###### **Mr C (Father)**

Mr C is the second generation on the farm having inherited the farm from the in-laws. In 1975 after finishing engineering studies, he was recruited by his in-laws to manage their farm. He studied Civil Engineering, grew up on a farm. He also studied a three months short

course in Agricultural Economics to gain knowledge in the industry In 1980 he was offered a stake in the business. In the same year there was an opportunity to buy a farm in the Ermelo district of which they asked him to take responsibility for its full development.

### **Son C**

Son C represents the second generation in the family. After completing his school, he studied Bachelor of Science in Agriculture at the University of Pretoria. After his university studies at the age of 23, he joined his father on the farm as an employee working for a salary for a period of six years. He was later offered five per cent (5%) share after showing potential of becoming a successful farmer.

## **4.2 Intergenerational knowledge transfer and sustainable commercial farming**

### **4.2.1 Knowledge transfer on economic viability**

Interviews with the three enterprises indicated that knowledge transfer on economic viability mainly occurred through socialisation. The predecessors mostly shared with their successors through, sharing experiences and trial and error. A wide diverse of knowledge on economic viability was shared. Firstly, there was a general perception among the first generation of farmers interviewed on the importance of understanding what they called, the basic principles of commercial farming. This was coined as the fact that, commercial farming needed to be economically feasible and able to secure financing from public, commercial, or concessional sources. Sources of initial funding highlighted from the interviews differed, from bank loans, inheritance, working and saving for own capital. The first generation of the farmers interviewed indicated that the difficulty of raising capital was a major push factor in ensuring a viable farming enterprise. It is such tacit knowledge that was transferred to their successors as a motivational factor for engaging in viable farming business. Such motivation is echoed in the following quotation from an interview with a second generation farmer:

*“...I learnt at an early age that I had to work to get my farm business going. My two sons who joined me in 2007 direct from school had a different funding arrangement with me. They requested to be part of the business but they always wanted to get the business by working hard unlike their equals who normally start by working for the family business as employees. They registered a close corporation and used my father’s land as collateral to raise funding for the new operation.”*

The three sons indicated that they learnt a lot from their parents and grandparents that one had to earn his wealth through hard work in the business. None of the generation got his business freely by virtue of being within the family. The three farmers also agreed that the help from government was important to sustain their businesses from one generation to the other. Even though currently there is absolutely no support from government, the foundation that was laid made a big difference in financing the capital intensive farming operations.

The interviews indicated that passing knowledge on decision making on investment in mechanisation is important. Decisions in mechanization are always tough due to technological advancements. The farmers highlighted a need for a “benchmark” and Farm C’s son indicated that they always conducted research in technology before making investments in mechanisation for livestock. All farmers and their sons were in agreement that to remain competitive the business must invest in the latest technology but avoid to over extending themselves through debt.

Diversification into new corporate strategies and continuously exploring into new markets (within the same production system) in maintaining business competitiveness was perceived as critical knowledge that generations transferred. Farming family A acknowledged that the inherent knowledge of primary agriculture helped in the diversification of the business from primary agriculture to supply of implements in the agricultural industry. The father was influential in advising that the business should diversify within the industry to avoid the costly exercise of the acquisition of new knowledge in other industries. Diversification broadened the family business' footprint within the same industry e.g. logistics and retail in implements. Unlike Family A, Family B is into mixed farming. Family B believed that improving productivity per hectare with the same commodities enhanced their business and to remain competitive the business had to avoid over stretching itself in the short term to keep up with other players in the industry.

According to the three families, a key operational lesson for all generations is the need for business to stick to its plans (with flexibility to changing situations) and have practical operation plans. The knowledge gained from the predecessors was deemed as valuable in this regard as the process was viewed as continuous learning. The knowledge was said to have been transferred informally through daily discussions and through observation. Family A indicated that, a replacement plan for shifting to other enterprises while having farmed cattle and sheep for decades would not be easy. This would erode the knowledge gained in beef and sheep over time. According to family A, such a replacement plan would only stabilise after at least 15 to 18 months, therefore a farming business cannot jump from one plan to the other easily because of huge risks.

#### 4.2.2 Knowledge transfer on social acceptability

According to the three families, a critical piece of knowledge that was transferred over generations is the need to value human capital. The low turnover of employees even when there is a transition from one generation to the other was said to indicate that values of respect of the workforce were upheld throughout generations. Workforce stability ensures institutional memory, continuous learning and harnessing of cumulative knowledge. All the three farmers maintained a stable labour force over the three decades. Some of the current employees are the children and grandchildren of the first generation that worked on the farms.

Another key lesson that emerged from the interviews is the need for in service training and skills enhancement for employees. This was deemed necessary each time there were implements or equipment. This was part of the broad skills development and employee retention plan. The need for experiential learning was heavily emphasized; Mr A and his son for instance did not receive any formal agricultural related qualifications. Most of the knowledge especially from the son was acquired through practical experience and learning from their father. Such knowledge was said to be transferred through conversational interactions, observation and review of past decisions. Family C, highlighted the importance of information communication technologies in enhancing farming knowledge within the global economy.



#### 4.2.3 Knowledge transfer on protection of biological resources

The farmers re-iterated the importance of preservation of biological resources as key in sustainable farming. They also pointed out the urgent need for commercially oriented agriculture in adapting to climate change. Farmer A and his son for example indicated that they started farming with large framed animals (Hereford) and went to the Gelbvieh and currently the son is contemplating on changing to even a smaller framed breed in response to changing climates. Knowledge on the utility of various plant species were transferred over the years through observations, discussions and trial and error. For example, it was indicated that, in early stages and throughout the business employees would identify plants that were harmful to cattle through observations. Knowledge of such plants has been shared over the generations.

Son A further indicated that his five year old son can already identify the animals that are sick as this information is shared on a daily basis. The soil conditions and how they should be kept were taught to all of the employees; they knew when to plant and prepare the soil for cultivation. The soil condition had to be tested from time to time thoroughly to ensure high yields over generations. All the sons had to ensure from the teachings of their fathers that it is important to maintain high quality soil to produce high yields. They learnt management of grazing to avoid overgrazing and soil degradation.

The families confirmed the existence of industrial activities that affected farming over the years. These include the development of SASOL and mines around Ermelo that affected the soil conditions. Family A further narrated the stories of the high amount of yield they used to enjoy before the soil condition was affected. They used to be the biggest wheat producers in that part of the country but due to climate change, winter rains were affected.

They further indicated that the water quality in the area has been affected badly due to the growth of the mining activities. The sons said that their parents taught them over years to maintain the water quality. Family B indicated that they always devised practices that would maintain soil moisture during periods of low rainfall through turning the soil immediately after harvesting particularly where they had planted soya.

#### 4.2.4 Knowledge transfer on reduction of production risk

Risk management is considered as a fundamental component of family commercial family farming enterprises. Indications from the interviews were that, the risk factor was highly considered by the older generations who continuously devised coping mechanisms to enhance viability. All the sons agreed that their parents were more risk averse than them and that helped to create a balance in risk management. They indicated that at times their parents would leave them to take risks and when things didn't work they would learn from such experiences. The sons indicated that their fathers always warned them not to spend more than they earned and their fathers became more risk averse with age. The sons feel they still can take more risk and try new things from time to time with caution from their fathers as this provides important lessons for them. As part of knowledge transfer, they were continuously warned to take calculated risks, not the big uninformed risks but evaluate every risk taken for the benefit of the business

Family enterprise A indicated that, since the major drought in 1992 and the crumbling of maize boards, their productivity had generally declined. As a coping mechanism for the high

risk in cropping, the family stopped producing maize and soya. This decision was due to observed trends from historic production levels that kept declining whilst the production costs inclined. As a result of this decision, the family decided to lease all the land (about 14000 hectares) to the other farmers who were still farming in crops. Son A mentioned that he learnt at an early age that commercial farming is all about risk hence when the father advised that they move away from crop farming he understood the business logic. This scenario highlights the importance of analysing production and marketing trends in business.

All the three farmers agreed that previously there were price structures through the different commodity products like maize boards which offered price protection. Since the abolishment of the boards the prices are market driven which make it difficult for the primary producers to cope given the rising costs of inputs. Prices were fixed so the farmer knew well in advanced and could plan properly. Agriculture all over the world is subsidized and farmers get backing from their respective governments. Perceptions from the interviews by the sons indicated that they felt there was no more backing for farmers from government like when their parents and grandparents started. The farmers have to carry most of the risk hence farmers are over committed with debts especially with crop production. From the production risk point of view the young generation asserts that they have to learn to manage risk better and even though they seem to want to take more risk than their parents, they have to rely more on their parents for guidance.

Family enterprise C indicated that their risk management approach over the years has been geared towards a risk management technique that mixes a wide variety of investments within a portfolio, hence they farm in three different commodities. The rationale behind this technique is that a portfolio of different kinds of investments will, on average, yield higher returns and pose a lower risk than any individual investment found within the portfolio. The same idea was also emphasized by family B and family A, although family A are diversified within the value chain *i.e.* logistics. Diversification strives to smooth out unsystematic risk events in a portfolio so that the positive performance of some investments will neutralize the negative performance of others.

#### 4.2.5 Knowledge transfer on maintenance and development of production and services.

Maintenance of biological productivity over generations was identified as crucial for sustainable farming with the choice of genetic forms being core. Family A claimed that it was pro-active in maintaining genetic resources throughout generations, in response to changing climatic conditions. They moved from the Hereford breed to Gelbvieh and now contemplating another breed as dictated by the climatic conditions. Both the sons and fathers emphasised the importance of continuous research on genetic development and the use of experts in that regard. Whilst Family A preferred the Gelbvieh and changed from Hereford as their initial breed, both Families B and C kept the Drankensberger as their preferred breed over the generations. Even though there have been new breeds in the market that looked attractive the two maintained the same breed but continued to improve the genetics.

The farmers explained that wrong choices of particular varieties or livestock breeds could have devastating effects on sustainable farming. The three families indicated that they invested a lot on research on cultivars and learnt from the neighbours. As a measure for maintaining genetic breeds in livestock throughout the farms, the farmers also provided their employees with quality male species to ensure consistency in case a bull or ram crossed over

to their herd from the employees grazing area. The employees were taught to maintain the species and genetics over generations

## 5. CONCLUSION

This paper addressed three research questions; what key intergenerational knowledge sustains commercial farming? What are the modes of knowledge transfer? What are key learning points for smallholder farmer extension practice? In the analysis, these research questions were tackled simultaneously. A number of intergenerational knowledge themes were identified as important in sustaining commercial agriculture. The analysis of the knowledge themes was guided by the five pillars of sustainability in commercial agriculture. Under the economic pillar of sustainability, intergenerational knowledge on; framing mindsets on commercial orientation i.e. understanding the need for economically viable approaches; investments in mechanisation; diversification; sticking to business plans and having practical operational plans were identified as key themes. The modes of intergenerational knowledge transfer were identified as continuous family engagements through dialogue and daily discussions and observations by successors. It was clear that experiential learning was important for sustainable commercial farming. Farmer C' son indicated that in his early years he learnt through play. Even though during school holidays they would go to the farm and work, for them it was more play than work but they learnt a lot in the process. Mr B's and Mr C' sons highlighted the importance of farm days in knowledge transfer. They further indicated the importance of short courses, information days, and the internet searches.

Within the social pillar of sustainability; a key knowledge theme that was identified is the need for valuing human resources. There is need for treating the farm workforce as knowledge assets. Farmers need to develop strategies for continuous skills enhancement for their workforce and mechanisms for integrating the workforce's tacit knowledge in their farm operations. Protection of biodiversity, maintenance of genetic pools in livestock enterprises were identified as key themes in the biological preservation pillar of sustainability. While in the development of production services pillar a key them was protection of biological resources and adaptation to changing environmental, and policy issues. These knowledge themes were transferred through daily interactions, practical observations and networking with other commercial farms. The production risk pillar was viewed as an application of business intelligence from accumulative learning. Intergenerational knowledge was transferred through continuous discussion of market dynamics and historical market trends as well as experiences in risk taking through trial and error.

The findings in this paper provide lessons that are important to extension for two scenarios. Firstly the lessons can be integrated by extension professional into extension practice for facilitating and mentoring the transition for smallholder farmers into commercial production and secondly; smallholder farmers need to appreciate the importance of intergenerational knowledge transfer within their farming enterprises. These will likely lead to more sustainable family farming enterprises that significantly contribute to food security and improved incomes.

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