



Barriers of website adoption for South African beef cattle breeder SMMEs

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Abstract

The benefits for SMMEs of adopting a website are well known and a lot of research has been done in various industries. However no such study has been done to provide insight into the perceived benefits and barriers of website adoption for beef cattle breeder SMMEs in South Africa.

The research methodology involved a quantitative design of a descriptive type as there is a depth of knowledge already available. A non-experimental survey design was used, which consisted of an electronic, self-administered survey. The survey served as the research method using a combination of the benefits and barriers identified by Walczuch *et al* (2000) and Cloete (2003). The sample size for the research consisted of 1261 registered beef cattle breeders from various breeder societies which have valid email addresses.

The study primarily outlines the proportion of website adoption and secondly describes the perceived barriers and benefits of website adoption by beef cattle breeder SMMEs in the survey. The results indicate that close to 70 percent of the cattle breeders in the survey have not adopted a website. Those SMMEs that have adopted a website perceive *marketing and advertising* as the primary benefit and the cattle breeders's primary perceived barrier of website adoption is *unfamiliar with or the lack of knowledge regarding websites*. This finding further indicates a definite difference between industries, compared to previous studies done by Walczuch *et al* (2000) and Cloete (2003).

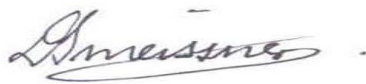
Keywords: Website adoption, barriers, SMME, cattle breeders, beef

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out the research.

Name: David Erasmus Stephanus Meissner

Signature:



Date: 7 November 2012

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CHAPTER 1

1. Introduction to Research Problem

1.1 Introduction

This study focuses on the barriers of website adoption for South African beef cattle breeder small, medium and micro-sized enterprises (SMMEs). SMMEs play a vital role in the development of the global economy and also in South Africa. The cattle breeding industry which contributes significantly towards the agricultural economy consists of a number of SMMEs.

The South African Government Information (2011) states that primary agriculture contributes about three per cent to South Africa's gross domestic product (GDP) and approximately seven per cent to formal employment. However, the agro-industrial sector comprises about twelve per cent of Gross Domestic Product (GDP). The livestock sector contributes up to 49 per cent of all agricultural output. The primary reason for this large proportion of agricultural output is because about 80 percent of the South African agricultural land is only suitable for extensive livestock farming. A second reason is that as the poorer portion of the population becomes more affluent, they prefer livestock-based foods to staple foods.

South Africa has a total number of 13.7 million beef cattle which include commercial and informal animal production as estimated by the Abstract of Agricultural Statistics (2011) in 2010/2011. There is however only 2400 seed stock beef cattle breeders, with 0.5 million animals that serve as the genetic pool and future of the entire South African beef industry (Scholtz, Bester, Mamabolo and Ramsey, 2008).

Factors that threaten the agricultural sector as specified by Vink & Van Rooyen (2009) also influence beef cattle breeders. Furthermore, according to Scholtz *et al* (2008), the emerging and communal sector is only interested in selling live cattle, household meat production and keeping cattle for other reasons, and therefore have no formal breeding plan. This is of concern for the future of the beef cattle breeding industry as a large portion of the potential genetic pool does not enter the market.

With the introduction of the internet and the adoption of websites, SMMEs should receive some benefits as suggested by Williams (1999). Various research projects (Cloete, 2003; Simmons *et al.* 2009; Walczuch, Van Braven and Lundgren, 2000) have been done to understand which barriers exist for SMMEs to adopt a website and what is valued as beneficial.

1.2 Research problem

The research problem identified is to gain an understanding of what the proportion of website adoption is for the beef cattle breeding industry of South Africa.

Secondary to the research problem will be to understand what the perceived benefits and barriers of website adoption are by beef cattle breeders.

For a better illustration of the problem each factor of the construct has been identified and discussed in more detail below.

1.2.1 Small, medium and micro-sized enterprises

According to Jutla, Bodorik and Dhaliqal (2002), it is estimated that 80 percent of the global economic growth are contributed by SMMEs.

It is estimated that 50 per cent of the gross domestic product (GDP) in South Africa is contributed by SMMEs, and they employ around 60 per cent of the country's workforce according to the *SME Survey* and *SMME Confidence Index* data (Munshi, 2009)

In South Africa the macro-economic strategies currently focus on transforming the economy to a knowledge-based economy (Department of Science and Technology [DST], 2008). Furthermore the National Small Business Act 102 of 1996 identifies small business development and the empowerment of entrepreneurs as the most important growth areas in South Africa. (Republic of South Africa, 2003)

Deducting from the above statements, SMMEs are and will play a critical role in sustaining and developing the South African economy. For the transformation of the current economy to a knowledge-based economy, focus must be given to technologies like the use of the internet and websites.

1.2.2 Internet

Porter (2001) suggests that the internet can be valuable for any company wanting to enhance market reach and operational efficiency.

Internet technology by Williams (1999) adds four primary benefits for companies using the internet, which include:

- a. Small companies increase the ability to compete with other companies locally and internationally.
- b. More people with diverse backgrounds are granted the opportunity to start a new business.
- c. Business transactions are made more convenient both for the customer and the business. For example the company is open for business 24 hours; seven days a week.
- d. Smaller companies can compete better with the larger companies because of a more inexpensive option of administering the business, for example less travel, telephone and postage costs.

These perceived benefits of being visible on the internet indicate that the internet technology could add great value to South African SMMEs, for example the beef cattle breeders.

It is however difficult to comprehend the magnitude of the usage of the internet, but according to the estimates of the Internet World Stats (2011), 32.7 per cent of the entire world population, which amounts to a staggering 2.267 billion people make use of the internet as illustrated in **Appendix 1**. Internet World Stats (2011), further estimates that almost 140 million people in Africa use the internet. Even though African internet users only consist of 6.2 per cent of the world internet users there has been a dramatic increase over the last 11 years, close to 3000 per cent. South Africa's contribution is 6.8 million users, which also grew from 2.4 million over the last 11 years. (**Appendix 2**).

World Wide Worx (2012) suggests that in 2011 the Internet economy contributed R59 billion (or 2 per cent) to South Africa's GDP and is expected to reach R79 billion by 2016 (or 2.5 per cent).

Furthermore, SMME Survey 2012 according to World Wide Worx (2012) identified that a high 63 per cent of formal SMMEs in South Africa have a website and that formal SMMEs in the Information Technology and Telecommunications sectors have the highest percentage of websites, with an astounding 89 per cent of all the companies. Another sector with good website exposure is the tourism industry with 77 per cent of all SMMEs. (World Wide Worx, 2012).

World Wide Worx (2012) identified five factors which might have influenced a sustained increase in the rate of growth of the number of Internet users in South Africa. The five factors include:

1. The increased use of smartphones, which provide the user the ability to access the Internet.
2. The growth in Asymmetric Digital Subscriber Line (ADSL) connections in small and medium enterprises in South Africa. Previously these enterprises had to rely on dial-up connections which limited the number of connections because only one person could use it at a time. ADSL is not only cheaper than dial-up for an office, but it also allows for everyone in that office to be connected at the same cost and at far higher quality.
3. The explosion of new services and service providers increases competition which brings down prices and builds greater awareness than ever before.
4. The popularity of social networking in South Africa which is penetrating the mass market at a rapid rate.
5. Local content on the Internet has also increased dramatically, which acts as another growth agent.

Glancing at the Internet World Stats (2011) figures and the latest World Wide Worx (2012) findings; one can deduct that the world-wide-web is growing and playing a pivotal role in the daily activities of individuals and businesses. By adopting a website, companies can gain access to these opportunities and possible customers. Worth mentioning though is that no indication is given what the current adoption percentage is for the beef cattle breeder industry which could also benefit from developments like these.

1.2.3 Beef Cattle Breeders

Vink and Van Rooyen (2009) identified several international and local factors that have impact on the agricultural sector's productivity and growth. These factors include the growth in the South African economy and the rising consumer demand, the international trade and trade agreements, the global recession and rise in food prices, the land reform programme, the reliance on product imports, the availability of water, the changing consumer patterns and demands, changes in technological mechanisms, quality standards, farm safety and security, broad-based black economic empowerment, legislation, skills demand and supply, and HIV/AIDS.

An important SMME role player in the agricultural sector is the beef cattle breeders. For South African beef cattle breeders to compete and survive in the global market; it is critical to be mindful of all the factors mentioned by Vink and Van Rooyen (2009). All avenues for improvement need to be researched. One of the avenues for investigation is the use of new technologies like the adoption of a website to gain more market reach and increased operation efficiency as suggested by Porter (2001).

1.3 Definitions

- **Internet:** Leiner *et al.* (2003) defines the internet as *"The global information system that -- (i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-on's; (ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-on's, and/or other IP-compatible protocols; and (iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein."*
- **Website:** According to the Houghton Mifflin Company, (2000) a website can be defined as *"A set of interconnected web pages, usually including a homepage, generally located on the same server, and prepared and maintained as a collection of information by a person, group or organisation"*.

1.4 Research objectives

With the purpose to address the research problem of this study the following objectives are outlined:

1. To explore what the current proportion of Website adoption is within the beef cattle breeding industry.
2. To get an understanding of what factors are perceived by the beef cattle industry as the primary benefits and barriers of website adoption.

CHAPTER 2

2. Literature Review

Within this study it is important to outline the contextual framework that drives the reasons of website adoption by South African SMMEs in the beef cattle breeding industry. Areas of literature compiled include SMMEs, the beef cattle breeding industry, determinants of website adoption, website benefits and barriers of adoption.

2.1 Small, medium and micro enterprises (SMMEs)

2.1.1 Definition

Small, medium and micro enterprises (SMMEs) are difficult to define because there is no single definition (Storey, 1994). Adding to the complication is that the context differs for each country and between industries (Esselaar et al. 2007).

Small, Medium Enterprises (SME) are normally classified according to size, turnover and the number of employees, but definitions differ throughout the literature. For example South Africa adds micro-sized enterprises and therefore the definition is based on that of the South African Department of Trade and Industry and the South African National Small Business Act, No102 of 1996.

The South African Department of Trade and Industry defines SMME's as:

“unless specifically demarcated, covers the full spectrum of business enterprises other than “large enterprises” or corporations and publicly owned enterprises. This includes categories known as micro-enterprises, survivalist enterprises, informal sector enterprises, and formal small and medium sized enterprises. It also covers businesses in all stages of evolution, from pre-establishment to start-up, emerging, stable or expanding, as well as enterprises in distress. Furthermore, it includes enterprises that can be characterized as family-owned, black-owned, women-owned or cooperatively owned” (Republic of South Africa Department of Trade and Industries, 2008, p. 5).

The National Small Business Act (SA, 1996) defines an SMME in terms of the number of full-time employees (FTE), annual turnover and value of assets. Small businesses in South Africa are divided further into distinct groups, namely; survivalist, micro, very small, small and medium, hence the use of the term “SMME” for small, medium and micro-enterprises. The official definition of a ‘small business’ defined in Section 1 of the National Small Business Act of 1996 as amended by the National Small Business Amendment Acts of 2003 and 2004 (SA, 1996:) as:

“ ... a separate and distinct business entity, including co-operative enterprises and nongovernmental organisations, managed by one owner or more which, including its branches or subsidiaries, if any, is predominantly carried on in any sector or subsector of the economy mentioned in Column I of the Schedule... ”.

Falkena *et al.*, (2001, 25 - 26) suggests the National Small Business Act of 1996 defines five categories of business that is most widely used for a framework as follows:

i. **Survivalist enterprise**

The income generated is less than the minimum income standard or the poverty line. This category is considered pre-entrepreneurial, and includes hawkers, vendors and subsistence farmers. In practice, survivalist enterprises are often categorised as part of the micro-enterprise sector.

ii. **Micro-enterprise**

The turnover is less than the value added tax (VAT) registration limit (that is, R150,000 per year). These enterprises usually lack formality in terms of registration. They include, for example, *spaza* shops, minibus taxis and household industries. They employ no more than 5 people.

iii. **Very small enterprise**

These are enterprises employing fewer than 10 paid employees, except for the mining, electricity, manufacturing and construction sectors, in which the figure is 20 employees. These enterprises operate in the formal market and have access to technology.

iv. **Small enterprise**

The upper limit is 50 employees. Small enterprises are generally more established than very small enterprises and exhibit more complex business practices.

v. **Medium enterprise**

The maximum number of employees is 100 or 200 for the mining, electricity, manufacturing and construction sectors. These enterprises are often characterised by the decentralisation of power to an additional management layer.

Appendix 3 illustrates the quantitative stratification for SMME's according to each industry (SA, 2003). **Table 1** highlights a broader definition by Falkena *et al.*, (2001).

Table 1: SMMEs defined broadly in the National Small Business Act

Enterprise Size	Number of Employees	Annual Turnover (S.A. Rand, million (m))	Gross Assets, Excluding Fixed Property (S.A. Rand, million (m))
Medium	< 100 to 200, depending on industry	< R4m to R50m depending on industry	< R2m to R18m depending on industry
Small	< 50	< R2m to R25m	< R2m to R4.5m depending on industry
Very Small	< 10 to 20, depending on industry	< R200,000 to R500,000 depending on industry	< R150000 to 500000 depending on industry
Micro	< 5	< R150,000	< R100,000

Source: (Falkena *et al.*, 2001)

2.1.2 Characteristics of SMMEs

It is revealed by the definition in the previous section that SMMEs are very diverse and complex in the classification. To get a better understanding of South African SMMEs it is important to evaluate at some characteristics of SMMEs.

2.1.2.1 Formal and informal SMMEs

According to the Department of Trade and Industry (2008) a SMME is only formal if its name is recognised and legally registered with the Companies and Intellectual Property Registration Office (CIPRO) as a private company, a close corporation or as an incorporated professional. Furthermore the entity must be registered for tax and/or value added tax (VAT) and for other bodies depending on the type of industry within which the SMME operates. Other bodies might include for example in the construction industry a company which attained a certification from a regulating body like the National Home Builder Registration Council (NHBRC).

Western Cape Provincial Treasury (2007) suggest that there is no universally accepted definition for an informal enterprise. However there is consensus that informal enterprises are small scale, and operate outside registration, tax and social security frameworks and health and safety rules for workers. Furthermore the informal economic activity is described by its particular nature.

Macqueen (2005) suggested that informal SMMEs are mostly micro enterprises

2.1.3 Importance of SMMEs

The importance of SMMEs must not be misunderstood as these enterprises play a vital role in combating unemployment related problems by creating jobs, facilitating innovation and foster long term economic growth (Baard & van den Berg, 2004; Storey 1994).

SMMEs facilitate innovation by giving opportunities for entrepreneurs who want to start a business. It provides niche markets not explored by large enterprises and stimulates competition (DTI, 2006; Levent, Masurel & Nijkamp, 2003).

Macqueen (2005) further emphasised the importance of SMMEs in communities by outlining the advantages and disadvantages. **Table 2** outlines the advantages that address the issues of social, economic and environmental importance:

Table 2: SMME advantages by Macqueen (2005)

Dimensions of Well-being	Economic	Social	Environmental
Basic survival	Provide local outlets for inputs and outputs without externally imposed standards	Strengthen connectedness to and responsibility for sustainability of production	Negative environmental problems are local – more quickly spotted and dealt with
Livelihood security	Reduce external dependency, with greater local resilience in uncertain times	Provide flexible working hours, which is especially important for child caregivers	Multi-functionality, especially at a micro level, builds environmental resilience
Affiliation and relationships	Profits accrue locally, are often reinvested locally with local economic multipliers	Greater social equity, which humanises relationships in buying and selling – building community	Shorter travel distances to reduce pollution and human risk
Creative endeavours	Distribute economic opportunities and returns fairly across multiple owners	Use local knowledge and skills – with ownership over business outcomes	Increased options to use and consequent vested interest in conserving local resources
Aesthetic awareness	Exploit local niches and maintain diversity in available products	Understanding of local tastes fosters craftsmanship	Diverse enterprises at landscape level creates space for biodiversity
Cultural identity	Exploit local niches and maintain diversity in available products	Provision of culturally sensitive options to empower marginalised groups	Local product or service design strengthens cultural landscapes

Source: (Macqueen 2005, p. 7)

Macqueen (2005) identified some disadvantages of SMMEs. Understandably this list is not exhaustive, but these items can be regarded as some of the primary disadvantages. The disadvantages identified are:

- ❑ High input transaction and investment cost mainly caused by the lack of collateral and bargaining power.
- ❑ SMMEs are in many cases geographically dispersed over many areas, which makes engaging with support providers an expensive exercise and causes the transaction cost to increase.
- ❑ Informal SMMEs present a great risk for governments collecting revenue for support, due to the lack of records of business transactions.

- Creating a generalised policy prescription is almost impossible because of the diverse nature of SMMEs. There can never be a 'one-size-fits-all' support for SMMEs because of the different priorities of small enterprises compared to medium enterprises.

2.1.4 Constraints for SMMEs

As discussed SMMEs are a critical component of any countries economical growth. However according to Balkenhol et al (2003) a common constraint of SMMEs is the high failure rate at the start-up of the enterprise both internationally and in South Africa.

The literature outline various constraints that may influence the success of a SMME which include access to finance, the lack of business skills and training and general services availability.

2.1.4.1 Access to finance

For any business to be successful, whether the enterprise operates in the formal or informal sector, access to financial services is very important. By having a savings or credit facility the owner of the business can purchase equipment and stock, mitigate the risk of unpredictable cash flow problems and do investments to expand the business (Western Cape Provincial Treasury, 2007).

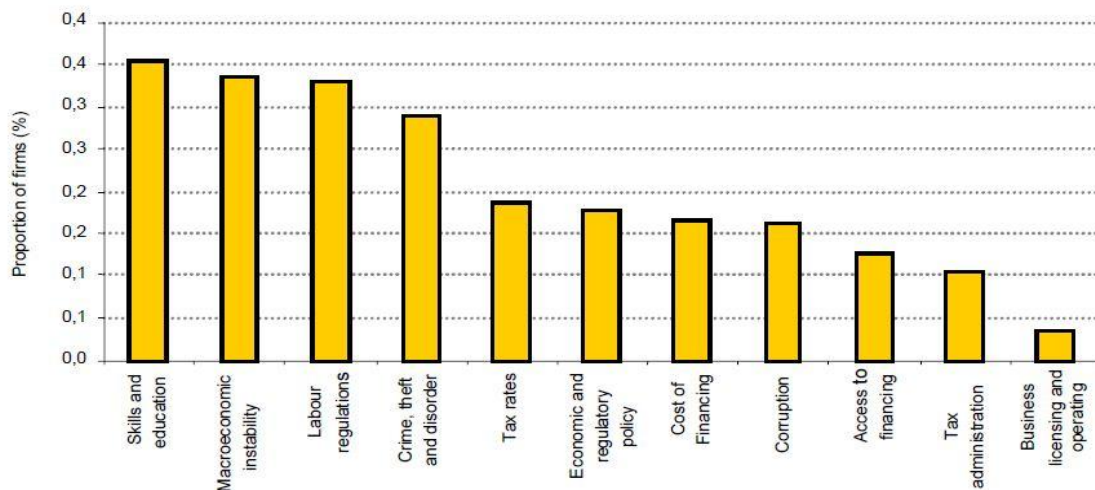
Informal SMMEs struggle even more to get financial support due to the perception of their higher risk. Therefore informal companies need to survive either without credit or seek credit from less reputable sources that charge inflated rates for credit facilities (Western Cape Provincial Treasury, 2007).

Having capital constraints limit individuals from engaging in SMME activities and furthermore it may have a negative impact on the growth rates of existing SMMEs (Western Cape Provincial Treasury, 2007).

Interesting though, a study done by the World Bank, as cited in Western Cape Provincial Treasury, (2007) which lists the perceived obstacles to business by companies in South Africa, suggests that the cost of capital and access to

finance do not rank among the top five reasons as indicated in **Figure 1** below.

Figure 1: Perceived obstacles to business by firms in South Africa, 2004 (Western Cape Provincial Treasury, 2007)



However, if you combine the cost of finance and the access to finance portions it is evident that access to financial services is a definite barrier for SMMEs. This assumption is confirmed by the Global Entrepreneurship Monitor (2011) for South Africa where a study shows that 59.5% of South African experts view financial support as a key constraint for entrepreneurship.

2.1.4.2 Lack of business skills and training

Figure 1 further confirms that the lack of business skills and education are one of the primary obstacles for SMMEs. There is however a definite difference between individuals working in the formal and informal sector. The informal sector individuals tend to be less educated and have fewer marketable skills than people working in the formal sector; this is mainly due to their access to skills training (Western Cape Provincial Treasury, 2007)

Education and training are also highlighted by the Global Entrepreneurship Monitor (2011) for South Africa as being a key constraint with 35.1% of the South African experts citing them.

2.1.4.3 Access to general services

For any business to function properly it needs to have access to basic infrastructure and services. According to Moteff & Parfomak (2004) basic facilities which form part of infrastructure that an enterprise require, includes buildings, roads, electricity supply and communication services. However basic municipal services like water, sanitation, refuse removal and access to electricity are also critical requirements to induce a favourable business environment (Western Cape Provincial Treasury, 2007).

Informal sectors suffer the most when it comes to infrastructure and services. The lack of these services constraints the businesses because poor accessibility of public transport translate into higher private transport costs to get their products to the markets and getting stock or raw materials from distant suppliers. Another issue outlined in **Figure 1** is crime, theft and disorder which the informal SMMEs are very exposed to for not having proper access to public services like the police to protect them (Western Cape Provincial Treasury, 2007).

2.1.4.4 Regulatory environment

According to the Global Entrepreneurship Monitor (2011) for South Africa the biggest constraint for entrepreneurship in South Africa cited by the South African experts is government policies. Constraining government policies include bureaucracy, legislative compliances, restrictive labour legislation and onerous administrative and legislative requirements related to registering and starting a business.

Figure 1 confirms the perceived negative impact that labour relations have on facilitating business. Furthermore tax rates and the administration thereof are also indicated as obstacles for more established businesses. The reason given is because the micro enterprises and businesses within the informal sector is not registered for tax and/or earn below the taxable income brackets (Western Cape Provincial Treasury, 2007).

2.1.4.5 Other constraints

Various other constraints may impact the informal and small businesses, which are specific to that industry in which that business operates. For example there might be a lack of access to business support services or the micro-enterprise are poorly integrated into the supply chain which blocks entrance into the main market where the business can be expanded (Western Cape Provincial Treasury, 2007).

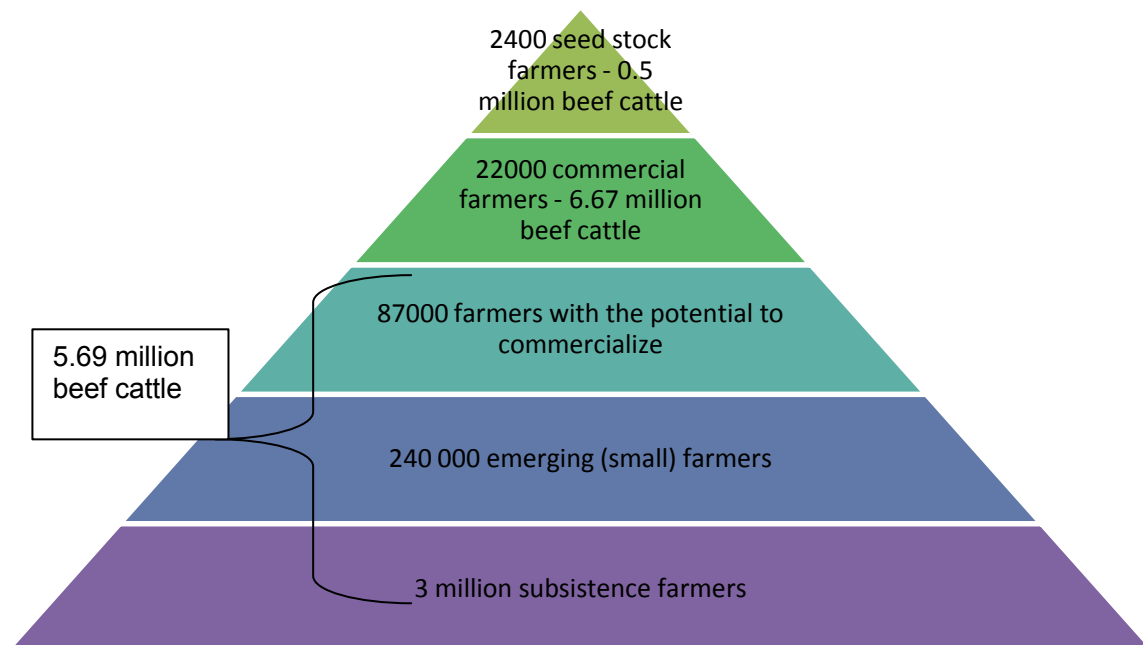
2.2 Cattle breeding Industry

2.2.1 Characteristics

Scholtz, Bester, Mamabolo and Ramsey (2008) conducted a national cattle survey for South Africa with the emphasis on beef production. The reason for their study was to understand the current status of the erosion of indigenous livestock breeds in southern Africa which provide a rich biodiversity for the region. These indigenous breeds are well-adapted and could serve as alternative breeds for future farmers to mitigate the risks of the ever changing environment.

The survey results were conceptualized in **Figure 2** which gives an outline of the 2008 status of the beef cattle industry of South Africa.

Figure 2: Gene flow pyramid for beef and dual- purpose cattle (Scholtz *et al*, 2008)



The purpose of the gene flow pyramid is to depict the importance of the seed stock farmers in the South African livestock industry. The entire industry depends on the sustainability and genetic improvement of seed stock herds. The genetic material that is bred will distribute through the whole industry and if not promoted could have detrimental consequences (Scholtz *et al*, 2008).

The Integrated Registration and Genetic Information System (INTERGIS), is the national database of South Africa for all breeds which compiles the cattle numbers supplied by the registering authorities for the different breeds (Scholtz *et al*, 2008).

Table 3 gives a breakdown of the most recent statistics by INTERGIS for beef and dual purpose stud cattle including the 10 most popular breeds which consist of: Bonsmara, Brahman, Nguni, Beefmaster, Simmentaler, Santa Gertrudis, Angus, Simbra, Drakensberger and Afrikaner.

Table 3 – Statistics on beef and dual purpose stud cattle (Scholtz et al, 2008)

Breed	No females 2 Years + 1995	No females 2 Years + 2003	% Females in National Recording	Bulls growth tested	Calving% (2002) (*)
Afrikaner	12 341	6 764	87	541	79.7
Beefmaster	8 359	7 169	94	411	78.4
Bonsmara	82 334	50 399	98	5 040	87.7
Brahman	25 259	23 617	10	210	69.6
Braford	---	1 752	85	43	90.1
Brangus	4 464	5 824	72	337	84.9
Braunvieh	2 828	1 188	56	69	83.6
Charolais	3 800	3 402	97	388	86.3
Drakensberger	9 814	6 255	98	575	81.9
Gelbvieh	1 341	1 128	88	61	77.3
Hereford	4 297	4 454	67	219	92.1
Huguenot	---	1 541	8	15	96.9
Limousin	3 192	6 472	62	417	77.8
Nguni	7 363	9 462	46	182	92.3
S A Angus	7 090	7 106	84	600	87.9
Santa Gertrudis	14 884	10 525	73	448	84.1
Simbra	3 635	11 066	30	33	93.2
Simmentaler	25 574	20 198	19	2	73.2
Sussex	5 366	5 458	81	407	85.2
Tuli	718	2 073	62	163	84.9

* - Calculated from calving interval according to Roux and Scholtz (1984).

It becomes clear after investigating the current numbers of beef cattle, that this sector provides a significant contribution to the economy of South Africa. According to the Abstract of Agricultural Statistics (2011) in 2010/2011, South Africa has a total number of 13.7 million cattle which include commercial and informal animal production. Furthermore the South African cattle industry produced 819.6 thousand tons of beef and veal meat and imported a further 56 thousand tons to supply the total demand of 864 thousand tons consumed by the people of South Africa (Republic of South Africa Department of Agriculture, Forestry and Fisheries, 2012)

2.2.2 Opportunities and threats for the beef cattle breeding industry of South Africa

Indigenous and custom bred cattle breeds of South Africa are well adapted to the harsh climatic and agricultural conditions of the southern hemisphere. For example the Sanga and Zebu cattle can survive, grow and reproduce in the presence of poor seasonal nutrition, diseases, hot climates, ecto- and endo-parasites (Bonsma, 1980, 1983 (as cited in Scholtz et al. 2011); Prayaga, 2003a, 2003b, 2004; Prayaga et al., 2006 (as cited in

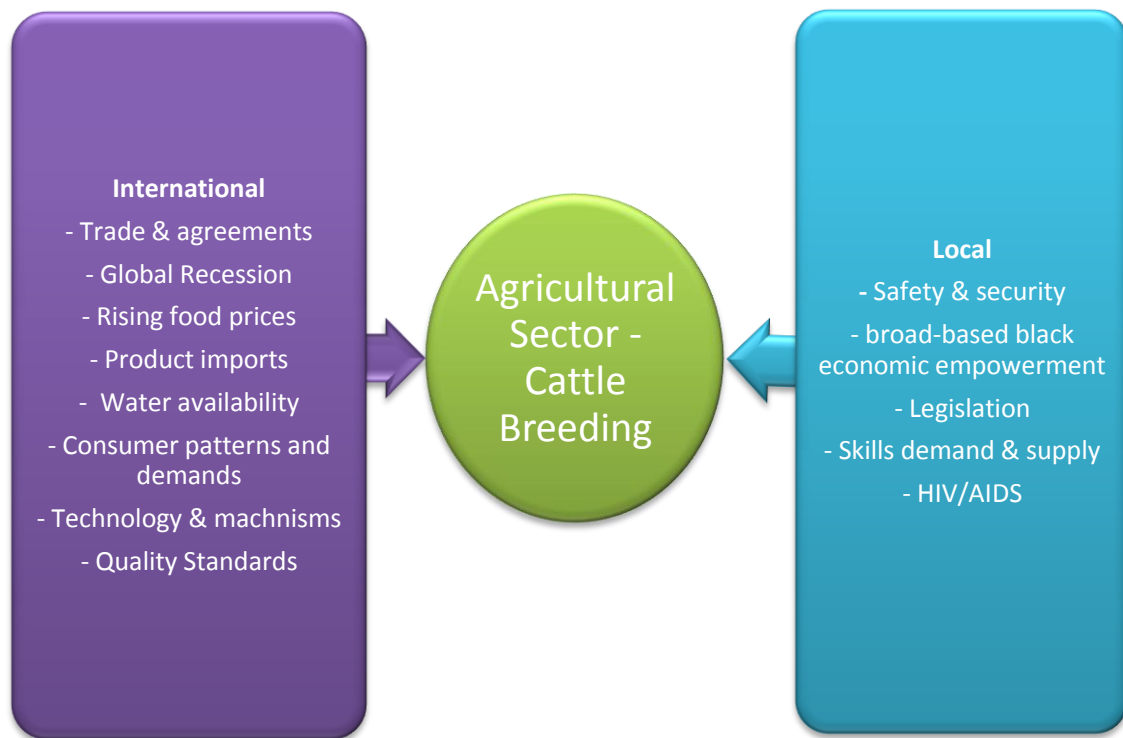
Scholtz *et al.* 2011); Scholtz, 1988). Scholtz (1988) identified that Sanga cattle are very adaptable to harsh environments and are recommended for crossbreeding systems due to their outstanding maternal performance. Garrick (2006) (as cited in Scholtz *et al.* 2011) suggests that the use of heterosis to improve fertility and the combinations of different characteristics from previous selected genotypes facilitate the purpose of crossbreeding. Thus the genetic merit of the parent breeds is crucial. Deducting from the advantage of crossbreeding, indigenous breeding presents an opportunity for the development of better producing cattle in harsh conditions.

The threat of climate change stands to effect the African and Southern American continents more drastically than other continents and it is believed that crossbreeding will play a vital role in developing countries of the southern hemisphere (Scholtz, McManus, Okeyo & Theunissen, 2011).

Scholtz *et al* (2008) identified a trend amongst communal and emerging sector farmers of South Africa that they make use of 35% non-descript/crossbred and 18.2% Brahman type bulls respectively for breeding. This demonstrates a definite threat for the future of indigenous cattle breeds and for beef production in the subtropics.

More threats as identified by Vink and Van Rooyen (2009) as mentioned in the Introduction are outlined and adopted in **Figure 3** for the beef cattle breeding industry as it relates to the agricultural sector.

Figure 3 - Factors affecting the Agricultural sector

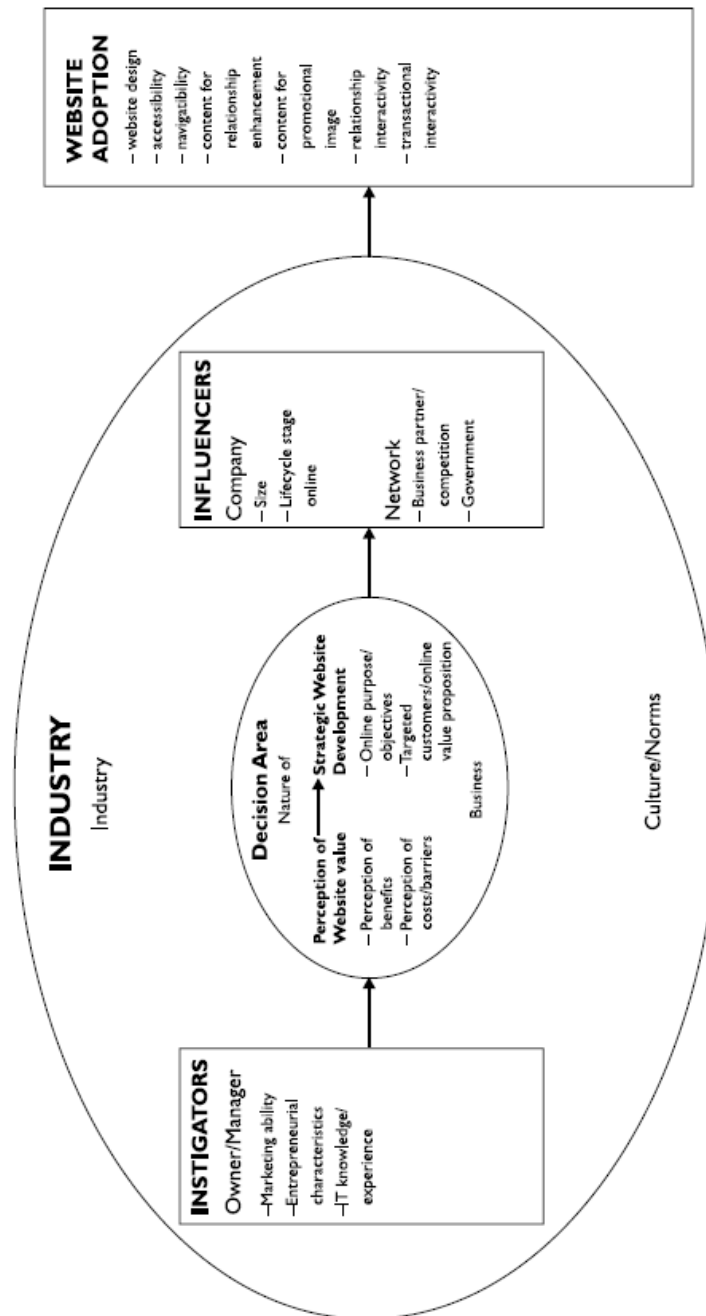


In relation to all the threats mentioned by previous research as discussed, it highlights the need for new ways to promote cattle breeders more in South Africa and globally. One of these avenues is the use of the new technologies available; for example the adoption of a website.

2.3 Determinants of Small Business Website adoption

Simmons *et al.* (2009) has done an in-depth literature review to conceptualize a framework for the determinants of small business Website adoption as seen in **Figure 4**.

Figure 4 - Conceptualization of the Determinants of Small Business Website Adoption (Simmons *et al.*, 2009)



The structure of the conceptualization is grouped into four determinant groupings namely the Decision Area, Instigators, Influencers and Industry.

2.3.1 Decision Area

Within the Decision Area determinant grouping the Perception of Website value and Strategic Development determinants play a central role in SME website adoption (Simmons *et al.*, 2009).

2.3.1.1 Perceptions of Website Value Determinant

Simmons *et al.*, (2009) builds on the model of diffusion of innovation, developed by Jones, Hecker and Holland (2003) by adopting the model in the perspective of website adoption and argues that the perception of the potential value delivered by a website forms the foundation of an e-vision. The perceptions of website value are further stratified in the perception of benefits and the perception of cost / barriers.

The perception of benefits is deducted from small businesses that are inherently resource constrained and therefore cost sensitive which results in a reluctance to invest in e-commerce development without understanding the potential benefits.

In relation to the perception of costs / barriers, large and small companies are encouraged to be able to find the potential costs or barriers that could have a negative impact on the adoption of a website. An example was used where the adoption of a website might deteriorate the funding of offline market channels.

In summary, by doing in-depth exploration of the benefits and barriers of adopting a website; the company can achieve a more accurate perception of the value of a website for their business (Simmons *et al.*, 2009).

2.3.1.2 Strategic Website Development

Simmons *et al.* (2009) argues that the internet is widely accepted as a significant marketing tool and suggests that companies should implement a strategic plan before adopting internet technology. Strategic website development determinants consist of online purpose / objectives and targeted customer / online value propositions. It has been found that the adoption of a website is more successful where the online purpose is more integrated with overall business purpose and that the integrated approach gives the appropriate direction to all the competencies required for website adoption (Jones *et al.*, 2003; McGowan, Durkin, Allen, Dougan & Nixon, 2001). This suggests that companies must be

guided to focus on what they want to achieve with their websites, which is an important component of the strategic website development determinant in regards to website adoption. Simmons et al. (2009) further suggests that by having clear objectives a better understanding for small businesses can be obtained of what areas of their website are the most effective. Evaluating the targeted customer and online value proposition, a website is viewed as a focused marketing tool by various researchers for SMMEs to get access to new niche markets and to align their value proposition with the new categories of the targeted customers (Baourakis, Kourgiantakis & Migdalas, 2002; Quinton & Harridge-March, 2003; Sparkes & Thomas, 2001).

The nature of business plays a pivotal role in the adoption of a website. Varadarajan and Yadav (2002) identified that the level of website adoption is determined by the importance of product portfolio characteristics. A weakness suggested is that the internet only address two human senses namely sight and sound which limits the type of product suitable to sell online.

Peterson, Balasubramanian and Bronnenberg, (1997) stratified online products and services into three dimensions which include: (1) The cost and frequency of purchase; (2) the value proposition and (3) the degree of differentiation.

2.3.2 Instigators

The only determinant for the instigator grouping is the owner / manager determinant. Simmons et al. (2009) suggest that three components can be isolated within the owner / manager determinant which includes: the ability to market, the knowledge and / or experience in Information Technology (IT) and the entrepreneurial characteristics. The ability to market is influenced positively by small enterprises demonstrating a double-loop style of learning, which cause these businesses to adopt a more relevant and developed website (Simmons et al, 2009).

Entrepreneurial characteristics which include imagination and creativity play an important role in the adoption of innovation, for example websites. In uncertain environments like the adoption of websites Elliott & Boshoff (2005) found that entrepreneurial characteristics can add value to the success of small business initiatives. Entrepreneurship is defined as “the discovery and exploitation of profitable opportunities”

(Shane and Venkataraman, 2000, as cited in Simmons et al, 2009). Jones et al., (2003) states that the mixture of an entrepreneurial process and marketing orientation results in greater returns for small enterprises that adopt innovation like websites.

Internal IT knowledge and / or experience have been identified as a key factor that inhibits the utilization and adoption of Internet technologies by small businesses (Van Akkeren and Cavaye, 1999; Straeder and Shaw, 2000). Meir, Husemnn, Luthi, Wismer, Hauschen, Myer and Wohlwender, (2001) recognized that technical understanding and integration of website technology into existing business systems and models as barriers of adoption.

2.3.3 Influencers

The determinants of the perception of the value of a website and strategic website development are influenced by the Influencers determinant which consists of two factors namely company factors and network factors (Simmons et al., 2009).

2.3.3.1 Company determinants

Within the small enterprise marketing context the company determinants consist of two components namely the size and the life cycle stage of the company.

i. Size

Internet adoption influenced by the effect of size is currently a debateable issue because on the one side, research proposes that with further diffusion the impact of size will become less important (Choi and Stahl, 1997) and other research indicates that the difference still exist (Chappell and Feindt, 2000, as cited in Simmons et al, 2009). Furthermore, a positive correlation between IT adoption and organization size has been found by Aguila-Obra and Padilla-Melendez (2006).

One of the positive dependencies that were found was between company size and the presence and sophistication of a company website. Simmons et al. (2009) suggest from the research done that small businesses with more constrained resources than their larger counterparts should follow a more incremental approach in developing their websites.

ii. Life cycle stage online

The time spent online by small businesses is an important factor in relation to website adoption of the company (Sadowski et al., 2002). Carson and Gilmore, (2000) (as cited in Simmons et al. 2009) suggest that in the small business marketing context, determining the type of marketing practices by the company are influenced by the life cycle stage offline. Small business website adoption and the usage thereof follow a series of stages and the company's current strategy is driven by the learning and experience gained (Sultan and Rohm, 2004).

2.3.3.2 Network determinants

Communication channels and information sources have been identified as important positive and negative influencers in the small business network environment that direct website adoption (Jones et al., 2003). Three components of Network determinants have been identified by Simmons et al., (2009) which include: business partners, competitors and the government.

i. Business partners

The effectiveness of website adoption by small businesses is influenced by the business partnerships and the potential negative factor of partner pressure according to Simmons et al. (2009).

ii. Competition

Simmons et al. (2009) summarise the literature on competition as website adoption being impacted by competitors in two ways namely confrontational and cooperative.

iii. Government

Government agencies present a threat of hijacking the foresight, strategy development and learning of small businesses. They should rather focus on their primary purpose of development and education of website adoption (Simmons et al. 2009).

2.3.4 Industry

The Industry determinant consists of one determinant namely Culture/Norms Determinant.

2.3.4.1 Culture/Norms

One of the key barriers of small business website adoption, recognized by various researchers, is cultural problems (Smith & Webster, 2000; Straeder and Shaw, 2000). Research done by Poon (1998) (as cited in Simmons et al. 2009) proposed that within an industry website adoption levels can directly affect the adoption strategy of small businesses in the same sector. A possible explanation is that small businesses are directed by the established norms of doing business in most sectors (Carmerer and Vepsalaen, 1988 (as cited in Simmons et al, 2009)).

2.4 Website benefits and barriers

Extensive research has been performed on the benefits and barriers of website, internet and e-commerce adoption by SMMEs. Walczuch, Van Braven and Lundgren, (2000) researched the internet adoption barriers for small companies in the Netherlands and tabled the benefits and barriers of internet adoption. Internet adoption relates directly to adopting of a website and is therefore used. **Table 4** illustrates all the identified benefits of the internet for small companies, and **Table 5** outlines the results obtained by Walczuch *et al*, (2000).

Table 4 – Internet benefits for small firms

Component	Benefit	Source
Product promotion	Direct and indirect advertising	Poon and Strom (1997)
New sales channel	Easy access to potential customers	Poon and Strom (1997)
	On-line sales and transactions	Poon and Strom (1997)
	Ability to reach out to international markets	Abell and Limm (1996)
	Increase in market share of products/services	Abell and Limm (1996)
Direct savings	Low cost communication	Poon and Strom (1997)
	Savings in communication costs	Poon and Swatman (1997)
	Savings in advertising costs	Poon and Swatman (1997)
	Increased productivity	Abell and Limm (1996)
	Lower cost margins for products/services	Abell and Limm (1996)
	Lower cost of obtaining supplies	Abell and Limm (1996)
Time to market	Product delivery	Poon and Strom (1997)
Customer service	Greater customer satisfaction	Abell and Limm (1996)
Brand image	Company image enhancement	Poon and Strom (1997)
	Create an up-to-date corporate image	Poon and Swatman (1997)
Technological and organisational learning	Obtain know-how through discussion with others on the Internet	Poon and Swatman (1997)
Customer relations	Form and extend business networks	Poon and Swatman (1997)
New business models	Competitor's performance benchmarking	Poon and Strom (1997)
	Create new business opportunities	Poon and Swatman (1997)
	Speedy and timely access to information from Websites	Poon and Swatman (1997)
	Communication efficiency improvement	Poon and Swatman (1997)
	Effectiveness in information gathering	Abell and Limm (1996)
	Availability of expertise regardless of location	Abell and Limm (1996)
	Better service and support from suppliers	Abell and Limm (1996)

(Walczuch *et al*, (2000))

Table 5 – Ranked perceived benefits of internet adoption for small firms

Perceived benefits	N	Now		Within a year	
		Mean	SD	Mean	SD
Distance related barriers disappear	25	3.52**	1.19	3.46	1.35
Improvement in company image	27	3.41*	1.19	3.96***	0.72
Continuous advertising all around the world	25	3.32	1.35	3.59*	1.38
Increased sales	26	3.31	1.26	3.54*	1.32
Effectiveness in collecting information	25	3.24	1.42	3.57**	1.12
More customer service	25	3.20	1.35	3.31	1.29
Increased customer satisfaction	26	3.08	1.39	3.64***	1.00
Possibility of reaching international markets	26	3.04	1.46	3.17	1.40
Better consciousness 'business environment'	24	2.92	1.53	2.62	1.47
Availability of knowledge regardless location	24	2.92	1.47	2.64	1.47
Better information on your customers	24	2.13***	1.39	2.83	1.55
Increased productivity	24	1.96***	1.40	2.00**	1.34
Better support and service by suppliers	23	1.57***	0.95	1.55***	1.06
Faster and/or more flexible delivery suppliers	23	1.43***	0.79	1.50***	1.06
Lower costs acquiring supplies	23	1.30***	0.64	1.41***	1.01

^a *** $P < 0.01$, ** $P < 0.05$, * $P < 0.10$

(Walczuch *et al*, (2000))

Table 6 illustrates all the identified barriers of the internet for small companies , and **Table 7** outlines the results obtained for the barriers by Walczuch *et al*, (2000).

Table 6 – Internet barriers for small firms

Category	Barrier	Source
Awareness of SMEs/access to infrastructure	Costs (start-up costs)	Purao and Campbell (1998)
	Unfamiliarity with the internet	Purao and Campbell (1998)
	Lack of guidance about how to start the process	Purao and Campbell (1998)
Critical mass among business partners	Suppliers or customers are not on-line	Abell and Limm (1996)
Confidence in legal and regulatory framework/security	Security hazards	Purao and Campbell (1998)
	Guarantee of message delivery	Abell and Limm (1996)
	Tampering with network messages	Abell and Limm (1996)
	Unauthorised access to internal networks	Abell and Limm (1996)
	Interception of network messages	Abell and Limm (1996)
	Verification of authorship of messages	Abell and Limm (1996)
	Enforceability of contracts negotiated over the network	Abell and Limm (1996)
Adaptation of business processes	Decreased productivity through frivolous use	Abell and Limm (1996)

(Walczuch *et al*, (2000))

Table 7 – Ranked perceived barriers of internet adoption for small firms

Variable	Whole sample			Firms with Internet access within a year		Firms with no Internet access within a year	
	N	Mean	SD	Mean	SD	Mean	SD
Lack of time	61	3.64**	1.38	3.30	1.17	3.84***	1.51
Does not lead to more efficiency or lower costs	56	3.63**	1.46	2.80	1.44	4.29***	1.10
Too expensive with regard to telecommunication costs	55	3.20	1.45	3.00	1.44	3.38	1.45
Technically too complicated	55	2.93	1.49	2.44*	1.42	3.28	1.44
Too expensive with regard to computer equipment	54	2.91	1.35	2.46*	1.35	3.27	1.26
Insecure	50	2.58**	1.43	2.75	1.42	2.42*	1.45
Too slow when using	49	2.45***	1.37	2.65	1.40	2.27**	1.34
Possible use for unintended purposes by personnel	50	2.24***	1.45	2.25**	1.42	2.23**	1.50

*** $P < 0.01$, ** $P < 0.05$, * $P < 0.10$

(Walczuch *et al*, (2000))

For a better understanding relating to South Africa, Cloete (2003) studied the acceptance and adoption of e-Commerce by SMEs in South Africa and postulated the ten most valued benefits and barriers of using the internet in **Table 8 and 9**.

Table 8 – Benefits of internet usage

Ranking	Q 23: Benefits of Internet usage
1	Financial reasons; such as online banking
2	Speed of communication/response rates
3	Reduction of communication costs
4	Research/gathering of information
5	Improve productivity/competitiveness
6	Global reach
7	Improve CRM
8	Transfer documents
9	Saves time
10	Marketing/advertising

(Cloete, 2003)

Table 9 – Barriers of internet usage

Ranking	Q 21: Barriers for non-Internet usage
1	Lack of time to investigate options
2	Lack of knowledgeable/qualified staff
3	Lack of information on options
4	Not enough business partners use it
5	No real business need/no benefit
6	Lack of HR & skills
7	Poor telecommunications infrastructure
8	Lack of training on e-commerce
9	Poor security on the Internet/fraud
10	Costs too high

(Cloete, 2003)

2.5 Conclusion

This chapter compiled the literature to describe the framework for the key aspects of this study. Firstly the concept of SMMEs in South Africa was illustrated to describe the complexities and unique characteristics by referencing various definitions and also outlining the importance of SMMEs for any country's economy. For a country to utilize the mentioned benefits of SMMEs it is important to facilitate a business environment that is not constraining for the development of those enterprises.

Access to finance, lack of business skills and training, access to general services, regulatory environment and other constraints were constraints identified from past studies that act as obstacles for SMME development in the formal and informal sectors.

The beef cattle breeding industry were identified as one of the key SMME contributors within the South African agricultural sector. Therefore to illustrate how big the South African beef market is an abstract of Agricultural Statistics (2011) in 2010/2011 display that South Africa has a total number of 13.7 million cattle which include commercial and informal animal production. Furthermore the South African beef cattle industry produced 819.6 thousand tons of beef and veal meat and this is all from genetic material delivered from 2400 seed stock beef cattle breeders (Scholtz *et al.*, 2008). However this industry is under threat because of climate change, cross breeding with non-descriptive bulls by the informal farmers and other factors that impact on the whole agricultural sector (Vink & Van Rooyen, 2009). Furthermore, to mitigate some of these threats the use of

technology is suggested to market the beef cattle breeders globally with the adoption of a website.

Simmons *et al.* (2009) has provided a conceptualization of a framework for the determinants of small business website adoption. This framework highlights all the aspects that impact website adoption by SMMEs in previous studies within different industries. Using this framework and identified benefits and barriers of website adoption by Walczuch, Van Braven and Lundgren, (2000) and Cloete, (2003), a construct was created to understand what are the perceived benefits and barriers of website adoption by the South African beef cattle breeders.

CHAPTER 3

3. Research Hypothesis

Deducting from the literature, some key findings suggest the following:

- SMMEs are very important in the context of economical contribution, job creation, alleviation of unemployment and facilitating entrepreneurial innovation for South Africa and globally.
- The beef cattle breeding industry forms part of the SMMEs of South Africa and provide the genetic backbone of the beef cattle production industry. Various factors were identified that could be detrimental to the future of the beef cattle breeding industry. New avenues need to be explored to mitigate the possible threats for example the use of new technology like website adoption.
- Website adoption by SMMEs has been well researched in different contexts to a level of conceptualization of all the determinants. Furthermore the benefits and barriers of website adoption within other industries have been identified.

By using the website adoption concepts and applying it to the beef cattle breeding industry a better understanding could be gained of what the current website adoption proportion is and also to add knowledge of what the perceived website benefits and barriers are. Using the information gained, the beef cattle breeding industry can understand what areas need to be addressed to exploit the mentioned advantages of having a website.

To address the objectives stipulated earlier the following hypotheses were used:

- 3.1. To explore what the current proportion of website adoption is within the beef cattle breeding industry.

Hypothesis 1:

H_{01} : The **proportion** of website adoption is **not less** than the proportion of non-adoption by the beef cattle breeding industry in South Africa.

H_{a1} : The **proportion** of website adoption is **less** than the proportion of non-adoption by the beef cattle breeding industry in South Africa.

- 3.2. To get an understanding of which factors are perceived by the beef cattle industry as the primary benefits and barriers of website adoption

Hypothesis 2:

H₀₂: *The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is **not** giving easy access to potential customers*

H_{a2}: *The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is giving easy access to potential customers*

- If however not enough data is collected to attain significant results a further Hypothesis 2a will be used to gain an understanding of the ranking of grouped perceived benefits. A new sales channel group will be tested because giving easy access to potential customers is one of the variables within the group:

Hypothesis 2a:

H_{02a}: *The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is **not** a new sales channel*

H_{a2a}: *The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is a new sales channel*

Hypothesis 3:

H₀₃: *The primary perceived **barrier** of website adoption by the beef cattle breeding industry in South Africa is **not** being unfamiliar with or the lack of knowledge regarding websites.*

H_{a3}: *The primary perceived **barrier** of website adoption by the beef cattle breeding industry in South Africa is being unfamiliar with or the lack of knowledge regarding websites.*

CHAPTER 4

4. Research methodology and design

This section discusses the research methodology and design used to address the hypotheses created for the study.

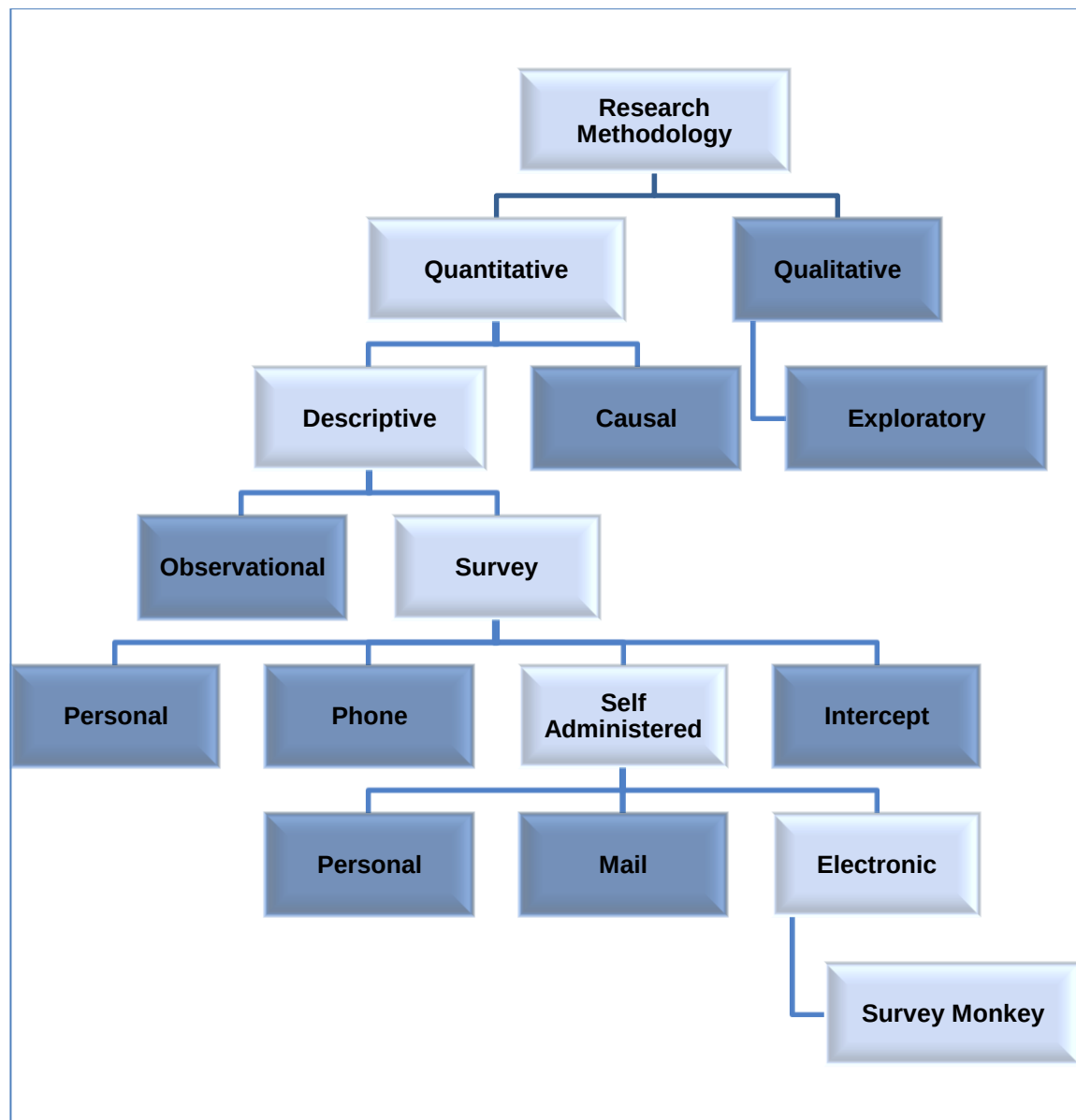
4.1 Research Design and Type

Figure 5 on page 34 illustrates the research methodology followed in the study. The diagram indicates a quantitative design of a descriptive type as there was a depth of knowledge already available.

Quantitative data consist of numbers or data that have been quantified, such as tables or figures (Saunders & Lewis, 2012). Zikmund, (2003) stipulated that descriptive studies are based on some previous understanding of the nature of the research problem and aim to answer the questions *who, what, when, where* and *how*.

This study will aim to identify the proportion of website adoption by the South African beef cattle breeders, and drawing from a combination of stated benefits and barriers of internet use by Walczuch, Van Braven and Lundgren (2000) and Cloete (2003) the perceived primary benefits and barriers of website adoption will be outlined.

Figure 5 – Compiled from Saunders and Lewis (2012)



4.2 Research Method, Type, Technique and Tool

With the purpose to identify the proportion of website adoption and to outline the primary perceived benefits and barriers of a website by the South African beef cattle breeding industry, a non-experimental survey design was used.

According to Saunders & Lewis (2012) a survey involves data from a sizeable population using the strategy of structural data collection and it takes the form of questionnaires, structured observations and structured interviews. An electronic, self-administered type

survey served as the research method using a combination of the factors identified by Walczuch *et al.* (2000) and Cloete (2003). Another option “Other” was also added to cater for possible undocumented reasons, whereby the respondent could manually type in a reason for the “Other” selection.

The questionnaire consisted of three questions (See **Appendix 4**):

- ❑ The first question seeks to determine the size of the enterprise to establish the proportion of small, medium, micro and large enterprises within the beef cattle breeding industry of South Africa.
- ❑ In question two of the questionnaire the applicant was asked to specify whether his/her enterprise has adopted a website or not. This question gave a good indication of what proportion of beef cattle breeders already had a website and what proportion had not. Question two also stratified the questionnaire into two sections depending on the selection of having a website or not (Y = Yes; N = No). If the applicant already had a website the benefits of website adoption would be listed and if not the possible barriers of website adoption would be listed.
- ❑ As mentioned above, depending on the selection of question two, question three would either consist of the benefits of website adoption or the possible barriers of website adoption. The respondent would then had to rank (1 = most important; 10 = least important) the top ten perceived benefits or barriers of website adoption, similar to the study of Cloete (2003).

The proposed tool that was used to administer the survey was Survey Monkey.

The survey was piloted by willing participants within the beef cattle breeding sector and fellow students to ensure the ease of use and readability. When changes were required the questionnaire was amended accordingly and resubmitted for final approval.

4.3 Population

A population is the complete set of grouped members and it can consist of people, or organisations, or places etc. according to Saunders & Lewis (2012).

The population of this study was limited to the estimated 2400 registered South African beef cattle breeders according to the Integrated Registration and Genetic Information System (INTERGIS). These registered beef cattle breeders consist of large, small, medium and micro enterprises.

4.4 Sampling

Saunders & Lewis (2012) defines a sample as a subgroup or a subset of the whole population in question.

The sampling frame, which is the complete list of all members of the total population according to Saunders and Lewis (2012), consisted of all registered beef cattle breeders in South Africa who have access to internet to take part in the electronic survey.

The sampling was done using a non-probability, non-random, convenience sampling technique (Saunders & Lewis, 2012). This sampling technique was followed because a list of a proportion of the population was available and accessible in the given timeframe and cost.

After consulting SA Stud Book for permission a list of beef cattle breeders from various breed societies were provided. The breeder list consisted of 1378 members but only 1261 had valid e-mail addresses. Therefore the 1261 registered beef cattle breeders made up the sample size for the research.

4.5 Participants

The participants were the registered beef cattle breeders whom had access to the internet and agreed to take part in the survey. Each participant did receive a cover letter via e-mail. This letter acted as the consent given by the participant but also gave a detailed description outlining the purpose of the study. The applicant could then complete the survey through an embedded website link. Furthermore, a statement was given that the survey will be voluntary and anonymous.

The participants have not received individual feedback, but a copy of the research can be made available if requested.

4.6 Data Analysis

To ensure that all surveys received were valid, data was reviewed to discard incomplete or invalid surveys. Using a survey tool like Survey Monkey an electronic analysis identified all the incomplete surveys and also limited a participant only to respond once to the survey.

The proportion of small, medium, micro and large enterprises in the beef cattle breeding industry who participated in the survey had been tabled and illustrated graphically for a better understanding. This provided assistance in the validity of the data analyses, where large enterprises could then be discarded from the results, because the scope of the study was only for small, medium and micro enterprises within the beef cattle breeding sector.

For determining the proportion of website adoption in *Hypothesis 1* a percentage of adoption was calculated from all the surveys received.

To achieve a ranking for each of the benefits of website adoptions in *Hypothesis 2* and *Hypothesis 2a* summation calculations were used. **Figure 6** below illustrates the Borda count sums ranking method that was used:

Figure 6 – Borda count sums ranking (Clive, William, & Michael, 2002)

$$A_k^B = \sum_{i=1}^m (n - \sigma_i(k))$$

Clive, William, & Michael (2002) explain the Borda count sums ranking as “each alternative A_k is assigned a number of points for each individual rank order R_i depending on its place in that order, and then the numbers are summed”.

n = value assigned to each rank

k = index value

m = number of rankings

σ = iterations

By using the Borda count sums ranking method for ten rankings, each ranking was then allocated a value as stated below in **Table 10**:

Table 10 – Ranking value allocation of benefits of website adoption

Ranking	1	2	3	4	5	6	7	8	9	10
Formula	(n)	(n-1)	(n-2)	(n-3)	(n-4)	(n-5)	(n-6)	(n-7)	(n-8)	(n-9)
Points	10	9	8	7	6	5	4	3	2	1

Furthermore, to rank the barriers of website adoptions in *Hypothesis 3* a calculation of each factor supplied with the questionnaire was done. Using the Borda count sums ranking method each ranking was then allocated a value as stated below in **Table 11**:

Table 11 – Ranking value allocation of barriers of website adoption

Ranking	1	2	3	4	5	6	7	8	9	10
Formula	(n)	(n-1)	(n-2)	(n-3)	(n-4)	(n-5)	(n-6)	(n-7)	(n-8)	(n-9)
Points	10	9	8	7	6	5	4	3	2	1

Using a summation of the value for each ranking, an overall ranking could be calculated for the benefits and barriers of website adoption. The ranking was tabled in a similar format as was done in the Cloete (2003) study.

Descriptive analysis

The following descriptive statistics were used to confirm the findings within the analysis:

Mean

For the purpose of describing the central tendency of the data the mean was calculated by summing the values of a variable for all the observations and then dividing it by the number of observations (Norusis, 2005).

Standard deviation

The standard deviation describes the dispersion of the data and is calculated as the square root of the variance (Norusis, 2005).

Median

The median is the middle value when observations are ordered from the smallest to the largest (Norusis, 2005). It is also considered to be another measurement of central tendency.

A chi-square test was done on the data received for both the benefits and barriers of website adoption to establish the significance of the data with the purpose to test the hypotheses.

Chi-square test

According to Diamtopoulos & Schlegelmilch (2000) when two groups are compared on a variable which is measured on a nominal scale the chi-square test should be used. Also, Cooper & Schindler (1998) suggest that the chi-square (X^2) test should be used to test for significant differences between an observed distribution of data among categories and the expected distribution based on the null hypothesis.

Another detailed explanation by Burns & Bush (1998) (as cited in Mostert, 2002) states that the chi-square test analyse the frequencies for two nominal scaled variables in a cross-tabulation table to determine whether the variables have a non-monotonic relationship.

Sudman & Blair (1998) noted that the chi-square tests apply to the overall relationship between variables and must not be used for individual differences. Furthermore the most important component of understanding the results of a chi-square test, known as the degrees of freedom and is calculated using the following formula:

$$\text{Degrees of freedom (DF)} = (R-1)(C-1)$$

R = number of rows

C = number of columns

(Sudman & Blair, 1998)

The importance of the degrees of freedom is confirmed with a quote of Burns & Bush (1998) (as cited in Mostert, 2002) that states:

"... Chi-square value says nothing by itself - you must consider the number of degrees of freedom in the cross-tabulation table because more degrees of

freedom are indicative of higher critical chi-square table values for the same level of significance".

Finally according to Burns & Bush (1998) (as cited in Mostert, 2002) the chi-square test yields a probability (also known as a P-Value on output of statistical computer programs) that the researcher can use to find evidence in support of the null hypothesis if the study is repeated a number of times using independent samples.

The statistical computer program that was used for this research is called StatTools 5.7 which operates as an add-on program for Microsoft Excel 2007.

To reject the null hypotheses for **Question 3 (See Appendix 4)** a significance of 5% was used. This denotes that the probability (P-value) must be less than 0.05 to signal a rejection of the null hypothesis.

4.7 Research limitations

Due to the nature of this study, and the time constraints of the research project, the following have been identified as research limitations:

- The selection has been done with some bias, initially only participants with internet access have been able to take part in the survey. This could have had an impact on the validity of the data regarding the barriers of website adoption.
- Subject bias could have had an impact on the validity of the data. Subject bias advocates that the research subjects provide unreliable information, whereby participants do not disclose the true information requested. (Saunders & Lewis, 2012).
- The possibility existed of a non-response error, a response bias and administrative errors when conducting a survey to obtain primary data.

CHAPTER 5

5. Research results

The purpose of this chapter is to display the results obtained as discussed in **Chapter 4**. Furthermore the research results are evaluated and laid out according to the research objectives and three hypotheses.

5.1 Sample Description

The sample consisted of the small, medium, micro and large beef cattle breeder enterprises of South Africa. An electronic survey was used, which required the respondents to have a valid e-mail address and access to the internet.

The information of the breeders was sourced from the South African Stud book and Animal Improvement Association and from the breed society websites. **Table 12** indicates the breed societies that participated in the survey.

Table 12 – A list of most of the Cattle Breed Societies of South Africa

Name of Cattle Breeder Society of South Africa	Included in Survey
Afrikaner	Y
Angus	Y
Ayrshire	N
Beefmaster	Y
Bonsmara	N
Boran	Y
Braford	N
Brahman	Y
Brangus	N
Braunvieh	N
Charolais	Y
Dexter	Y
Drakensberger	Y
Gelbvieh	Y
Holstein	N
Hugenoot	N
Jersey	N
Limousin	N

Name of Cattle Breeder Society of South Africa	Included in Survey
Nguni	Y
Pinzgauer	N
Red Poll	Y
Romagnola	N
S A Dairy Swiss	N
S A Guernsey	N
S A Hereford	N
Santa Gertrudis	N
Senepol	Y
Shorthorn	Y
Simbra	N
Simmentaler	Y
South Devon	Y
Sussex	Y
Tuli	Y
Wagyu	N

Table 12 indicates that only sixteen societies were used as respondents. This was due to certain societies not wanting to participate in the survey and because of convenient sampling where the information of the breeders were sourced as discussed above.

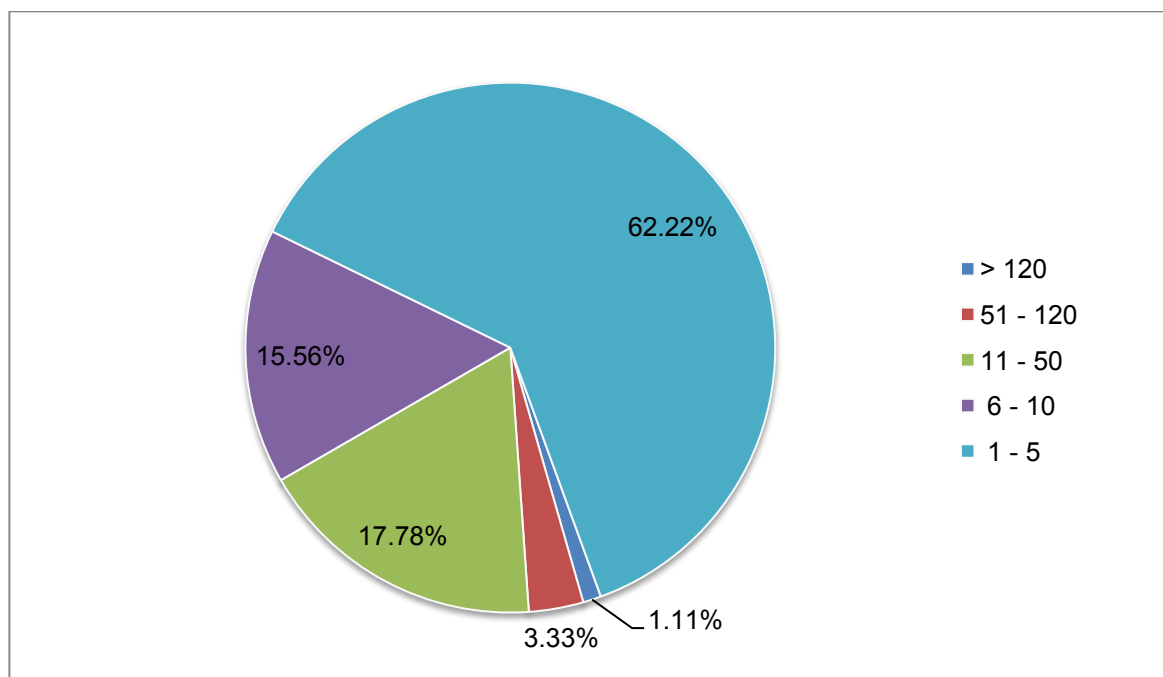
The sample consisted of 1261 respondents whom received a questionnaire and two reminder e-mails over a period of three weeks. From the 1261 questionnaires 90 were answered and only 77 were completed in full. Thirteen of the respondents only completed the first two questions, whereas one of the respondents was a large organisation which had to be excluded. Unfortunately the response rate was therefore only 6.0 per cent $((76/1261) \times 100)$.

All incomplete questionnaires including the large organisation were discarded from question two and three to attain relevant data for website adoption by the beef cattle breeding industry SMMEs.

5.2 Beef cattle breeders enterprise size proportion

For the purpose to get a better understanding of the enterprise size proportions within the beef cattle breeding industry, the first question asked was how many workers are employed on a full-time basis. A descriptive analysis was done using a nominal measurement to calculate the frequency of each category. These frequencies were then converted to proportions and the results were graphically displayed as percentages in **Figure 7**.

Figure 7 – Total full-time employees



The number of full-time employees was stratified according to the Agricultural industry specification in **Appendix 3**. **Figure 7** indicates that of the enterprises that responded 62.2% were micro sized enterprises, 15.6% very small enterprises, 17.8% small enterprises, 3.33% medium enterprises and only 1.11% large enterprises.

5.3 Website adoption proportion

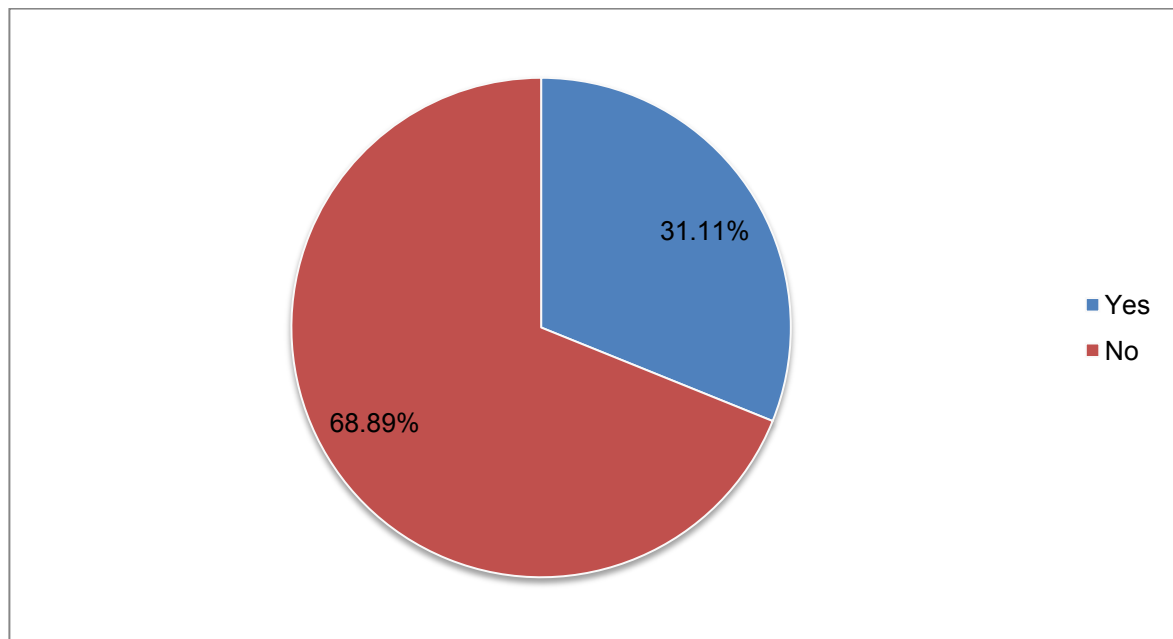
Hypothesis 1:

H_{01} : The **proportion** of website adoption is **not less** than the proportion of non-adoption by the beef cattle breeding industry in South Africa.

H_{a1} : The **proportion** of website adoption is **less** than the proportion of non-adoption by the beef cattle breeding industry in South Africa.

A nominal measurement in a descriptive analysis was used to calculate the frequency of website adoption. Thereafter the frequencies were converted to proportions in order to test *Hypothesis 1* and the results were graphically displayed as percentages in **Figure 8**.

Figure 8 – Website adoption proportion



From **Figure 8** it is clear that the proportion (31.1%) of website adoption (respondents selecting Yes) is not more than the proportion (68.9%) of non-adoption (respondents selecting No).

Therefore the null hypothesis (H_{01}) was rejected.

5.4 Perceived benefits of website adoption

Hypothesis 2:

H_{02} : The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is **not** giving easy access to potential customers.

H_{a2} : The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is giving easy access to potential customers.

5.4.1 Testing ungrouped perceived benefits

Hypothesis 2 was tested by asking the respondents to rank the ten primary perceived benefits of adopting a website from a list of seventeen possible answers, which were compiled from previous studies as discussed in **Chapter 4**. The data retrieved from the questionnaire for **Question 2** was attached as **Appendix 5**.

Five responses were collected for the “Other” variable but only three reasons were given which are listed below:

- “Provide knowledge to customers and not only products (bulls and cows)”
- “Website is always online and we can reach a lot more people that we do not know of previously”
- “Exposure to Market that is increasingly searching via internet”

Figure 9 – Borda summation results for 17 perceived benefits of website adoption



Table 13 – Summation ranking of perceived benefits of website adoption

Rank	Benefits
1	1. Advertising and marketing of products or services
2	2. Give easy access to potential customers
3	13. Enhanced company image and brand
4	15. Create new business opportunities
5	6. Low cost of communication
6	7. Savings in advertising cost
7	5. Increase the market share of products or services
8	11. Improved product delivery to the market
9	8. Improved productivity and competitiveness, example: Saves time
10	12. Improved customer relations management and services

The Borda count sums ranking method assigned a summation of points according to **Table 10** for each variable and which is graphically illustrated in **Figure 9**. Using the total score for each variable a ranking was realized for the top ten as shown in **Table 13**.

To insure the validity of the data a Chi-square independence test and descriptive statistics were done as illustrated in **Tables 14 and 15**.

Table 14 – Chi-square test for the perceived benefits of website adoption

Distance from Expected	1	2	3	4	5	6	7	8	9	10
1. Advertising and marketing of products or services	8.1619	0.1331	0.1632	0.7930	0.2297	0.3044	1.8683	0.6856	0.2134	0.0581
2. Give easy access to potential customers	0.1662	0.7720	0.1632	0.0581	1.1592	0.3044	1.8683	2.4324	0.2134	1.1187
3. On-line sales and transactions	0.2445	0.0018	0.0000	1.7784	0.3838	1.2934	1.4012	0.2559	0.0291	2.7751
4. Able to reach international markets	0.0800	0.0112	0.2777	1.9760	2.3353	0.2205	0.1992	0.1261	0.0765	4.6276
5. Increase the market share of products or services	2.2444	0.1095	0.0802	0.0327	0.6433	0.0730	0.8172	1.7904	0.1553	0.2329
6. Low cost of communication	0.7436	0.0307	0.0458	4.1239	0.9771	1.5090	1.1402	0.2465	0.1062	0.5568
7. Savings in advertising cost	0.0800	0.0112	0.0210	0.4821	0.1892	1.6996	1.3377	1.5569	0.0765	0.4821
8. Improved productivity and competitiveness, example: Saves time	0.6248	0.3307	0.6669	0.5306	0.1892	4.5705	1.5569	0.1261	0.3537	1.9760
9. Lower cost for products or services	1.4457	0.5790	0.0000	0.0276	3.9964	0.0666	1.4012	0.1149	0.5594	0.3407
10. Lower cost of obtaining supplies	0.0008	0.7441	0.0072	0.0611	0.4888	0.0402	1.3234	0.3460	0.0128	0.0611
11. Improved product delivery to the market	1.4207	0.7441	2.3793	1.6796	0.0001	1.2216	1.3234	1.3234	0.6920	0.2750
12. Improved customer relations management and services	0.8674	0.7930	0.8474	3.6750	0.0724	0.1111	0.0482	0.2965	0.2094	0.3141
13. Enhanced company image and brand	2.6464	2.3713	0.0784	0.0139	0.1260	0.1111	0.9678	0.2965	1.4491	0.3141
14. Obtain relevant information through interaction with other interested parties	0.5117	0.0011	0.3808	0.4099	0.6693	0.2951	8.3819	0.1552	0.4477	1.8772
15. Create new business opportunities	0.1762	0.0581	0.0784	1.5345	0.1260	0.1111	0.9678	0.9678	1.4491	0.6337
16. Increased speed effectiveness communication and/or response rate	2.0821	0.0581	0.0784	0.3141	0.0724	0.2134	0.9678	0.0482	1.6598	0.0139
17. Other	1.4752	0.5389	3.7755	0.4940	0.5838	0.3593	0.3892	0.9585	0.3293	0.4940

Distance from Expected	1	2	3	4	5	6	7	8	9	10
Chi-Square Statistic										
Chi-Square	143.9041									
p-Value	0.4866									

Table 15 – Descriptive statistics for the perceived benefits of website adoption

	Mean	Variance	Std. Dev	Median	Range	Count	Sum
1. Advertising and marketing of products or services	2.400	7.822	2.797	2.000	10.000	10	24.000
2. Give easy access to potential customers	2.400	2.933	1.713	2.000	5.000	10	24.000
3. On-line sales and transactions	1.800	2.400	1.549	2.000	4.000	10	18.000
4. Able to reach international markets	2.000	2.667	1.633	2.000	5.000	10	20.000
5. Increase the market share of products or services	2.300	1.344	1.160	2.000	4.000	10	23.000
6. Low cost of communication	2.100	2.322	1.524	2.000	5.000	10	21.000
7. Savings in advertising cost	2.000	1.556	1.247	2.000	4.000	10	20.000
8. Improved productivity and competitiveness, example: Saves time	2.000	1.778	1.333	2.000	4.000	10	20.000
9. Lower cost for products or services	1.800	1.956	1.398	1.000	5.000	10	18.000
10. Lower cost of obtaining supplies	1.7000	0.9000	0.9487	2.0000	3.0000	10	17.0000
11. Improved product delivery to the market	1.700	3.344	1.829	1.000	5.000	10	17.000
12. Improved customer relations management and services	2.200	1.511	1.229	2.000	4.000	10	22.000
13. Enhanced company image and brand	2.200	3.956	1.989	2.000	7.000	10	22.000
14. Obtain relevant information through interaction with other interested parties	1.900	1.878	1.370	2.000	5.000	10	19.000
15. Create new business opportunities	2.200	1.289	1.135	2.000	4.000	10	22.000
16. Increased speed effectiveness communication and/or response rate	2.2000	0.6222	0.7888	2.0000	2.0000	10	22.0000
17. Other	0.5000	0.7222	0.8498	0.0000	2.0000	10	5.0000

Deducting from **Table 14** the probability to reject the null hypothesis was more than 0.05 (5%).

Therefore the null hypothesis (H_{02}) could not be rejected.

However to run a Chi-square independence test and according to the Central Limit Theorem (Minitab, 2009) the sample size needs to be at least 30. As indicated previously only 22 samples were collected for determining the perceived benefits of website adoption by the beef cattle breeders.

5.4.2 Testing grouped perceived benefits

Hypothesis 2a:

H_{02a} : The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is **not** a new sales channel

H_{a2a} : The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa a new sales channel

With the purpose to achieve the minimum required sample size of 30, sixteen of the seventeen variables were reduced to five groups as indicated in **Table 16** which were deducted from the previous studies of Walczuch, Van Braven and Lundgren, (2000) and Cloete, (2003). The “Other” variable was discarded because of the low response and ability to assign it to a specific group.

Table 16 – Five groups of perceived benefits of website adoption

Group	Perceived benefits
1. Marketing and Advertising	1. Advertising and marketing of products or services 13. Enhanced company image and brand
2. Direct Savings	6. Low cost of communication 7. Savings in advertising cost 9. Lower cost for products or services 10. Lower cost of obtaining supplies
3. Productivity / competitiveness	8. Improved productivity and competitiveness, example: Saves time 11. Improved product delivery to the market 16. Increased speed effectiveness communication and/or response rate
4. Customer Relations and Research	12. Improved customer relations management and services 14. Obtain relevant information through interaction with other interested parties
5. New Sales Channel	2. Give easy access to potential customers 3. On-line sales and transactions 4. Able to reach international markets 5. Increase the market share of products or services 15. Create new business opportunities

Due to the nature of the perceived benefits the variables could not be distributed evenly between the groups. In order to mitigate the imbalance all responses for each group

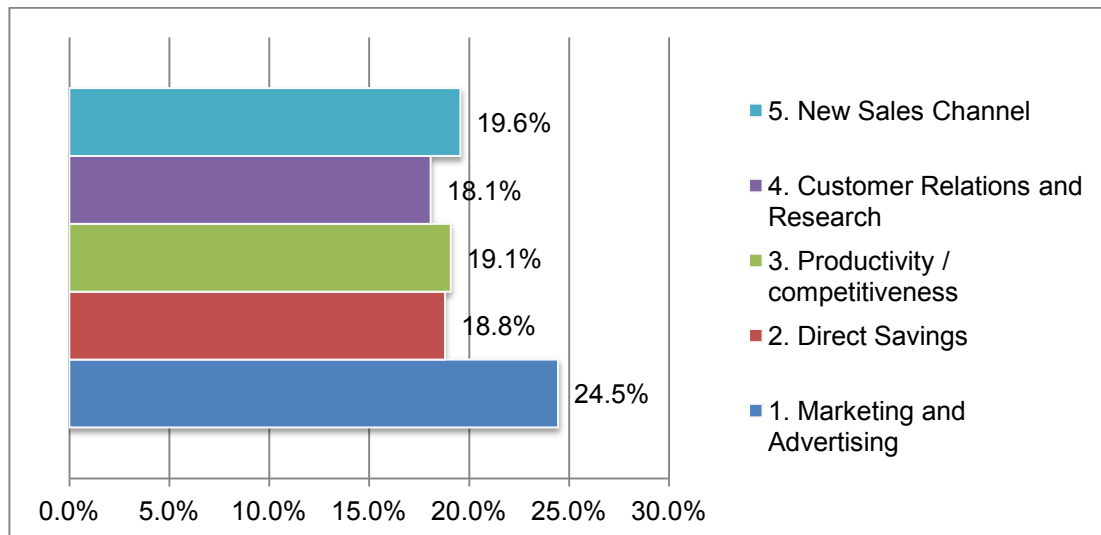
were divided by the number of variables in that group, for example the *New Sales Channel* was divided by five because it consisted of five variables. Furthermore, all five groups were then multiplied by five to ensure that enough samples were available to test for significance.

The Borda count sums ranking method was again applied but the proportion was added to demonstrate the results better. **Table 17** and **Figure 10** illustrates the results below.

Table 17 – Weighted group proportions for perceived benefits of website adoption

Benefit groups (Divide by number of variables x 5)	Row Totals	Sum Ranking	Proportion As %
1. Marketing and Advertising	115.00	778	24.5%
2. Direct Savings	95.00	598	18.8%
3. Productivity / competitiveness	98.33	607	19.1%
4. Customer Relations and Research	102.50	575	18.1%
5. New Sales Channel	107.00	622	19.6%
Column Totals		3179	

Figure 10 – Borda summation proportions for grouped perceived benefits of website adoption



By using the proportions a ranking could be compiled as illustrated in **Table 18**.

Table 18 – Summation ranking of grouped perceived benefits of website adoption

Rank	Benefits
1	1. Marketing and Advertising
2	5. New Sales Channel
3	3. Productivity / competitiveness
4	2. Direct Savings
5	4. Customer Relations and Research

To ensure the validity of the data merged into five groups, a Chi-square independence test was done.

Table 19 – Chi-square test for grouped perceived benefits of website adoption

Distance from Expected	1	2	3	4	5	6	7	8	9	10
1. Marketing and Advertising	21.4865	3.5930	0.3087	1.5492	0.7895	0.1603	0.5744	0.3196	3.6599	0.2972
2. Direct Savings	1.4235	1.0090	0.0024	0.7930	2.5883	0.1181	0.0540	0.5280	0.0094	0.7647
3. Productivity / competitiveness	1.2568	1.3188	0.2137	0.0004	0.3602	0.1120	1.4088	0.0330	3.6304	1.8909
4. Customer Relations and Research	4.1696	0.6968	0.0365	1.9381	0.2729	0.6625	8.5765	0.8089	1.2749	0.4403
5. New Sales Channel	0.3697	0.5399	0.0748	0.7954	0.4341	0.1433	0.5240	1.3296	0.7343	4.9571
Chi-Square Statistic										
Chi-Square	79.0332									
p-Value	< 0.0001									

Table 19 indicates that the grouped samples were highly significant with a p-Value less than 0.05.

As indicated in **Table 18** the *New Sales Channel* was ranked as the second most perceived benefit by the beef cattle breeding industry of South Africa.

Thus the null hypothesis (H_{02a}) could not be rejected.

5.5 Perceived barriers of website adoption

Hypothesis 3:

H_{03} : The primary perceived **barrier** of website adoption by the beef cattle breeding industry in South Africa is being **not** unfamiliar with or the lack of knowledge regarding websites.

H_{a3} : The primary perceived **barrier** of website adoption by the beef cattle breeding industry in South Africa is being unfamiliar with or the lack of knowledge regarding websites.

Hypothesis 3 was tested by asking the respondents to rank the ten primary perceived barriers of adopting a website from a list of fifteen possible answers. As with the benefits the fifteen possible answers were compiled and adopted from previous research done as discussed in **Chapter 4**.

Seven responses were collected for the “Other” variable but only five reasons were given which are listed below:

- “I don't want to pay someone else - want to do it myself”
- “Just start marketing my animals”
- “Herd not big enough, not enough animals to supply demand”
- “Website currently being developed”
- “I am in the process of creating a website”

Figure 11 – Borda summation results for the perceived barriers of website adoption

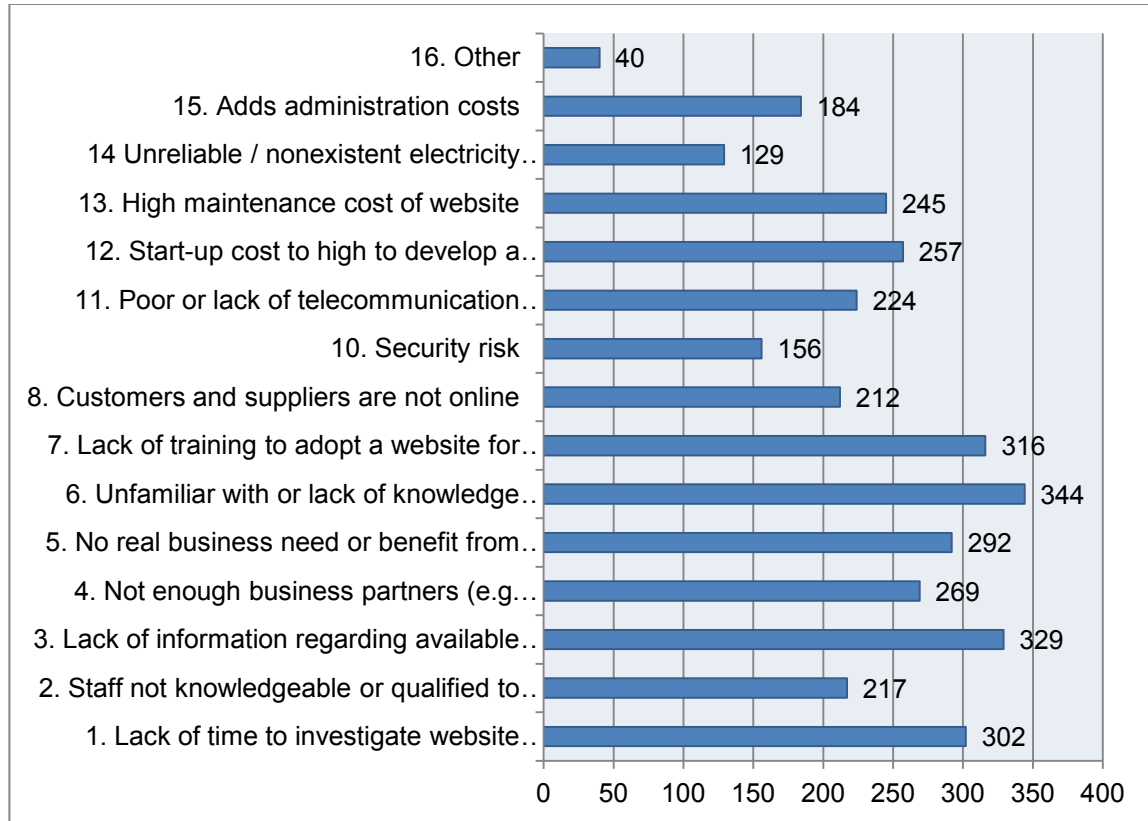


Table 20 – Summation ranking of perceived barriers of website adoption

Rank	Barrier
1	6. Unfamiliar with or lack of knowledge regarding websites
2	3. Lack of information regarding available options
3	7. Lack of training to adopt a website for business
4	1. Lack of time to investigate website technology
5	5. No real business need or benefit from having a website
6	4. Not enough business partners (e.g. customers, suppliers, stakeholders) will use the website
7	11. Start-up cost to high to develop a website
8	12. High maintenance cost of website
9	10. Poor or lack of telecommunication infrastructure
10	2. Staff not knowledgeable or qualified to maintain a website

As with the benefits of website adoption a method of ranking was used to conclude a result. The ranking was done for each variable using a summation of points allocated to each rank which realized a result as indicated in **Figure 11**. The results for the Borda count sums ranking method were shown in **Table 20**.

To insure the validity of the data a Chi-square independence test and descriptive statistics were done as illustrated in **Table 21 and 22**.

Table 21 – Chi-square test for the perceived barriers of website adoption

Distance from Expected	1	2	3	4	5	6	7	8	9	10
1. Lack of time to investigate website technology	0.5973	0.0011	0.6528	0.2390	0.5511	0.3612	0.0092	0.5910	0.3141	0.0387
2. Staff not knowledgeable or qualified to maintain a website	0.0023	1.7202	0.7409	1.0212	0.6274	0.9000	0.1921	1.0922	2.5000	0.0650
3. Lack of information regarding available options	0.1253	2.6302	0.2143	1.4243	0.0221	0.0157	1.8667	0.0861	1.1490	2.3646
4. Not enough business partners (e.g. customers, suppliers, stakeholders) will use the website	0.2103	3.9808	0.0549	0.1309	0.5537	0.0800	0.4136	0.1827	0.8514	0.1007
5. No real business need or benefit from having a website	14.0184	0.0952	3.6429	1.0212	1.4466	2.5000	0.4587	0.2195	0.9000	0.0201
6. Unfamiliar with or lack of knowledge regarding websites	0.0078	0.1758	9.8721	1.5089	0.0040	0.3463	2.4930	0.6452	3.0233	0.9397
7. Lack of training to adopt a website for business	0.0009	0.0022	0.8234	11.9074	3.3479	0.4652	0.0310	0.0612	1.1999	1.4529
8. Customers and suppliers are not online	3.5109	0.9165	0.0645	0.8693	0.0213	0.0618	1.3911	2.8270	1.0959	0.0006
9. Security risk	0.0233	0.1129	2.6262	0.4302	0.3798	0.0217	1.2219	0.2445	0.0217	2.5475
10. Poor or lack of telecommunication infrastructure	0.3763	0.4435	1.6838	0.1193	0.0427	0.1956	2.9900	0.0327	0.1956	0.7361
11. Start-up cost too high to develop a website	0.3894	0.0536	0.0350	0.1564	1.5912	0.9000	0.9921	0.2922	0.9000	1.7729
12. High maintenance cost of website	0.5555	0.7029	0.1731	0.2120	2.3221	0.0563	0.1203	0.1921	0.7318	0.4106
13. Unreliable / nonexistent electricity infrastructure	0.4384	0.6173	0.2220	0.2621	0.0207	1.5698	0.5137	0.1153	0.1179	4.0250
14. Adds administration costs	1.2735	3.1894	0.0446	0.8652	1.1198	0.0456	3.0300	1.9281	1.2056	2.8237
15. Other	1.6838	0.5581	0.5930	0.4302	0.0013	0.4070	0.5233	0.6395	0.8641	0.9001
Chi-Square Statistic										
Chi-Square	159.0964									
p-Value	0.0246									

Table 22 – Descriptive statistics for the perceived barriers of website adoption

	Mean	Variance	Std. Dev	Median	Range	Count	Sum
1. Lack of time to investigate website technology	5.100	5.211	2.283	4.000	7.000	10	51.000
2. Staff not knowledgeable or qualified to maintain a website	4.300	6.678	2.584	4.000	8.000	10	43.000
3. Lack of information regarding available options	4.800	9.289	3.048	5.000	10.000	10	48.000

	Mean	Variance	Std. Dev	Median	Range	Count	Sum
4. Not enough business partners (e.g. customers, suppliers, stakeholders) will use the website	4.200	8.400	2.898	3.000	9.000	10	42.000
5. No real business need or benefit from having a website	4.300	34.011	5.832	3.000	20.000	10	43.000
6. Unfamiliar with or lack of knowledge regarding websites	5.200	14.844	3.853	5.000	11.000	10	52.000
7. Lack of training to adopt a website for business	4.900	7.878	2.807	4.000	9.000	10	49.000
8. Customers and suppliers are not online	4.100	3.656	1.912	4.000	6.000	10	41.000
9. Security risk	3.100	5.656	2.378	2.000	8.000	10	31.000
10. Poor or lack of telecommunication infrastructure	4.000	9.778	3.127	3.000	10.000	10	40.000
11. Start-up cost too high to develop a website	4.300	5.567	2.359	4.000	8.000	10	43.000
12. High maintenance cost of website	4.500	6.056	2.461	4.000	8.000	10	45.000
13. Unreliable / nonexistent electricity infrastructure	2.700	5.344	2.312	2.000	8.000	10	27.000
14. Adds administration costs	4.000	10.667	3.266	3.000	10.000	10	40.000
15. Other	0.700	1.122	1.059	0.000	3.000	10	7.000

Table 21 shows the probability (P-value) to reject the null hypothesis was less than 0.05 (5%). This implied that the null hypothesis (H_{03}) could be rejected.

Figure 11 and **Table 20** confirmed that the primary perceived **barrier** of website adoption by the beef cattle breeding industry in South Africa was *unfamiliar with or the lack of knowledge regarding websites*.

Therefore the null hypothesis (H_{03}) was rejected.

CHAPTER 6

6. Discussion of Results

The purpose for this chapter is to discuss the results obtained from Chapter 5 in terms of the research questions and hypotheses. Furthermore, the purpose is to provide reasons for the results in relation to the literature review.

6.1 Introduction

Globally, within Africa and in South Africa the increase in internet traffic has become evident as indicated by the Internet World Stats (2011). Porter (2001) and Williams (1999) dictates that the internet have many benefits that could be valuable for any company wanting to enhance their market reach, operational efficiency and unlocking new value by gaining access to new markets.

Simmons *et al.* (2009) provided a conceptualization of a framework for the determinants of small business website adoption. This framework highlights four aspects that impact website adoption by SMMEs in previous studies within different industries. The components include the instigators, the industry, the decision area and the influencers.

Munshi (2009) denotes that according to the *SME Survey* and *SMME Confidence Index* data 50% of the gross domestic product (GDP) in South Africa is contributed by SMMEs, and employs around 60 per cent of the country's workforce. It is therefore important that platforms like having a global presence with a website are available to further stimulate the growth of SMMEs.

Furthermore World Wide Worx (2012) confirms that the website adoption in South Africa has increased substantially in various industries. However no data is available for one of the most important SMME industries within the agricultural sector, the beef cattle breeders. Currently the beef cattle breeders are under threat due to various factors and new avenues are considered like the adoption of a website to keep this industry viable.

The research aim was to get a better understanding of what the current proportion of beef cattle breeders is that have a website and source insights into the perceived benefits and barriers of website adoption.

6.2 Beef cattle breeders enterprise size proportion

According to the *National Small Business Amendment Act, no 26 of 2003* the metrics of the size of an enterprise is comprised of three metrics which include the total full-time equivalent of paid employees, the total annual turnover and the total gross asset value (fixed property excluded).

For the purpose of getting an indication of the size of the enterprise the first question in the electronic survey was to ask the number of full time employees. This was the only metric used to determine the size of the enterprises, because the companies are reluctant to disclose their total annual turnover and the total gross asset value if the survey is not endorsed by a higher authority like for example the receiver of revenue.

The size of the enterprise was stratified into four classes as depicted in **Appendix 3** for the agricultural sector which consisted of micro, very small, small and medium. However a large size was also added to incorporate all types of enterprises because no information was available about the population with regards to the size of the enterprise. To get an indication of which enterprises were large the option to filter the data was added to be relevant to the scope of this research which does not include large organisations.

A descriptive analysis was done using a nominal measurement to calculate the frequency of each class of enterprise. Percentages were then calculated from the frequencies to source the proportions of enterprise size within the beef cattle breeder industry.

Figure 7 illustrates the results indicating that from the enterprises that responded 62.2% were micro sized enterprises, 15.6% were very small enterprises, 17.8% were small enterprises, 3.33% were medium enterprises and only 1.11% were large enterprises. Bearing in mind the small size of the survey sample, this implies that almost 99 per cent of the enterprises of the beef cattle breeder industry can be categorised as SMMEs. This proportion seems very high for any industry. Therefore the impact of a new technology for example the use of internet and the adoption of a website could be significant.

6.3 Website adoption proportion

Hypothesis 1:

H_{01} : The **proportion** of website adoption is **not less** than the proportion of non-adoption by the beef cattle breeding industry in South Africa.

H_{a1} : The **proportion** of website adoption is **less** than the proportion of non-adoption by the beef cattle breeding industry in South Africa.

In order to calculate the frequencies of website adoption a nominal measurement in a descriptive study analysis were used. The frequencies were then converted to proportions or percentages to test *Hypothesis 1*.

Figure 8 illustrates the results which indicate that 31.1% of the respondents have adopted a website and 68.9% have not.

The research yielded significant results with 76 responses for Hypothesis 1. Therefore the null hypothesis (H_{01}) may be rejected because the proportion of website adoption is less than the proportion of non-adoption.

This result is noteworthy, because it suggests that almost 70 per cent of the beef cattle breeding industry do not make use of the possible benefits which a website may offer to improve their business as an SMME.

Bearing in mind the small size of the survey sample, if a comparison is made to the statistics mentioned by World Wide Worx (2012) the beef cattle breeding industry's 30 per cent adoption of websites is lagging far behind the 63 percent of the formal SMMEs in South Africa.

To understand the considerable difference between the adoption of websites by the beef cattle breeder sector to the rest of the South African sectors a more detailed analysis is required. This involves an understanding of which of the determinants of small business website adoption as conceptualized by Simmons *et al.* (2009) deters the growth within this industry.

By using the Simmons *et al.* (2009) framework the following question could help to establish the primary determinants for website adoption by the beef cattle breeders:

- *Are the instigators responsible whereby the owner and / or the manager lack skills like the ability to market, entrepreneurial characteristics or IT knowledge and / or experience?*
- *Are the influencers responsible whereby the company size, the lifecycle stage online, business partner or the government deter the website adoption?*
- *Is the culture or the norms of the industry responsible?*
- *Is the nature of the business a responsible determinant whereby the perception of website value is influenced by the perception of the benefits and barriers of website adoption?*

With only 30 per cent adoption of a website one can deduct that all of these factors might play a role, but it is important to find the primary determinant in order to find suitable solutions.

For the scope of this investigation further analysis was done on the perceived value of a website, by determining the primary perceived benefits and barriers of website adoption as discussed in **6.4** and **6.5**.

6.4 Perceived benefits of website adoption

Hypothesis 2:

H_{02} : The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is **not** giving easy access to potential customers

H_{a2} : The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is giving easy access to potential customers

6.4.1 Testing ungrouped perceived benefits

A list of seventeen possible benefits were compiled from previous studies done to determine the primary perceived benefits of website adoption by the beef cattle breeding industry. The respondents had to rank the top ten. These results were then used to test *Hypothesis 2*.

By the use of the Borda count sums ranking method a ranking was achieved as indicated in **Table 13**.

The results identified that the primary perceived benefit of website adoption is *advertising and marketing of products and services*, whereas *giving easy access to potential customers* was only the second most perceived benefit.

Therefore the null hypothesis (H_{02}) could not be rejected.

A Chi-square test was additionally run to determine the significance of the data collected as outlined in **Table 14**. This illustrated that the p-value was 0.4866 which is much higher than the proposed 0.05 level of significance. Therefore the data collected could not be regarded as significant.

A possible reason for this was the small sample size of 22 as indicated in **Appendix 5**, collected from respondents whom had a website.

Furthermore an indication is given by the responses to the “Other” variable that the perceived benefit descriptions were not completely understood as indicated below:

- “Provide knowledge to customers and not only products (bulls and cows)”

Suggested allocation: *12. Improved customer relations management and services.*

- “Website is always online and we can reach a lot more people that we do not know of previously”

Suggested allocations: *2. Give easy access to potential customers; 4. Able to reach international markets.*

- “Exposure to Market that is increasingly searching via internet”

Suggested allocations: *1. Advertising and marketing of products or services; 2. Give easy access to potential customers; 4. Able to reach international markets.*

Descriptive statistics were run in addition to get an indication of the ranking according to the mean of each variable. The results are shown in **Table 15** which point out that *advertising and marketing of products and services along with giving easy access to potential customers* have the highest means of 2.4.

6.4.2 Testing grouped perceived benefits

Hypothesis 2a:

H_{02a} : The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is **not** a new sales channel

H_{a2a} : The primary perceived **benefit** of website adoption by the beef cattle breeding industry in South Africa is a new sales channel

Due to the fact that only 22 samples were collected the data retrieved could not be regarded as significant as indicated in **6.4.1**. In order to retrieve some significant result from the data it was decided to group sixteen of the seventeen variables into five groups. The “Other” variable was discarded from this study because of the low response and the inability to assign it to a specific group.

As indicated in **Table 16** the groups consisted of:

1. Marketing and Advertising
2. Direct Savings
3. Productivity / competitiveness
4. Customer relations and Research
5. New Sales Channel

These groups were derived from previous studies done by of Walczuch, Van Braven and Lundgren, (2000) and Cloete, (2003) and the results of the Borda summation on the five groups are displayed in **Figure 10** and ranked accordingly in **Table 18**.

The results illustrated that the primary grouped perceived benefit of website adoption was *Marketing and Advertising*.

For the purpose to determine if the data were significant a Chi-square independence test was done. **Table 19** indicates that the grouped samples were significant with a p-value less than 0.05.

However as indicated in **Table 18** the *New Sales Channel* was only the second most perceived benefit by the beef cattle breeding industry of South Africa.

Thus the null hypothesis (H_{02a}) could not be rejected.

6.4.3 Perceived benefits observations

For the purpose of not committing a type II error when one incorrectly accepts a null hypothesis that is false (Albright, Winston, & Zappe, 2009), variables were grouped to increase the sample size per variable in order to achieve significant results to test *Hypothesis 2a*.

By having statistical significant data a definite indication is realized that *marketing and advertising* is perceived as the primary benefit of website adoption. In contrast to this result, Cloete, (2003) found that marketing and advertising was only the tenth most important benefit. However when comparing the result to the study done in the Netherlands by Walczuch *et al*, (2000), the improvement of the company image and continued advertising around the world ranked number two and three, respectively.

These three studies therefore suggest that the ranking of perceived benefits varies between industries, which are in line with the Simmons *et al*. (2009) framework as discussed previously. The Simmons *et al*. (2009) framework states that the industry acts as one of the determinants for website adoption by small firms.

6.5 Perceived barriers of website adoption

Hypothesis 3:

H_{03} : The primary perceived **barrier** of website adoption by the beef cattle breeding industry in South Africa is being **not** unfamiliar with or the lack of knowledge regarding websites.

H_{a3} : The primary perceived **barrier** of website adoption by the beef cattle breeding industry in South Africa is being unfamiliar with or the lack of knowledge regarding websites.

A list of fifteen possible barriers was compiled from previous studies done to determine the primary perceived barriers of website adoption by the beef cattle breeding industry. **Appendix 5** lists all the data retrieved for the perceived barriers. The respondents had to rank the top ten. These results were then used to test *Hypothesis 3*.

With the use of the Borda count sums ranking method a ranking was achieved as indicated in **Table 20**.

The results identified that the primary perceived barrier of website adoption is being *unfamiliar with or the lack of knowledge regarding websites*.

To determine the significance of the data collected a Chi-square test was done as shown in **Table 21**. This illustrated that the p-value of 0.0246 was lower than the proposed 0.05 level of significance. Therefore the data collected could be regarded as significant.

Furthermore, an indication is given by the responses to the “Other” variable that the beef cattle breeders are starting to see the value of having a website as indicated below:

- ☐ “I don't want to pay someone else - want to do it myself”
- ☐ “Just start marketing my animals”
- ☐ “Herd not big enough, not enough animals to supply demand”
- ☐ “Website currently being developed”
- ☐ “I am in the process of creating a website”

Descriptive statistics were run in addition to obtaining an indication of the ranking according to the mean of each variable. The results shown in **Table 22** confirm that the primary perceived barrier of website adoption by the beef cattle breeders is *being unfamiliar with or the lack of knowledge regarding websites* by having the highest mean of 5.2.

6.5.1 Perceived barriers observations

From the results obtained from the Borda sums count ranking and the comparison of means, it is evident as proposed in *Hypothesis 3*, that the primary perceived barrier of website adoption by the cattle breeders is *being unfamiliar with or the lack of knowledge regarding websites*.

The primary perceived barrier finding of *unfamiliar with or the lack of knowledge regarding websites* contradicts the findings of Cloete, (2003) and Walczuch et al, (2000). According to their findings the primary perceived barrier of internet usage is *the lack of time to investigate and/or adopt*.

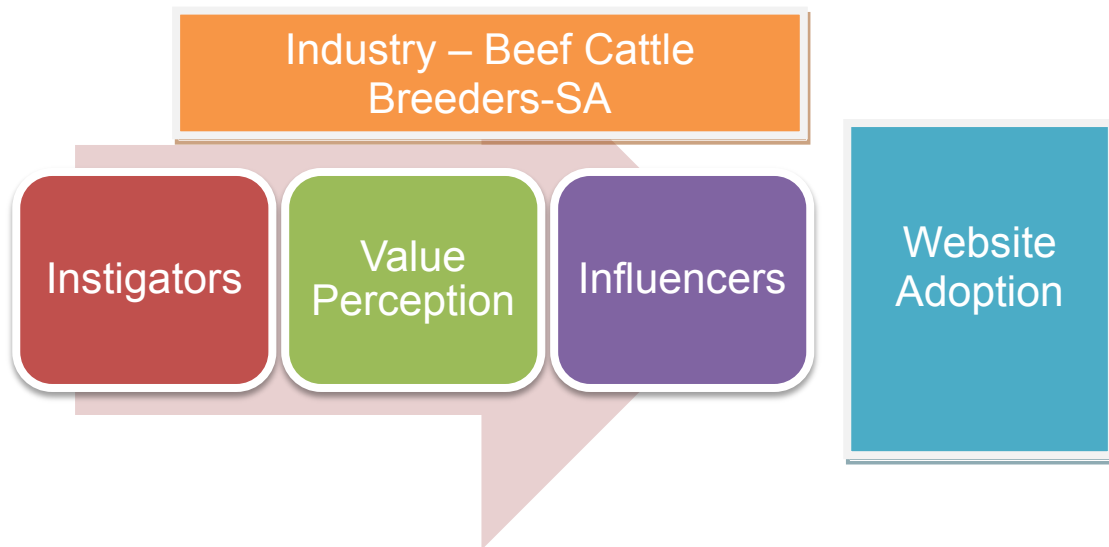
The *lack of time to investigate website technology* however also ranks fairly high as the fourth most perceived barrier of website adoption by the beef cattle breeding industry.

Another interesting finding is that the *cost barrier and lack of telecommunication infrastructure* are only ranked the seventh, eighth and ninth perceived barriers of website adoption, even though almost 96 per cent of these companies are smaller than medium enterprises. Nonetheless, these findings are reasonably in line with the results of Cloete (2003) which ranks *poor telecommunications infrastructure* and the *cost too high*, seventh and tenth respectively.

Walczuch et al, (2000), however ranked *too expensive with regards to telecommunication cost* and *too expensive with regards to computer equipment* in contrast as the third and fifth most perceived barriers of internet adoption.

For the purpose of understanding these findings in context with the literature the Simmons et al. (2009) framework was adopted as indicated in **Figure 12**.

Figure 12 – Adopted model for perceived barriers of website adoption by the SMMEs in the beef cattle breeding industry of South Africa



The following question could help to establish which of the determinants for website adoption influence the beef cattle breeders:

- *Are the instigators responsible whereby the owner and / or the manager lack skills like the ability to market, entrepreneurial characteristics or IT knowledge and / or experience?*

The instigators are definitely responsible whereby the findings indicate that the primary perceived barrier is *being unfamiliar with or the lack of knowledge regarding websites*. Furthermore the top three ranked barriers relate to the lack of knowledge, this indicates that the owner and/ or the manager lack IT knowledge and experience.

- *Are the influencers responsible whereby the company size, the lifecycle stage online, business partner or the government deter website adoption?*

Although the influence of company size and life cycle stage online were not part of the scope of this study, the influence thereof cannot be discarded. For instance almost 96 per cent of the respondent companies are smaller than medium sized enterprises. Furthermore, *not enough business partners* and *poor or lack of telecommunication infrastructure* ranked the sixth and ninth most perceived barriers. This indicates to a lesser extent that the business partners and the

services of the government play a role as determinants of website adoption by beef cattle breeders.

□ *Is the culture or the norms of the industry responsible?*

As discussed these findings and the studies of Cloete, (2003), Walczuch *et al*, (2000) differ in the ranking of perceived barriers and therefore a variance in industries are suggested.

Focusing on culture, a deduction can be made that the industry is definitely different in terms of the value perception of website adoption if one considers the low response rate of six percent for this research. Therefore as a result, the industry is also a responsible determinant of website adoption by the beef cattle breeding small companies.

□ *Is the nature of the business a responsible determinant whereby the perception of website value is influenced by the perception of the benefits and barriers of website adoption?*

The lack of time to investigate website technology and no real business need or benefit from having a website are ranked the fourth and fifth most perceived barriers to website adoption. This indicates that the nature of the business is a moderately strong responsible determinant.

By using the Simmons *et al*. (2009) framework a clear indication is given that all four determinants influence website adoption by South African beef cattle breeder SMMEs.

CHAPTER 7

7. Conclusion

The purpose for this chapter is to highlight the main findings of the research and the interpretation thereof in a cohesive manner. Furthermore Chapter 7 includes recommendation to stakeholders, identifies limitations and highlights future research topics.

7.1 Findings

The beef cattle breeding industry was identified as one of the key SMME contributors within the South African agricultural sector. However this industry is under pressure caused by various factors as discussed. New avenues must be considered to mitigate some of the risks and enable global competitiveness. Therefore the use of technology is suggested as one of these avenues in order to market the beef cattle breeders globally with the adoption of a website.

The results of the research conducted indicates that the website adoption by the beef cattle breeder SMMEs of South Africa is considerably less than the 63 per cent average across industries in the formal sector as reported by World Wide Worx (2012). In fact close to 70 per cent of the SMMEs do not have a website.

From the enterprises that responded (**Figure 7**) 62.2 per cent were micro sized enterprises, 15.6 per cent very small enterprises, 17.8 per cent small enterprises, 3.33 per cent medium enterprises and only 1.11 per cent were large enterprises. Thus, almost 99 per cent of the enterprises within the beef cattle breeder industry can be categorised as SMMEs. This proportion seems very high for any industry which suggests the impact of a new technology like for example the use of internet and the adoption of a website could be significant for the industry.

For the close to 30 per cent of respondents that already have adopted a website the primary perceived benefit is *marketing and advertising*. This finding is in line with the study done in the Netherlands across industries by Walczuch *et al*, (2000) but contradicts the findings of Cloete, (2003) where marketing and advertising was only perceived as the

tenth most important benefit. A possible explanation for this difference could be the industry determinant as conceptualised by Simmons *et al.* (2009).

Constraints that were identified by previous studies include access to finance, lack of business skills and training, access to general services, the regulatory environment and others, as obstacles for SMME development in the formal and informal sectors.

Mindful of the constraints identified for SMME development and recognized barriers of website adoption by previous studies, the primary perceived barrier for the beef cattle breeding industry identified in the study is *unfamiliar with or the lack of knowledge regarding websites*. Furthermore, the top three ranked barriers relate to the lack of knowledge. The result of a lack of knowledge relates to the lack of business skills and training as identified as one of the constraints of SMME development. In addition, this finding suggests that one of the main determinants for website adoption as conceptualised by Simmons *et al.* (2009), is the influence of the instigators where the owner and/ or the manager have a lack of IT knowledge and experience.

However, the primary perceived barrier finding of *unfamiliar with or the lack of knowledge regarding websites* contradicts the findings of Cloete, (2003) and Walczuch *et al*, (2000). According to their findings the primary perceived barrier of internet usage is *the lack of time to investigate and/or adopt*. Within this study *lack of time to investigate website technology* also ranks fairly high as the fourth most perceived barrier of website adoption by the beef cattle breeding industry.

Worth mentioning from the results attained that although almost 96 per cent of the companies that responded are smaller than medium enterprises, the *cost barrier and lack of telecommunication infrastructure* are only ranked seventh, eighth and ninth as perceived barriers of website adoption. These findings are however in line with the results of Cloete (2003) which ranks *poor telecommunications infrastructure* and the *cost too high*, as the seventh and tenth perceived barriers respectively. Again the findings differ as Walczuch *et al*, (2000), ranked *too expensive with regards to telecommunication cost* and *too expensive with regards to computer equipment*, in contrast, as the third and fifth most perceived barriers to internet adoption.

As shown the primary barrier for almost 70 per cent of the beef cattle breeders of South Africa lack the knowledge and skills to understand the intricacies of adopting a website and what advantages and costs it might involve.

7.2 Recommendations

Comparing the beef cattle breeding industry to other industries the results suggest that this sector is lagging behind in the adoption of websites for their SMMEs. This study showed that the top five perceived barriers of website adoption for this industry include the lack of knowledge, training and no real business need or benefit. It is suggested that education and training of website technology should be beneficial to the beef cattle breeders of South Africa.

Some of the breeder societies already provide a platform in the form of a website where their breeders can advertise their registered animals. Initiatives like this are encouraged to provide exposure for the beef cattle breeders that have not enough knowledge and training. Although cost is not one the main barriers it plays a perceptive role in adoption of a website. Therefore, if a breed society provides the website and the maintenance thereof the cost barriers could be mitigated.

Societies must provide forums on their websites where breeders may interact to share knowledge and experiences that will not only add to the benefit of the breeder but also to the future of that breed. These forums will introduce new breeders to the use of the internet and what advantages it may offer that could lead later to the adoption of his/her own company website.

Making use of a society's website, however can also be limiting, because space is limited and the person would have to follow the rules and preferences set by the society. On the other hand, if a beef cattle breeder adopts his/her own company website, everything can be custom setup to his/her preference. A website also provides a platform where other parts of his/her business may be advertised, for example the marketing of a guest house on the farm or marketing of other species farmed with etc.

A very important factor to improve adoption of a website is the use of proper metrics of the website in order to provide the breeders with appropriate figures to what the impact of the global exposure has been on their business. This will also reveal to the breeders who do not see the business benefit or need, that a website can provide exposure to new markets, facilitate direct savings, provide a new sales channel and offer better customer relations.

A starting point of education would be enthusiasm and support higher up as it must be driven from the top, meaning that the available options for website adoption must be

communicated to institutions like the South African Studbook, the Agricultural Research Council etc with the purpose to train and encourage the breed societies to provide the forums and platform for their breeders. These forums and platforms will then promote an understanding for the business needs and benefits of adopting a website.

New options exist that beef cattle breeders need to be informed of, where a website can be created and maintained for free for example the Woza Online initiative by Google, partnering with Vodacom, the Department of Trade & Industry, and the Human Resources Development Council. (South African Business Wosaonline, 2012).

7.3 Limitations

Due to the nature of this study, and the time constraints of the research project, the following have been identified as limitations:

- ❑ The sample size for determining the perceived benefits were not sufficient and therefore samples had to be grouped to gain significant data to test the hypothesis.
- ❑ Certain larger breed societies did not want to disclose the information of their breeders, which could have influenced the result. These include the Bonsmara, the Brahman and other societies.
- ❑ No triangulation with use of personal interviews and other research methods were used to mitigate subject bias, non-response error, response bias and administrative errors.
- ❑ This study only applies for the beef cattle breeding industry of South Africa and not other industries.

7.4 Future Research Topics

7.4.1 Confirm the primary perceived benefit of website adoption by the beef cattle breeder SMMEs of South Africa

With the purpose to confirm that the primary perceived benefit is *advertising and marketing of products or services* for the beef cattle breeder SMMEs of South Africa, an in depth study is suggested with the use of triangulation to facilitate a better response rate for obtaining a significant sample size.

7.4.2 Other African Countries

Africa is known for the rich diversity of fauna and flora including cattle breeds. These cattle breeds are well adapted to the harsh environment, including the beef cattle breeds in South Africa. African cattle breeder SMMEs obviously will also benefit from the adoption of a website. Therefore, future research for website adoption for cattle breeders of other African countries could add knowledge to their perceived benefits and barriers of website adoption

7.4.3 Other Breeders of South Africa

Other breeders of South Africa for example in the sheep sector, the horse sector etc., could also benefit from the adoption of a website. Therefore further research on other breeders of South Africa could add value to that specific SMME industry.

7.4.4 Company size

Company size results were obtained from this study but no research was done to understand what influence company size has on the adoption of a website by the beef cattle breeders of South Africa and further research might outline some correlations.

7.5 Final Summary

To conclude, this study has contributed to the body of knowledge by identifying the proportion of website adoption by the beef cattle breeder SMMEs of South Africa. The results indicate that close to 70 percent of the beef cattle breeders of South Africa have not adopted a website. Beef cattle breeder SMMEs that have adopted a website perceive *marketing and advertising* as the primary benefit and the beef cattle breeders that have not, perceive the primary barrier of website adoption as *unfamiliar with or the lack of knowledge regarding websites*. Furthermore, the results obtained from this study suggest a clear difference between industries, compared to other previous studies.

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Appendixes

Appendix 1 - (Internet World Stats, 2011)

WORLD INTERNET USAGE AND POPULATION STATISTICS December 31, 2011						
World Regions	Population (2011 Est.)	Internet Users Dec. 31, 2000	Internet Users Latest Data	Penetration (% Population)	Growth 2000- 2011	Users % of Table
Africa	1,037,524,058	4,514,400	139,875,242	13.5 %	2,988.4 %	6.2 %
Asia	3,879,740,877	114,304,000	1,016,799,076	26.2 %	789.6 %	44.8 %
Europe	816,426,346	105,096,093	500,723,686	61.3 %	376.4 %	22.1 %
Middle East	216,258,843	3,284,800	77,020,995	35.6 %	2,244.8 %	3.4 %
North America	347,394,870	108,096,800	273,067,546	78.6 %	152.6 %	12.0 %
Latin America / Carib.	597,283,165	18,068,919	235,819,740	39.5 %	1,205.1 %	10.4 %
Oceania / Australia	35,426,995	7,620,480	23,927,457	67.5 %	214.0 %	1.1 %
WORLD TOTAL	6,930,055,154	360,985,492	2,267,233,742	32.7 %	528.1 %	100.0 %

Appendix 2 - (Internet World Stats, 2011)

INTERNET USAGE STATISTICS FOR AFRICA						
AFRICA	Population (2011 Est.)	Internet Users Dec/2000	Internet Users 31-Dec-11	Penetration (%Population)	Users % Africa	Facebook 31-Dec-11
South Africa	49,004,031	2,400,000	6,800,000	13.9 %	4.9 %	4,822,820

Appendix 3 – (SA, 2003)

Sector or subsectors in accordance with the Standard Industrial Classification	Size or class	Total full-time equivalent of paid employees Less than	Total annual turnover Less than	Total gross asset value (fixed property excluded) Less than
Agriculture	Medium	120	R 4.00 m	R 4.00 m
	Small	50	R 2.00 m	R 2.00 m
	Very small	10	R 0.40 m	R 0.40 m
	Micro	5	R 0.15 m	R 0.10 m
Mining and Quarrying	Medium	200	R30.00 m	R18.00 m
	Small	50	R 7.50 m	R 4.50 m
	Very small	20	R 3.00 m	R 1.80 m
	Micro	5	R 0.15 m	R 0.10 m
Manufacturing	Medium	200	R40.00 m	R15.00 m
	Small	50	R10.00 m	R 3.75 m
	Very small	20	R 4.00 m	R 1.50 m
	Micro	5	R 0.15 m	R 0.10 m
Electricity, Gas and Water	Medium	200	R40.00 m	R15.00 m
	Small	50	R10.00 m	R 3.75 m
	Very small	20	R 4.00 m	R 1.50 m

	Micro	5	R 0.15 m	R 0.10 m
Construction	Medium	200	R20.00 m	R 4.00 m
	Small	50	R 5.00 m	R 1.00 m
	Very small	20	R 2.00 m	R 0.40 m
	Micro	5	R 0.15 m	R 0.10 m
Retail and Motor Trade and Repair Services	Medium	120	R30.00 m	R 5.00 m
	Small	50	R15.00 m	R 2.50 m
	Very small	10	R 3.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Wholesale Trade	Medium	120	R50.00 m	R 8.00 m
	Small	50	R25.00 m	R 4.00 m
	Very small	10	R 5.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Commercial Agents and Allied Services	Medium	120	R50.00 m	R 8.00 m
	Small	50	R25.00 m	R 4.00 m
	Very small	10	R 5.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Catering	Medium	120	R10.00 m	R 2.00 m
	Small	50	R 5.00 m	R 1.00 m
	Very small	10	R 1.00 m	R 0.20 m
	Micro	5	R 0.15 m	R 0.10 m
Transport	Medium	120	R20.00 m	R 5.00 m
	Small	50	R10.00 m	R 2.50 m
	Very small	10	R 2.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Storage	Medium	120	R20.00 m	R 5.00 m
	Small	50	R10.00 m	R 2.50 m
	Very small	10	R 2.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Communications	Medium	120	R20.00 m	R 5.00 m
	Small	50	R10.00 m	R 2.50 m
	Very small	10	R 2.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Finance	Medium	120	R20.00 m	R 4.00 m
	Small	50	R10.00 m	R 2.00 m
	Very small	10	R 2.00 m	R 0.40 m
	Micro	5	R 0.15 m	R 0.10 m
Business Services	Medium	120	R20.00 m	R 4.00 m
	Small	50	R10.00 m	R 2.00 m
	Very small	10	R 2.00 m	R 0.40 m
	Micro	5	R 0.15 m	R 0.10 m
Community	Medium	120	R10.00 m	R 5.00 m
	Small	50	R 5.00 m	R 2.50 m
	Very small	10	R 1.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Social and Personal Services	Medium	120	R10.00 m	R 5.00 m
	Small	50	R 5.00 m	R 2.50 m
	Very small	10	R 1.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m

Appendix 4 – Questionnaire

Website adoption survey for South African cattle breeding SMMEs

Thanks you for agreeing to complete this survey. Please be assured that your identity is anonymous and that all information is anonymous and will be treated as strictly confidential.

This survey will not take more than 10 minutes and consists of 3 questions.

Instructions for each question are indicated with an asterisk sign (#)

Question 1

Please select ONE of the following:

Total full-time employees:

1. > 120	
2. 51 – 120	
3. 11 – 50	
4. 6 – 10	
5. 1 – 5	

Question 2

Please select ONE of the following:

Do you have a website?

1. Yes
2. No

Question 3

If the answer for Question 2 is Yes fill in List A.

If the answer for Question 2 is No fill in List B.

Please select the 10 most important factors provided in the list below. Rank them from one to ten (1 = most important; 10 = least important).

List A – Benefits of having a website

Factor	Ranking (1 – 10)
Advertising and marketing of products or services	
Give easy access to potential customers	
On-line sales and transactions	
Able to reach international markets	
Increase the market share of products or services	
Low cost of communication	
Savings in advertising cost	
Improved productivity and competitiveness, Example: Saves time	
Lower cost for products or services	
Lower cost of obtaining supplies	
Improved product delivery to the market	
Improved customer relations management and services	
Enhancing the company image and brand	
Obtain relevant information through interaction with other interested parties	
Create new business opportunities	
Increased speed, effectiveness, communication and/or response rate	
Other	

If “Other” is chosen, please specify what these benefits are:

Please select the 10 most important factors provided in the list below. Rank them from one to ten (1 = most important; 10 = least important).

List B – Barriers to adopt (take on) a website

Factor	Ranking (1 - 10)
Lack of time to investigate website technology	
Staff not knowledgeable or qualified to maintain a website	
Lack of information of available options	
Not enough business partners (e.g. customers, suppliers, stakeholders) will use the website	
No real business need, so no benefit from a website	
Unfamiliar or lack of knowledge regarding websites	
Lack of training to adopt a website for business	
Customers and suppliers are not online	
Security risk	
Poor or lack of telecommunication infrastructure	
Start-up cost too high to develop a website	
High maintenance cost of website	
Unreliable / nonexistent electricity infrastructure	
Adds administration costs	
Other	

If “Other” is chosen, please specify what these barriers are:

Thank you for completing this survey and for your valuable time!

Appendix 5 – Questionnaire Question 2 data

Benefits of website adoption for South African cattle breeding SMMEs												
Please select the 10 most important factors provided in the list below. Rank them from one to ten (1 = most important; 10 = least important). List A – Benefits of having a website												
Answer Options	1	2	3	4	5	6	7	8	9	10	Response Count	
1. Advertising and marketing of products or services	10	2	2	1	2	1	0	3	1	2	24	
2. Give easy access to potential customers	5	4	2	2	1	1	0	4	1	4	24	
3. On-line sales and transactions	4	2	2	0	3	0	0	2	1	4	18	
4. Able to reach international markets	4	2	3	0	0	2	1	2	1	5	20	
5. Increase the market share of products or services	1	3	3	2	4	2	3	0	2	3	23	
6. Low cost of communication	2	2	2	5	4	0	3	1	1	1	21	
7. Savings in advertising cost	4	2	2	1	3	3	3	0	1	1	20	
8. Improved productivity and competitiveness, example: Saves time	2	3	1	3	3	4	0	2	2	0	20	
9. Lower cost for products or services	1	3	2	2	5	1	0	1	2	1	18	
10. Lower cost of obtaining supplies	3	3	2	2	1	1	0	2	1	2	17	
11. Improved product delivery to the market	5	3	4	0	2	0	0	0	2	1	17	
12. Improved customer relations management and services	2	1	1	5	3	2	2	1	2	3	22	
13. Enhanced company image and brand	7	0	2	2	2	2	3	1	0	3	22	
14. Obtain relevant information through interaction with other interested parties	2	2	3	1	1	2	5	1	2	0	19	
15. Create new business opportunities	3	2	2	4	2	2	3	3	0	1	22	
16. Increased speed effectiveness communication and/or response rate	1	2	2	3	3	1	3	2	3	2	22	
17. Other	2	0	2	0	0	0	0	1	0	0	5	

											Question Totals
If "Other" is chosen, please specify what these benefits are.											3
Barriers of website adoption for South African cattle breeding SMMEs											
Please select the 10 most important factors provided in the list below. Rank them from one to ten (1 = most important; 10 = least important). List B – Barriers for not having a website											
Answer Options	1	2	3	4	5	6	7	8	9	10	Response Count
1. Lack of time to investigate website technology	8	4	6	4	9	4	4	3	2	7	51
2. Staff not knowledgeable or qualified to maintain a website	9	1	2	1	4	4	4	6	5	7	43
3. Lack of information regarding available options	11	7	5	5	7	3	1	5	1	3	48
4. Not enough business partners (e.g. customers, suppliers, stakeholders) will use the website	10	7	4	2	4	2	2	3	1	7	42
5. No real business need or benefit from having a website	20	4	0	1	3	0	2	3	4	6	43
6. Unfamiliar with or lack of knowledge regarding websites	11	5	11	1	7	2	7	3	0	5	52
7. Lack of training to adopt a website for business	10	4	6	9	2	4	4	5	1	4	49
8. Customers and suppliers are not online	3	5	3	4	6	2	1	7	4	6	41
9. Security risk	6	3	0	1	3	2	4	2	2	8	31
10. Poor or lack of telecommunication infrastructure	10	2	1	3	6	3	0	4	3	8	40
11. Start-up cost too high to develop a website	7	3	4	2	9	4	5	5	1	3	43
12. High maintenance cost of website	7	2	3	2	10	3	4	5	4	5	45
13. Unreliable / nonexistent electricity infrastructure	4	1	3	1	4	0	1	3	2	8	27
14. Adds administration costs	5	0	3	1	8	2	6	1	4	10	40
15. Other	3	0	0	0	1	0	0	0	1	2	7

	Question Totals
If "Other" is chosen, please specify what these barriers are.	5

Benefit groups (Divide by number of variables x 5)	1	2	3	4	5	6	7	8	9	10
1. Marketing and Advertising	42.50	5.00	10.00	7.50	10.00	7.50	7.50	10.00	2.50	12.50
2. Direct Savings	12.50	12.50	10.00	12.50	16.25	6.25	7.50	5.00	6.25	6.25
3. Productivity / competitiveness	13.33	13.33	11.67	10.00	13.33	8.33	5.00	6.67	11.67	5.00
4. Customer Relations and Research	10.00	7.50	10.00	15.00	10.00	10.00	17.50	5.00	10.00	7.50
5. New Sales Channel	17.00	13.00	12.00	8.00	10.00	7.00	7.00	11.00	5.00	17.00