TECHNOLOGY PROFILING FOR EMERGING COMMERCIAL COTTON FARMERS IN THE MAKHATHINI REGION

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ABSTRACT

This research article profiles cotton technology in the Makhathini region, focusing on the extent to which it is available to support farmers Although Makhathini Farmers have produced cotton for more than 10 years at a subsistence level, and despite using the related technology extensively, the farmers' mission remains to produce cotton commercial. The technology mentioned in the study is available worldwide, as well as locally. The technology accessed is readily available to the local farmers. Representatives of 13 Famers' Associations were interviewed and a response rate of 13/13 (100 percent) was obtained. The findings indicate overwhelming use of technology by the farmers. Yet an issue that is unresolved is why farmers are not producing at a commercial level despite the aid of technology.

OPSOMMING

'n Profiel van die katoen tegnologie gebruik in die Makhatini streek word aangespreek in hierdie navorsingsartikel. Die fokus van die artikel is gerig op die mate van ondersteuning beskikbaar aan die boere in die streek. Die klein boere verbou die afgelope 10 jaar katoen in die streek. Die verbouing van katoen is meer gerig op oorlewings boerdery, maar dit is 'n oogmerk van die boere om in die toekoms katoen op 'n kommersiële vlak te verbou. Die tegnologie waarna verwys word in die artikel is globaal sowel as plaaslik van toepassing in die verbouing van katoen en is vrylik beskikbaar aan die boere in die streek. Gestruktureerde onderhoude is met boere van 13 plaaslike boere verenigings gevoer en die navorser het daarin geslaag om 'n 100 persent terugvoer reaksie hiermee te verkry. Die bevindinge dui daarop dat boere in die streek tegnologie gebruik in die verbouing van katoen. Die onbeantwoorde vraag is dan waarom die verbouing van katoen nie op 'n kommersiële vlak plaasvind nie.

1 INTRODUCTION

The literature paper will focus primarily on the availability of technology in the cotton industry in South Africa, challenges or obstacles to using the technology that cotton farmers face and support mechanisms for the formation of fully commercialised and sustainable small and medium-sized businesses.

Cotton farmers in the South African Development Community, including the South African cotton farmers, face a common problem of having to compete internationally. The advent of free trade has resulted in countries such as China and India taking advantage of the existing market gap. South Africa still has to grapple with exchange rates and the strong Rand, which impact adversely on exporters of cotton lint. The South African textile industry has suffered financial setbacks, and has had to cut down on jobs following market shrinkage. Verryne [32] add that the strengthening of the Rand exchange rate has made the conditions worse.

Cotton SA has revealed its plans to support emerging commercial cotton farmers in producing 30 percent of the South African crop by 2014. Verryne [32], reports on ARC-IIC a five-point plan that has been drawn up:

- to familiarise emerging commercial cotton farmers with the nature and characteristics of cotton plants;
- to demonstrate best practice for farming management;
- to devise a practical method of transferring information to all the farmers, even if they are illiterate;
- to prepare incumbent farmers with basic knowledge for second level training, which involves sector education and training authority courses in cotton cultivation and management. Verryne [32] adds that farmers should be encouraged to move from subsistence cotton farming to emerging commercial cotton farmers.

2 LITERATURE REVIEW

2.1 Introduction

This literature review focuses on theories that seek to explain the reason for using technology within the context of the emerging commercial cotton farmers among whom the empirical study was conducted. The results of the study indicate that the farmers use technology, yet they are still farming at a subsistence level. The theories will include Technology; resource-based theory; awareness of technology; accessibility of technology; and the appropriateness of technology. Comparative cotton technology applications will be drawn from the following countries: the United States of America, China, India, Pakistan, and South Africa.

2.2 Theory of technology

According to Feenberg [11], technology theory has undergone evolutionary changes. He argues that modern people, or people who lived in the 19th century, were more rational than their ancestors. Their rationality could probably be attributed to the early embracing of scientific information to explain natural phenomena. Conversely, those who lived had to be content with myths or unexplained occurrences. However, Feenberg [11] has to admit that, even within advanced societies, there are still bizarre beliefs.

An agricultural mechanisation strategy managed the use of technology on small family operated farms, commercial farms, farmers' association irrigation groups, Contractors, primary agricultural produce processors, and government operators. It also dealt with mechanical power, tool utilisation, manual draft, machinery, and their supply and maintenance. Rijk [28] adds that the need to improve agricultural labour productivity has become a forceful reality in recent years. The mechanisation of agricultural labour productivity has had various impact:

- increased labour productivity, where labour is substituted by machinery to facilitate the cultivation of a larger area or serviced by the same labour force;
- increased labour productivity, where there is a faster turn-around time to achieve a higher cropping intensity; and
- decreased costs of production, where the introduced machine runs for longer at a lower cost, which offsets the initial capital outlay.

Technology can be categorised as follows:

2.2.1 Codified technology

Codified technology permits users to have know how a machine works, and not necessarily why it might not work. It can be difficult to transfer this type of technology. The mastery of the machine relies on an understanding of both non-explicit and explicit tacit knowledge Guzman and Trivelato [13]. Knowledge needs to be codified so that it can be articulated, embedded, and managed. Technology in the form of codified knowledge can be transferred or moved around.

Customers do not generally buy technology. They buy products and services that satisfy their needs. Business has to convert technology capabilities into saleable units that meet customer needs Pries and Guild [26]. For the benefit of the originations, tacit knowledge can be packaged as technological terms in a manual Hall [14]. Knowledge based on 'know-what' 'know-how' and 'know-why' forms the domains of technology, which is seen as standardised content that can be shared or used to develop and train personnel Hall [14].

2.2.2 New technology

According to De Coster and Butler [8], 'new technology' refers to technology that is used for the first time by a firm or organisation, even though it may have been in existence for a long time. Its impacts on the old way of achieving the company's objectives. Although it may have been on the market, it is new to the organisation. Often its use impacts on cost and time-based competitiveness. De Coster and Butler [8], cite two approaches that assess new technology: business personnel who come from diverse backgrounds; and venture capitalists. Business personnel who are interested in the assessment of entrepreneurs focus less on market risk. Venture capitalists employ approaches that are essentially process-based to achieve a full picture when they assess new technology.

2.2.3 High technology

High technology companies generally focus on deploying an overall technology approach to business. They constantly seek to develop new technologies that are superior to those of their competitors. They have diverse technology portfolios. In particular, these organisations pursue technology with high intensity to gain technology-based competitive superiority Lichtenthaler [23].

2.2.4 Emerging technology

'Emerging technology' refers to technology that has not yet been used to its fullest potential or not yet commercially exploited. The use of it might be limited by certain government policy restrictions. The level of its use depends on the impact of that knowledge proximity and economic stability of the country with emerging technology. The European Union has developed a technology framework that is based on cognitive science, healthy ageing, and an emerging knowledge–based economy. The policy makes provision for healthy ageing, (that is an extended healthy life in the later years), and an improved health care support system, an improved quality of life for the elderly, and reactivation of social participation Rijker-Defrasne et al., [27].

2.3 Resource-based theory

According to Barney and Arikan [3], in Hit [16], 'resources' are tangible and intangible assets that an organisation or firm uses to achieve its objectives and strategies. Resource-based theory seeks to explain why some organisations are successful, while others are less so, or experience difficulty achieving success. The theory focuses on the attributes of successful organisations, and explains different techniques that are used to analyse the conditions required to attain competitive advantage.

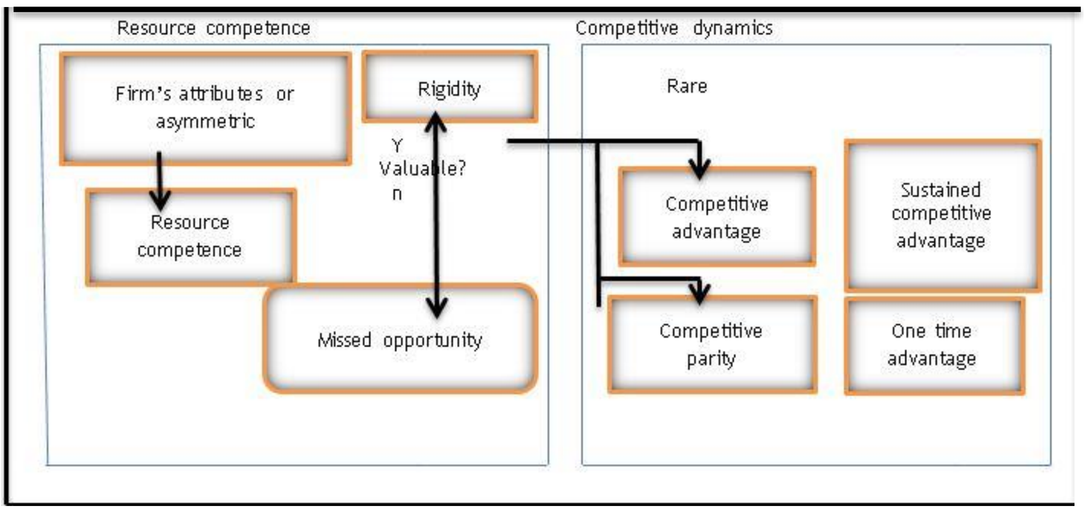

Figure 1: Expanded value-rarity-imitability organisation resource evaluation flowchart

Source:(Knott [19])

2.3.1 Value-rarity-imitability organisation technique

According to Knott [20], this technique has been widely use to assess a particular organisation's resources. However, it is not a tool for practical application, but one to be used as way to understand the use of the organisation's resources. It is a strategic tool that efficiently analyse component breakdown.

2.4 Asset-based theory

To some extent, the asset–based theory complements the resource-based theory. Similar to the resource-based theory, it cites and those tangible resources such as capital, machinery, inventory, equipment, buildings, skill of employees, patents, and brand names, which must be properly configured to ensure the sustainability of a business, Allee [2]. Negassi and Amir-Ashani [26], confirms this view, stating that over the past 15 years the resource-based view has advocated competitiveness through the heterogeneity and immobility of an organisation's resources.

Allee [2], adds that knowledge in the form of intangible assets represents a commercial commodity. As a commodity, it can be traded for more knowledge and related benefits Lerro, Lacobone and Schiuma [22], point out that a knowledge asset is assessed against the criteria of identification, classification, and measurement.

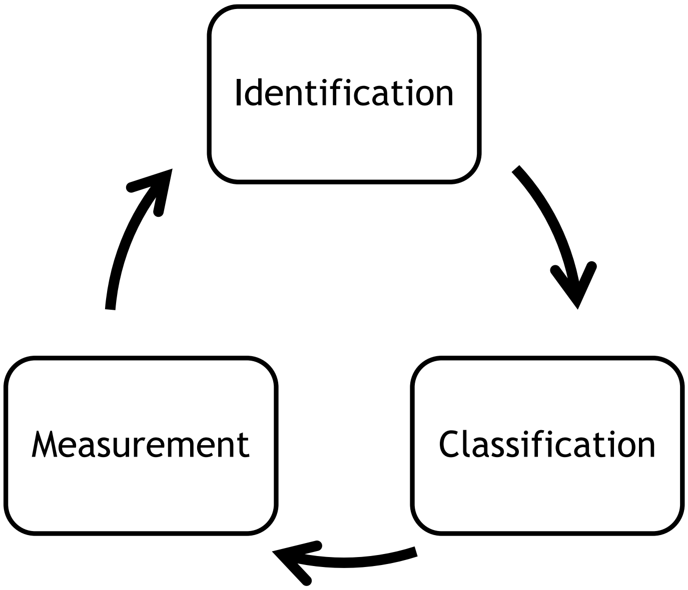

Figure 2: Process of the dimensions of knowledge assets (Lerro, Lacobone & Schiuma [22])

According to Lerro, Lacobone and Schiuma [22], metrics and indicators that aid performance measurement can be defined. Once defined, they are used to monitor efficiency and effectiveness. The aim of a knowledge asset measurement strategy is to identify and measure the knowledge asset of an organisation for the purpose of managing it. The strategy seeks to strengthen the alignment between an organisation's knowledge asset endowment and an organisation's performance objectives.

A knowledge asset communication strategy aims to convey the value of the company knowledge asset to the interested public domain, the market, and stakeholders. The public domain is informed of the company's capability to create value in the market. The company's brand name, employee know-how and competences, culture, stakeholder relationships, and market access capabilities are placed in the public domain.

2.5 Appropriateness of technology

According to Duan, Deng and Corbitt [9], 'appropriate technology' is a concept more prevalent in small and medium enterprises, widely and have distinctive characteristics in their adoption of technology.

Jerzmanowski [17], argues that SMEs face challenges in adopting technology. Even though small and medium enterprises or other companies compete in the same market, they might not employ the same technology. Barriers encountered by them might differ from one country to another. This is due to institutional cultural differences. Negassi and Amir-Ashani [24], maintain that the use of appropriate technology will result in improved resource use and better productivity rates.

3 COMPARATIVE COTTON TECHNOLOGY USE

3.1 Technology use in the United States of America

As the United States of America (USA) is highly developed in its use of technology, many countries benchmark its use to evaluate areas that are similar. The level of technology use in the USA makes it competitive in all spheres.

In terms of the use of organic cotton, Patagonia is a manufacturer, designer, and distributor of topquality outdoor wear and sportswear. The firm was founded by a mountaineer called Yvon Chouinard, and is based in Ventura,,California. It sells sportswear for mountaineering, rock climbing, skiing, fishing, kayaking, long-distance running (marathons), and mountain biking. In 1994 the company decided to manufacture apparel from organically produced cotton cloth. From 1996 onwards the firm used well certified cotton Casadesus Masanelm [6].

Glyphosate technology is a broad-spectrum herbicide. It was first developed by Bayer Crop Science in the 80s. In 2009 a limited release of it called Glytol appeared on the market. The Bayer Crop Science Director, expected a new release of the Fibre Max variety with Glytol and Liberty Link traits in 2010, Link Plus Bollgard II in 2011, and TwinLeink in 2012 Bruwer [4].

3.2 Technology use in China

According to Clover [7], bacillus theringieusis cotton has made an impact in the developing world in improving productivity on a large scale. Bacillus theringieusis cotton has resulted in reduce pesticide use by small farmers in China. As a result of this reduced pesticide use, there has been a reduction in the incidence of pesticide poisoning among farmers. Bruwer [4], adds that, when used judiciously, there can be enormous benefits, including effective control of certain pests, reduced insect damage and related losses attributed to infestation by insects, and reduced application of insecticide, which results in a higher income for farmers. According to Hillocks [15], in China, India, and South Africa, bacillus theringieusis has improved the quality of life of emerging commercial cotton farmers.

Clover [7], argue that innovators have to shoulder the responsibility when applying technology to hazards. Proper assessment is necessary so that real benefits can be achieved. According to Dr Arjunan Subramanian, a research fellow at the University of Warwick, the higher yield from using bacillus theringieusis cotton seed has resulted in increased wages and increase employment in India Kempen [19].

Another technique used in China is the molecular marker technique. According to Preetha and Raveendren [25], molecular markers have played an important role in cotton-breeding research. There are various marker techniques. They include: restriction fragment length polymorphism (RFLP), random amplified polymorphic deoxyribonucleic acid
(DNA), amplified fragment length polymorphism, simple sequence repeats, inte-simple sequence repeats, and sequence related amplified polymorphism.

The random amplified polymorphic DNA technique relies on the use of primers to increase random segments of genome. It is used for marker-assisted selection to identify specific populations involving genes called gossypium sturtianum, and to identify glandless seeds. (RADP) Random Amplified Polymorphic DNA provides an important input to cotton's resistance to a deficiency called verticulium wilt Cai et al.,[5].

The amplified fragment length polymorphism DNA technique involves the digestion of DNA with two different controls, referred to as endo-nucleases and ligating adaptors.
China also uses the simple sequence repeats technique, which provides the basis for a multi-allelic, co-dominant genetic marker system. The technique is considered the marker of choice for self-pollinated crops that have little intra-specific polymorphism.

Another technique is the inter-simple sequence repeats technique, which use primers in conjunction with the simple sequence repeats technique to accomplish its purpose. They are used to reveal inter and intra-specific variations.

The final technique used in China is the sequence related amplified polymorphism technique, which combines simplicity, reliability, and a moderate passing through of enzyme ratio and facile sequencing of chosen blend. It is actively involved in targeting the coding sequence in the genome. It regulates a number of dominant markers Funke et al., [12].

3.3 Technology use in India

Sabir et al. [29], note that the integrated pest management technology module was developed in India to discourage staggered sowing between April and June, instead. The recommended periods are between June and October. Farmers have been trained in synchronised sowing.

Productivity-enhancing technologies:

- Application of improved hand tool technology: In the majority of countries globally hand tools are the only technologies used in agriculture.
- Draught animal power application: A huge number of implements and machines that have been improved use animals as their principal power source.
- Stationary power substitution: Mechanical power is replaced by human and animal power. Mechanised tools are used for paddy dehusking, grain milling, water pumping, and threshing.

The application of bacillus theringieusis crops has helped to reduce chemical pesticide use. The application of this technology has had positive environmental, economic, and health results Krisna and Qaim [21]. Emerging countries that have experienced a decrease in marginal returns due to a yield that has stagnated should look to adopting organic agriculture. The organic technology has been successful in India, Eyhorn, Ramakrisma & Mäder [10].

3.4 Technology use in Pakistan

A large irrigation system was constructed in Pakistan. Due to an acute shortage of water information on irrigation performance and supply of water at various levels, a need existed for such schemes. It involves an energy-balancing technique that uses remote sensing data to estimate the effect of evapo-transpiration on water usage Kazmi, Ertsel & Asi [18].

Manure from cattle and water buffalos were used as biogas and bio-fertilizers. The development accounted for approximately 20 percent of nitrogen and 66 percent of phosphorus required for the crop Shah et al [30]. The Pakistani government installed 10 000 tube wells to stem rising water-logging which created hazards Kazmi, Ertsel & Asi [18]. Use of Bacillus theringieusis cotton to improve yields was adopted. In the first use of this crop technology included transgenic cotton with a single insecticidal Bt gene was used Abid et al [1].

3.5 Technology use in South Africa

Genetically modified cotton was introduced into South Africa in 1997 Verryne [32]. Some African countries saw it as a panacea that would ensure sustainable development. Reaction to this argument ranges from outright rejection to enthusiastic acceptance. This technology has sparked lively discussions all over the world. According to Yang [33], scholars in this field are widely optimistic about the benefits that GM technology holds for the agricultural industry. Sceptics deny that there are benefits for developing countries, let alone small-scale farmers Clover [7]. Scepticism is unavoidable, but what does seem certain is the fact that the world population is increasing by 81 million people per year. The total population is expected to increase from the present figure of 6.6 billion to 9 billion by 2050 Morse and Mannion [23].

3.6 Constraints

According to Verryne [32],there are major constraints to the successful transfer of technology.Technology transfer from research to small-scale farmers does not reach all of the farmers at the grass-roots level. There are no mechanism in place for the access of research information. For the cotton sector to succeed, an adequate number of extension officers will have to be deployed. The responsibility for the extension officers, and for dissemination of information, lies with the extension officers. However, they are often not given the resources to carry out their jobs, and they do not have the specialist knowledge.

Some farmers stopped paying their loan to Vusani. As a results, Vusani refused to grand the any further loans. The majority of the farmers did not have collateral for their loans, apart from the crop itself (Shankar, Bennett & Morse 2008)

3.7 Support mechanism for formation of sustainable sme's

- Familiarise emerging commercial cotton farmers with the wonderful creation that the cotton plant is.
- Explain all the components of the plant, and the development of the crop.
- Devise the methodology to demonstrate best practices of cotton production, and how each activity contributes to the yield that can be obtained by the producer.
- Device the methodology that not only literate people. But also semi-literate people would be able to understand.
- Preparation of the farmers with basic knowledge of cotton production to attend SETA courses in cotton cultivation and management.
- Demonstrate good quality by differentiating between bad and good quality cotton.

4 RESEARCH METHODOLOGY

4.1 Introduction

This study investigated the problem statement:

"*How is technology deployed* among emerging commercial cotton *farmers in the Makhathini region to support sustainable cotton production?*"

Based on the problem statement, a secondary question is this:
"To what extent are respondents aware of cotton technologies and information?"

The principal objective was to make a theoretical and practical contribution to the situation of the emerging commercial cotton *farmers* and other stakeholders in the cotton supply chain, with regard to using technology deployment as a way of to facilitate quicker reaction to customer needs, meeting expectations, and improving profitability.

4.2 Significance of the research

The research is particularly important because it aimed to identify factors hindering the deployment of technology to emerging commercial cotton *farmers* in the Makhathini region and to propose solutions to them. The solutions would be benchmarked against factors or models that have made other commercial farmers successful.

4.2.1 Hypotheses

The first hypothesis tested whether respondents were aware of technologies related to cotton picking, planting genetically modified cotton, the use of integrated pest control, and the latest technologies applied by the cotton industry. The generic hypothesis can be formulated as:

H0: No significant difference exists between small-scale emerging commercial cotton *farmers* who are aware of cotton technologies and small-scale emerging commercial cotton farmers who are unaware of cotton technologies.

H1: More small-scale emerging commercial cotton farmers are aware of cotton technologies than those who are unaware.

The second hypothesis will test access to technology as picking machines, modified seed, pest control systems, and equipment.

The Cronbach Alpha reliabilities for technology awareness, and use were all above 0.85; thus, the outcomes of the measuring instrument proved to be reliable. The reliability of the qualitative data was ensured by the fact that the chairperson of each Farmers' Association was always present during the fieldwork to confirm or to provide a better perspective on respondents' views. The chairperson also played a useful role in interpreting areas of the questionnaire that were not clear to farmers.

4.3 Research design and methodology

The research used a survey research design to describe the conditions of the farmers. Based on the empirical research findings the researcher was able to explain the farmers' level of preparedness to transform their operations from subsistence cotton production to commercial cotton production.

Makhathini Cotton is a black economic empowerment firm with 65 per cent black empowerment owners. In 2002 this firm invested about R50 million in a cotton ginnery. Currently between 90 and 120 small-scale farmers are involved in this project. In 2002 the Kwazulu-Natal provincial government committed itself to providing production inputs to about 2 100 cotton farmers.

Smale et al. [31], state that an estimated 3 000 farmers are organised into 33 farmers' associations. It can therefore be assumed that the population size of emerging commercial cotton farmers in Kwazulu-Natal province is in the vicinity of 2 500. In the Makhathini region there are 30 cotton farmers' associations, representing 2 000 farmers. As this study focuses on the Makhathini region, a sample will be selected from this population.

During the planning phase of the research, and with the support of the President of the Farmers' Association of the Makhathini region, the researcher was able to obtain access to the contact details of 13 farmers' associations representing a sample frame of 1 210 small-scale farmers who were eligible for selection.

Two principal complaints: geographic distance from the research area and the limited resources budget, required the researcher to limit the sample size to 10 percent of the sample frame, resulting in a sample selection target group of 121 participants. This relatively small sample size might negatively influence the generalisation of the results to other cotton regions in South Africa, due to the impact that such a small size could have on reliability and validity. However, the data produced will be valuable to the Makhathini region, as representativity will be ensured by the use of the stratified sampling in geographical areas within the Makhathini region.

4.3.1 Data collection

4.3.1.1 Technology awareness

A total of 25 questions were presented to the respondents. The question relating to how they have become aware of technology was formulated as an open-ended question to allow respondents to give the actual sources of awareness. A total of four questions related to necessity technologies used in the cotton industry, while the remaining 10 questions focused on sources of awareness popularity used to inform and sensitised people about available technologies. These 10 questions were evaluated on a four-point scale coded according to the following key: always = 1; frequently = 2; seldom = 3; never = 4.

4.3.1.2 Access to technology

A total of four questions were presented to be answered on a three-point scale using the following

key: yes = 1; no = 2; unsure = 3.

5 RESULTS

Table 1: Access to biologically modified seed

Table1: access to biologically modified seed **Response**		**Frequency**	**Percentage**	**Valid Percentage**	**Cumulative Percentage**
Valid	1.00	117	96.7	96.7	96.7
	2.00	3	2.5	2.5	99.2
	4.00	1	.8	.8	100.0
	Total	121	100.0	100.0	

An overwhelming majority of respondents have access to biologically modified seed, with frequency of n=117, (96.7 per cent). Relatively few almost negligible respondents still use conventional seed with a frequency of (n=3; (2.5 per cent)

According to Figure 1 below, a level of technology awareness has filtered through to the majority of the farmers:

- Awareness of latest technology: 121 respondents; 120 apply the latest technology;
- Integrated pest control: all of the respondents use this technology;
- Genetically modified cotton: Of 121 respondents, 117 use the technology whereas four do not.
- Mechanical cotton-picking machine: of the 121 respondents, 113 respondents use the technology as opposed to two who do not.

It could be deduced from the figures that the level of preparedness for the use of technology is advanced. However, competitiveness is still lagging behind.

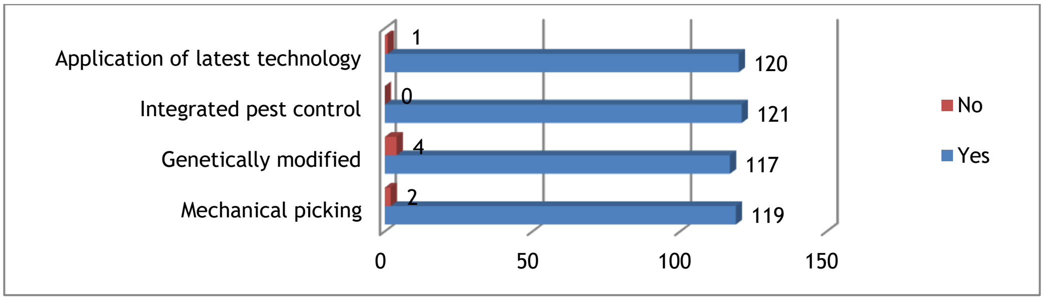

Figure 1: Awareness of technology

Table 2 below was used to test the hypothesis whether there is a significant difference between small-scale emerging commercial cotton farmers who have access to technology and those who do not. According to Table 2, the results revealed that H_0 should be partially rejected because further explanation is required. A significant difference exists between the small-scale farmers who have access to mechanical cotton picking machines and those who do. The majority of small-scale emerging commercial cotton farmers still rely on hand-picking for cotton harvesting.

Table 2: Access to mechanical cotton picking machine

Response	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Yes	32	26.4	26.4	26.4
No	85	70.2	70.2	96.7
Unsure	4	3.3	3.3	100.0
Total	121	100.0	100.0	

Respondents indicate a strong tendency towards not utilizing mechanical cotton picking machine (n=85; 70.2%) as opposed to respondents who do use the technology (n=32; 26.4%). The phenomenon raises an interesting question relating to identifying the characteristics of farmers who utilize mechanical cotton picking machine as opposed to those that do not use it.

Table 3: Access to comprehensive cotton pest control system

Response	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid Yes	121	100.0	100.0	100.0

Respondents indicated a strong tendency towards using pest control systems, with a frequency of n = 121: (100 percent). This can be attributed to their continued efforts to reduce production costs and increase the yield.

There is a strong that respondents have access to mechanical cotton planting equipment. It can be expected that they possess this equipment because it is important aspect of farming. The frequency is n = 120; (88.2 per cent) as opposed to the frequency of n =1; (8 per cent) of those who do not.

5 CONCLUSION AND RECOMMENDATION

It is necessary to revisit the research questions posed in section 1. The principal research question was:

"How is technology deployed among emerging commercial cotton farmers in the Makhathini region to support sustainable cotton production?"

Based on the principal research question, a secondary question was formulated:

"To what extent are respondents aware of cotton technologies and information?"

An overwhelming majority of the respondents were aware of the technology and had access to, available technology as per table 1,2and figure 1.

However, the goal of the emerging commercialisation of cotton eluded them, and continues to do so. In the view of the researcher, too much emphasis was placed on the internal conditions of emerging commercial cotton farmers, while too little emphasis has been placed on the synchronisation of the internal and external conditions in which the farmers operate. The failure to synchronise these conditions could impede the transition of emerging commercial cotton farmers. This view is also supported by the theories put forward by Knott [20], discussed in the theory section. It is therefore recommended that a paradigm shift in approach be adopted; in which interventions focus on the emerging commercial cotton farmers to enable them to compete successfully in the competitive internal and external commercial market. Although the evidence is presented in the above tables and figure, farmers need to be helped as individuals; particularly the capable ones – to make the adjustment from being staple producers to compete collaboratively and globally.

7 SHORTCOMINGS OF THE STUDY

The survey method used was stratified: the farmers were divided into 13 associations. More open-ended questions to association leaders and officials could have enriched the quantitative data more, and provided more in-depth knowledge that was required to make adequate recommendations. The inclusion of other stakeholders from Cotton SA, as well as farmer representatives at higher levels than association level, such as board members from the gins or cotton researchers, could have added value to the research information.

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