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Full Length Research Paper

Assessing the innovative nature of the agricultural based small businesses in Rwanda - The case study of the coffee industry

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Innovation is one of the characteristics that distinguish an entrepreneurial venture from one that is non-entrepreneurial. In a situation where undifferentiated mass production is the defining feature of the global coffee industry, some Rwandan coffee producers have undertaken innovative actions in branding and niche marketing by developing speciality coffees. Though Rwandan farmers could in the past survive without innovation initiatives, seeing as they only competed in protected environments, with current globalisation initiatives innovation is no longer a luxury but a necessity. Innovative practices do not only marginalise the volatile nature of costs faced by these producers but also increase their profit margins. The purpose of this study is to assess the innovative nature of the agribusinesses, specifically a case study of the coffee industry in Rwanda. The coffee industry has been transformed from a highly controlled, politicised industry to a liberalized sector that is quickly developing a prized niche product, (namely specialty coffee). This study highlights important recommendations that governments and NGOs supporting the agricultural sector in Rwanda, could apply to enhance innovation in the Rwandan agricultural sector in general, and the coffee industry in particular.

Key words: Entrepreneurship, SME's, innovation, creativity, coffee industry.

INTRODUCTION

The survival and improved contribution of small and micro enterprises (SMEs) in addressing the problems of poverty and unemployment can be achieved by the adoption of an entrepreneurial culture and innovative practices. This is especially true in the agricultural sector. SMEs can contribute greatly to the alleviation of poverty and creating jobs when the agricultural sector forms a big component of the country's economy. Many developing countries have benefited less from free market global economy due to the exportation of commodities with low values, for example, raw materials, instead of value added intermediary and final products that are of higher perceived value. It is evident that strategies need to be planned and implemented to reverse the decline of Africa's share of world trade (Murenzi and Hughes, 2006:252). Through the development of regional and sub-regional integration coupled with the development of national science and technological innovative and entrepreneurial skills among other things, the fortunes of SMEs can be reversed.

Rwanda is a small landlocked and mountainous country commonly referred to as "the country of a thousand hills". It is bordered by Uganda, Burundi, Tanzania, and the Democratic Republic of Congo (DRC). Rwanda is located in East-Central Africa and has a surface area of 2.6 million hectares, of which only 1.4 million hectares is arable land. The Rwandan economy is heavily dependant on agriculture which is still largely smallholder driven (Haba, 2004:1). Coffee is grown by small scale coffee farmers estimated at 500 000 in number, with an average of 165 coffee trees per farmer (Ocir Cafe, 2008). The

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agricultural sector contributes about 85% of export revenue (World Bank, 2010). The share of agriculture to Rwanda's GDP was 38.2% in 2007, services 41.7% and industry 20.1% (The World Fact book, 2008). According to the World Bank (2007a) agriculture in Rwanda currently accounts for just fewer than 40% of GDP and provides jobs to 90% of the population. Coffee is one the major exports of Rwanda; other major exports include tea and pyrethrum.

Historically, Rwanda has produced Arabica coffee on small farm holdings. Missionaries may have first introduced coffee into Rwanda in the early part of the twentieth century, but it was not until the 1930s that colonial authorities actually required Rwandan farmers to plant at least one-fourth of their land with coffee trees (Boudreaux, 2007:4). The author further states that the coffee industry has played a major role in Rwanda's development because coffee for many years has been the country's top export and chief source of foreign exchange income.

Before the introduction of speciality coffee production, the Rwandan Coffee sector was engulfed in a low quality-low quantity loop (Gahamanyi, 2005). Primarily among many reasons for this was the decreased coffee prices at the world coffee market, a situation arising out of increased worldwide production and consolidation of purchasing by multinational corporations as well as the 1994 Genocide in Rwanda, which left the sector in dismay.

This study illustrates how coffee farmers in Rwanda have adopted process and market innovations as a means of improving the quality and output of their coffee, hence improving their livelihood. This study emphasises the fact that even in the most basic forms of production, innovation is possible. The following research questions apply:

Question 1: What is the relationship between the different innovation factors and the different biographic variables?
Question 2: What is the relationship between the different innovation factors and the profit level of coffee farmers?
Question 3: What is the relationship between the different innovation factors and the perceived performance of coffee farmers?

Globalisation exposes entrepreneurs everywhere to merciless competition as tariffs are reduced and trading straddles national borders (Rwigema and Venter, 2004). Protectionism is losing ground and governments are compelled to open up national markets to compete against aggressive external producers. Survival depends upon the creativity and resilience of a country's entrepreneurs. The question arises if innovation, through product differentiation and niche marketing, can give a small producer an edge over competition nationally and globally, where undifferentiated mass production and marketing is the norm.

Rwanda coffee farmers are competing with other coffee producers to improve their product, expands their knowledge of the global coffee market, and increase demand for their goods (Boudreaux, 2007:1). Small and Medium Enterprises (SMEs) operate in an environment that is extremely competitive. Here low technology and capital requirements, easy to copy processes and ideas result in consequently high failure rates. Therefore, Rwanda coffee farmers need to distinguish themselves from other role players in the meso-environment through creative and innovative ways. Innovation and creativity should be regarded as core keys to the successful business enterprise in Rwandan coffee farmers.

LITERATURE REVIEW

According to Le Roux (2003:11) entrepreneurship is the vehicle for companies and societies to find innovative ways to exploit opportunities as a way to survive in an ever-changing environment. This is also supported by Kruger (2004:3) who mentions that creativity and innovation are major factors in being entrepreneurial and meeting the changing needs of society. Entrepreneurship is crucial in any country for birthing new ideas, creating new enterprises and nurturing the economy. It is particularly important in overcoming unemployment (Hisrich and O'Cinneide, 1985:1). Entrepreneurship can also be described as vibrant process of pursuing an opportunity and creating incremental wealth and value (Echecopar et al., 2003:2). Healthy entrepreneurship leads to positive financial returns for both independent business ventures and organisations alike.

Entrepreneurship is regarded as the process that causes changes in the economic system through the innovations of individuals who respond to opportunities in the market (Nieman and Nieuwenhuizen, 2009). The value of entrepreneurship is currently recognised through concepts like creativity, innovation and opportunity development in a dynamic environment (Kruger, 2004:18). While innovation lies at the heart of entrepreneurship, creativity seems to be the root of innovation (Wickham, 2006). It is further argued that entrepreneurial activity, with innovation as key leads to increased productivity and more effective competition in the market environment (Antonites, 2003:49). The author concludes by holding the view that the combined variables of innovation and creativity distinguish the entrepreneur from the general small business person.

Three common skills are generally found in the definition of entrepreneurship namely (1) creativity and innovation; (2) resource gathering and the founding of an economic organisation; and (3) the chance for gain under increased risk and uncertainty (Dollinger, 2003:5). Kruger (2004:28) concluded that the key concepts of the entrepreneurship domain are innovation and strategic objectives that impact on a venture's potential for growth.

Creativity and innovation seems to be fundamental to true entrepreneurship. Wickham (2006:5) identifies three aspects of entrepreneurship:

Table 1. Definitions of innovation.

Definition	Author
Innovation is the process by which organisations master and implements the design and production of goods and services that are new to them, irrespective of whether they are new to their competitors, their country, or the world.	Mytelka (2000:18)
Innovation is the mechanism where new methods, customs, or devices are used to perform new tasks.	Sunding and Zilberman (2000:2)
Innovation is the sum of the invention plus the commercialisation of that invention.	Ireland et al., (2001:73)
Innovation is further described as the introduction of new products and/or improvement of products, services and production processes, the driving force of a nation's economic development and an improvement in the competitiveness of its firms.	Oerlemans et al. (2001:2)
Innovation additionally provides a centre for profit and is a consequential product of entrepreneurship.	Shepherd and Kruger (2002:167)
Innovation is the successful implementation of creative ideas.	Kruger (2004:103)
Successful innovation is the use of new technological knowledge, and/ or new market knowledge, employed within a business model that can deliver a new product and/ or service to customers who will purchase at a price that will provide profits.	Kaplan and Warren (2007:24)

(i) The entrepreneur as a manager undertaking particular tasks;
(ii) The entrepreneur as an economic agent generating particular economic effects; and
(iii) The entrepreneur as an individual of a particular personality.

Effective innovation has a direct impact on reduction of poverty and the improvement of the quality of life of the people (Roelofse, 2006:7). Innovation is defined as the key process by which products, processes and services are created, and by which businesses generate jobs and wealth (Roelofse, 2006:7). Innovation is the specific tool by means of which entrepreneurs exploit change to create a business opportunity. A range of definitions of innovation are proposed by different authors, as summarised in Table 1.

Definitions of innovation

Kirby (2003:132) is of the opinion that the advancement of creativity through the generation, identification and exploitation of opportunities, leads to innovation. Creativity is therefore a prerequisite and at the root of innovation. Accordingly the relationship between innovation and creativity is discussed. According to Majaro (1988:7) creativity is the thinking process that leads to the generation of ideas, while innovation is the practical application of such ideas towards meeting the firm's objectives in a more effective way. The main source of innovation is creative thinking, but innovations can also come from successful exploitation of opportunities both in and outside the business. Kruger (2004:111) further explains that creativity is the generation and articulation of new ideas whereas innovation is the application of new ideas and the implementation of inventions.

Creativity is a catalyst in the process of new product development (Antonites, 2003:98). Firms are required to exhibit creativity and innovation if they are to stay alive and thrive in a competitive and increasingly demanding world (Carrier et al., 1999). The identification of new opportunities is one of the key tasks of entrepreneurs (Wickham, 2006:7). This author further defines an opportunity as a gap in a market where the potential exists to do something better and hence creates value. Entrepreneurial innovations should therefore engage in feasible and viable market opportunities.

As innovation based competition diffused through the processes of trade liberalization, it accelerated the pace of technological change. This increased the need for SME's especially in developing countries to engage in a continuous process of innovation irrespective of the sector in which they are located (Mytelka, 2000:15). Today's organisations are faced with slow growth, commoditisation and global competition; innovation and competitiveness are seen as the main economic multipliers and an effective solution to this ever-growing dilemma (Montalvo, 2006:312).

Different forms of organisational innovation are identified which are related to the: product, service and process (Smith, 2010).

(i) Product innovation refers to the development of a new

Table 2. Types of innovations.

Innovation	Components	System
Incremental	Improved	No change
Modular	New	No change
Architectural	Improved	New configuration
Radical	New	New configuration

Source: Adapted from Smith (2010).

product or improvement of an existing product so that it appears unique and hence persuades consumers to make a purchase.
(ii) Service innovation is a new way of providing a service in a way that is different and/or better than the service provided by their competitors.
(iii) Process innovation involves unique and better production and manufacturing methods which deliver products that are better and at lower cost compared to competitors' products.

The product, service and process forms of innovation take place through component and systemic innovation, which are incremental, modular, architectural and/or radical (Table 2).

Incremental innovation refers to the refinement and improvement of an existing product, or service by improving the components (Davila et al., 2006:38; Morris et al., 2008:63; Morten et al., 2005:315; Smith, 2006:22, 29). Incremental innovation either improves something that already exists, or reconfigures an existing form of technology to make it more relevant for newly developed needs and purposes (Harvard Business Essentials, 2003:2). Modular innovation uses the architecture and configuration of the existing system but introduces new components (Smith, 2006:31). Architectural innovation refers to the process when the components and associated design concepts are renewed, and the system changes as new linkages are instituted (Smith, 2006:32). Radical innovation involves a whole new design of a new product or service delivered in an entirely new way through the development of specialised components or systems (Davila et al., 2006:38; Morris et al., 2008:63; Morten et al., 2005:315; Smith, 2006:29). Radical innovation introduces something new to the world, which departs from existing technology or methods (Harvard Business Essentials, 2003:2). Semi-radical innovation would involve substantial change to either the business model, or technology of an organisation but not to both (Davila et al., 2006:38; Morris et al., 2008:63; Morten et al., 2005:315).

It is argued that the use of radical and modular innovations should be seen as opportunities for the Rwandan farmers to investigate, consequently that these forms of innovation are currently under-utilised by Rwandan coffee farmers. In addition, the re-vitalisation of incremental and architectural innovations should be examined for reasons indicated by Stark (2000) as follows:

(i) Technology is changing rapidly with new products, new processes and services from competitors.
(ii) The effect of a changing environment with product lifecycles becoming increasingly shorter means that old products or services will have to be replaced with new ones.
(iii) Customers are increasingly more sophisticated, segmented and demanding; they expect more in terms of quality, originality and price.
(iv) With markets and technology changing vehemently, good ideas are becoming very easy to copy. This therefore calls for continuous methods of devising new and better products, and faster processes and services.
(v) Innovation leads to faster growth, increased market share and better corporate positioning.
(vi) Boyd (2004:5) also states that innovation is the lifeblood of any successful business. Among the most important aspects of success in small firms is innovativeness, as exemplified by phenomenal growth of start-up .ventures like Starbucks, Apple Computers, Dell, and Kinkos (Daily et al., 2005:773).

The coffee industry and the overall agricultural sector should also invest in the use of modern technology in the production processes since the agricultural sector employs 90% of the whole Rwandan population (World Bank, 2007b). Unfortunately many coffee farmers still use traditional equipments like hoes to cultivate the land, and the few coffee washing stations do not satisfy the service of the coffee production capacity. The use of new and up-to-date technology has the following advantages to SMEs:

(i) Better and more competitive products and services.
(ii) Improved efficiency
(iii) Reduced operational and production costs and
(v) Improved quality of products and services.

The survival of SMEs and their contribution to addressing the problem of poverty in Rwanda is directly tied to the availability of sufficient and appropriate agricultural information technologies to increase production; promote operational efficiency and improve managerial decision making (Haba, 2004:3). Additional to the product/service, process and organisational forms of innovation, the following forms of innovation are also stipulated (Davila et al., 2006:38; Morris et al., 2008:63; Morten et al., 2005:315):

(i) Discontinuous innovation: This form of innovation is a breakthrough type of innovation which results in the changing way customers address their needs for a product or a need that was not addressed before.
(ii) Dynamically continuous innovation refers to a dramatic improvement of a product or service over an existing

state-of-the-art solution.
(iii) Continuous innovation involves the step-by-step enhancement of an existing product.
(iv) Initiation innovation that involves copying, adapting, or mimicking the innovations of other firms.

According to Janvry et al. (1999:2), technological change in agriculture can reduce poverty in the following ways:

(i) Firstly, it can help reduce poverty directly by raising the welfare of poor farmers who adopt the technological innovation. Potential benefits can be increased production for home consumption, more nutritious foods, and higher gross revenues from sales.
(ii) Secondly, technological change can also help reduce poverty indirectly through the effects of the adoption of the new technologies by both poor and non-poor farmers.

For these reasons it is important to investigate the possibilities of application of innovation in the agricultural sector.

Application of innovation in the agricultural sector

Sunding and Zilberman (2000: 2) identify the following categories of innovation in the agricultural sector which include:

(i) Innovations that are embodied in capital goods such as tractors, fertilizers and seeds.
(ii) Innovations that are disembodied for instance integrated pest management schemes.

A special research and development report by the World Bank (2007a:1) on the enhancement of agricultural innovation explains the following innovative changes that have taken place in the context of agricultural development:

(i) Markets, and not production, increasingly drive agricultural development. Previously the focus was on the improvement of staple foods. But with their falling prices, strategies have been adopted that enhances agricultural diversification and increases the value of agricultural produce.
(ii) The production, trade, and consumption environment for agriculture and agricultural products is progressively more dynamic and evolving in unpredictable ways.
(iii) Knowledge, information, and technology are increasingly generated, diffused, and applied through the private sector. Private businesses develop and supply a substantial number of the technologies that farmers use, for example, seeds, fertilizers, pesticides, and machinery.
(iv) Exponential growth in information and communications technology (ICT), especially the internet, has transformed the ability to take advantage of the knowledge developed in other places or for other purposes.
(v) The knowledge structure of the agricultural sector in many countries is changing markedly. Thirty years ago, most farmers were uneducated. Nowadays there is an overall increase in the education levels of farmers in many countries. Great numbers of experienced and educated people in the farming community, the private sector, and non governmental organisations (NGOs) can now interact to generate new ideas.
(vi) Agricultural development increasingly takes place in an international setting. Globalization causes quality standards to be defined increasingly by international markets. This leads to small sectors that suddenly confront strong potential demand.

Having mentioned the process of innovation in the agricultural sector, it is important to discuss the factors that affect the successful application of innovative practices in any country. It is argued that the coffee industry has adopted a differentiation strategy focused on specific niche markets in the world as a means of innovation and the creation of world brand. This has helped Rwanda to distinguish its coffee from the coffee of its global competitors. With the production of speciality coffee Rwandan farmers have been able to obtain higher prices for their coffee leading to more profit. Discerning consumers now demand authenticity: they want stories of where their coffee beans come from (Anon, 2008:68). So the best coffees will increasingly be differentiated, like fine wines and spirits, and subsequently sold at previously unthinkable prices

The author is of the opinion that countries have developed specific national product brands in which they have a competitive advantage that is acquired over a long period of time. Examples include French wines and Cuban cigars. Developing national brands in this era of globalisation where ideas and technologies spread very fast is a difficult task. Growing a brand from the most mundane of products like coffee requires creative innovation. Within national brands, innovative entrepreneurs have made innovations that target specific niche markets for instance; Rolex and Swatch are some of the many Swiss watches that have an established niche market. SMEs in the Rwandan coffee industry have imitated the Swiss strategy by producing speciality coffees in different areas of the country and branding it uniquely based on its specific flavour. Examples include Rwandan Medium, “Akadugudu” Rwandan Blend, Rwandan Dark, “Vooba Vooba”, Naturally Flavoured Coconut and Naturally Flavoured Hazelnut. The Rwandan coffee industry’s competitive advantage is based on quality processing, packaging and niche marketing.

According to Gahamanyi (2005) Rwanda is an emerging specialty coffee producer. Within the past years coffee farmers have become more organized by implementing quality-enhancing procedures. Interventions have taken place in the form of the establishing of central washing stations, improved coffee processing procedures and an increase in the training of farmers by quality

Table 3. Value of coffee exports and their contribution to the total exports of Rwanda (in billion US$).

Year	1990	1992	1996	1998	2000	2001	2002	2003
Value of coffee exports	65.7	35.1	43	25.9	22.4	19.4	19.2	15
Total exports	103	69	61.7	64.4	69	73	65.9	62.9
% Coffee contribution	63.8	50.9	69.7	40.2	32.5	26.6	29.1	23.8

Source: Adapted from Gahamanyi (2005).

Table 4. The evolution of coffee production and quality from 1986 to 2004.

Year	1990	1992	1996	1998	2000	2001	2002	2003	2004
Production (tons)	39575	38970	15239	14268	16098	18267	19426	14175	25000
% Standard coffee	7	0.32	0.25	7.4	19.5	18.5	29.4	32.4	40
% Ordinary coffee	86.9	93	82.9	80.5	72.4	75	58	55	50

Source. Adapted from OCIR Café (Gahamanyi, 2005).

assessment cupping laboratories. Besides differentiation, the coffee industry has also adopted niche market operations as another form of market innovation.

According to Gahamanyi (2005) only 20% of world coffee can qualify as specialty coffee today. Low-grade coffee sells for 28 US cents per kilogram (kg) on average; specialty coffee earns 80 cents per kg. The forecast for coffee prices on the international market shows a tendency towards low prices. Global consumption remains modest except for the category of high quality coffee which contributes seven percent of the volume of coffee put on the international market at the moment, and which has also been rising by 15% a year. Table 3 is an indication of the value of coffee exports and their contribution to the total exports of Rwanda (in billion US $).

The Rwandan coffee sector was engulfed in a low quality-low quantity loop primarily among many reasons for this was the dropping of coffee prices at the world coffee market. This situation arose out of increased worldwide production and consolidation of purchasing by multinational corporations as well as the 1994 genocide in Rwanda which left the sector in shambles. After the introduction of specialty coffee production in 2001, the value of standard coffee production in Rwanda increased and ordinary coffee production decreased as indicated by Table 4. In 2007, importers paid US $ 55.00 per kilo for the best Rwandan coffee.

Though growth in worldwide coffee consumption remains modest, the consumption of high quality speciality coffee is rising by 20% a year. This is in favour of Rwandan coffee farmers. According to Boudreaux (2007:1) Rwanda's speciality coffee industry is helping to improve the lives of coffee producers and of other Rwandans in the following ways:

(i) The speciality coffee industry in Rwanda aids in local poverty alleviation and job creation.

(ii) The speciality coffee industry provides opportunities for developing business and management skills.

(iii) The actions of specific coffee entrepreneurs have affected the lives of ordinary Rwandans, for example big buyers who buy raw coffee from very poor farmers with no access to washing stations, and who then process raw coffee beans into processed quality coffee.

(iv) Entrepreneurial activities within the Rwandan speciality coffee industry provide Rwandans with opportunities to interact in ways that may promote post-conflict reconciliation.

(v) As a major export of the country, coffee sales have boosted the economy.

(vi) The production of speciality coffee is believed to have opened up more trading opportunities with the outside world.

(vii) To have a sustainable organisation, innovation is essential even to small businesses (Lumsdaine and Binks, 2007:183).

(viii) Innovation can be used as strategic process that enables organisations to establish a position of competitive advantage (Poon and MacPherson, 2005:259).

Innovation is the key characteristic of an entrepreneurial business that will ultimately affect business performance (Georgellis et al., 2000:8). Accordingly, another advantage of innovation is that it leads to high performance hence business or entrepreneurial success. Zhao (2005:28), investigating the perceptions of entrepreneurship and innovation, found that entrepreneurial businesses (businesses that were continuously creating new products and services, projects, new business opportunity and markets), regardless of size and the industry, had a positive link with performance.

The main objective of the research is to assess the innovative nature of the agricultural based small businesses in Rwanda belonging to the Abahuzamugambi Coffee Cooperative. The study endeavours to determine

Table 5. Gender of the participants.

Gender	Frequency	Percentage	Cumulative frequency	Cumulative percentage
Male	43	43	43	43
Female	57	57	100	100
Total	100	100	100	100

the current innovation climate by use of the above research questions in order to recommend enhanced strategies to the Rwanda coffee industry. This could form a very good base for further investigation as to what can be done to increase the levels of innovation in the larger Rwanda agricultural sector and elsewhere in the world. The study investigated the baseline of innovation, in order to determine the current innovation climate of coffee farmers belonging to Abahuzamugambi Coffee Cooperative in Rwanda. The Abahuzamugambi Coffee Cooperative in Rwanda won the Swedish City of Gothenburg's International Environmental Prize for 2005, for establishing organic coffee production successfully and improving social structures (Anon, 2005). The importance of innovation, to also ensure the entrepreneurial success of these coffee farmers, needs attention. This could form a very good base for further investigation as to what can be done to increase the levels of innovation in the larger Rwanda agricultural sector.

Kaplan and Warren (2007:24) emphasise the importance of innovation by positing that many firms could in the past survive and prosper without innovation, however they competed in a protected environment. The improvement of and/or the introduction of new products and services through innovation should enhance economic growth and the international competitiveness of these countries.

RESEARCH METHODOLOGY

Research design

The intention of this study was to assess the innovative climate in the Rwanda coffee industry. The study is a quantitative formal, cross-sectional, ex post facto non-experimental design (Cooper and Schindler, 2006: 141). Cross-sectional studies are studies representing a snapshot of circumstances at one point in time...

Population and sampling

A sample of 100 speciality coffee producers who are members of one of the pioneer coffee cooperatives in Rwanda, the Abahuzamugambi Coffee Cooperative, (which has 2000 members), was selected as the unit of analysis for this study. Non-probability, convenience sampling was done with the selection of accessible respondents who were available for the administration of group questionnaires.

Research instrument

The questionnaire consisted of two sections, namely: a biographic section, with questions concerning the biographical data of the entrepreneurs and second section measured the innovativeness of the organisation (Wang and Ahmed, 2004:307). The following components were embraced by the instrument: product innovativeness, market innovativeness, strategic innovativeness, process innovativeness, and behavioural and innovativeness. The questionnaire was translated to Kinyarwanda, Rwanda's only local language.

Data collection and analysis

A pencil-and-paper group administered questionnaire was used in this study as the method of data collection. The questionnaires were physically handed out to the sample. In terms of the analysis an *ex-post-facto* inference were made of the relationships between the measured variables. Statistical analysis was carried out on empirical data obtained whereas descriptive statistics was applied and the means, standard deviations, frequencies, and variances of the biographic variables determined. One way Analysis of Variance (ANOVA) was conducted to determine the relationships between the innovation factors as dependent variables, and the biographic variables, as well as profit and perceived performance as independent variables.

RESULTS

Descriptive statistics are performed to describe the characteristics of the sample, while the inferential results are derived to answer the research questions.

Demographic characteristics of the sample of participants from the Abahuzamugambi coffee cooperative in Rwanda

The following descriptive results portray the demographic nature of the unit of analysis.

The biographical data shown that the sample drawn can be generalised as being a relatively young sample as the majority of the respondents were below 45 years of age (72%) (Table 6). The number of speciality coffee farmers decreased as age increased, with 28% older than 45 years of age (Table 6). The oldest farmer was 86 years old while the youngest farmer was 18 years old (Table 6). The gender distribution is: 43% male and 57% female (Table 5).

Table 7 indicate that the majority of the participants (75%) had primary school qualification, followed by 12% of respondents with secondary school qualification, 12% with no education and 1%.

Table 8 indicates that the majority of participants have been in coffee production between 4 to 6 years (60%)

Table 6. Age of participants.

Age	Frequency	Percentage	Cumulative frequency	Cumulative percentage
≤24	36	36	36	36
25-44	36	36	72	36
≥45	28	28	100	28
Total	100	100	100	100

Table 7. Educational levels of participants.

Educational level	Frequency	Percentage	Cumulative frequency	Cumulative percentage
No education	12	12	100	100
Primary school	75	75	75	75
Secondary school	12	12	87	87
Tertiary Institute/University	1	1	88	88
Total	100	100	100	100

Table 8. Years in coffee production.

Year	Frequency	Percentage	Cumulative frequency	Cumulative percentage
1-3	24	24	24	24
4-6	60	60	84	84
7-9	14	14	98	98
Above 10	2	2	100	100
Total	100	100	100	100

Table 9. Average coffee production.

Production (Kg)	Frequency	Percentage	Cumulative frequency	Cumulative percentage
1-5	88	88	88	88
6-10	7	7	95	95
11-15	1	1	96	96
16 and above	4	4	100	100
Total	100	100	100	100

Table 10. Number of employees.

Employee	Frequency	Percentage	Cumulative frequency	Cumulative percentage
1-5	81	81	81	81
6-10	14	14	95	95
11-15	5	5	100	100
Total	100	100	100	100

and 1 to 3 years (24%), with participants between 7 to 9 years and more than 10 years representing only 14 and two percent of the sample respectively.

According to Table 9, majority of the participants (88%) average coffee production is between 1 to 5 kg per tree, the remaining 8% of participants' average coffee production is between 6 and 15 kg per tree, and 4% of participants produce above 16 kg of coffee per tree.

Table 10 indicate that 81% of participants employ five or less workers on their farms, 14% of the participants employ between 6 to 10 workers while 5% of participants employ between 11 to 15 workers.

Table 11. Profit per season.

Amount in Rwandese Francs	Frequency	Percentage	Cumulative frequency	Cumulative percentage
Frw 500 000 and less	88	88	88	88
Frw 510 000-600 000	7	7	9 5	95
Frw 610 000-700 000	3	3	98	98
Frw 710 000-800 000	1	1	99	99
Frw 800 000 and above	1	1	100	100
Total	100	100	100	100

Table 12. Business performance.

Business performance	Frequency	Percentage	Cumulative frequency	Cumulative percentage
Extremely well	33	33	33	33
Quite well	46	46	79	79
Not so well	6	6	85	85
Badly	3	3	88	88
Improved	12	12	100	100
Total	100	100	100	100

Table 13. Product innovation.

Independent variable	F	df	p > F
Gender	0.34	1	0.5644
Level of education	0.15	3	0.9297
Number of years attended in education	0.77	4	0.5489
Number of years involved in coffee production	0.19	2	0.8239
Alternative sources of income	0.59	1	0.4470
Average coffee production (kg)	2.78	2	0.0698
Number of employees	1.22	2	0.3016
Total expenditure per hectare	1.00	3	0.4003
Profit per season	0.24	3	0.8697
Perceived business performance	4.77	4	0.0021*

*p = 0.05.

Table 11 illustrates that 88% of the participants profit per season is Frw 500 000 (equivalent to US $ 909) or less. Ten percent of participants earn between Frw 510 000 and 700 00. Only 2% of the participants earn more than Frw 710 000 (US $1,291).

Table 12 indicate that 33% of participants were of the opinion that they performed extremely well (thus fundamental increases in business growth, example, turnover and profit), 46% of participants' opinions were that they performed quite well (example, moderate increases in turnover and profit) and the remaining 21% indicated that they did not perform well (not increases or decline in turnover and profit). Table 13 illustrates the results of one way Analysis of Variance with factor one and the product innovation sub-scale as dependent variable (N = 100).

Only the groups formed in terms of perceived business performance scored significantly different on product innovation as a sub-scale. These differences were further investigated by means of a t-test on the LS-mean scores on the product innovation sub-scale. Individuals that evaluated their business performance as badly scored the highest on the product innovation sub-scale. Table 14 illustrates the results of one way Analysis of Variance with factor two and the market innovation sub-scale as dependent variable (N = 100).

The groups formed in terms of number of years involved in coffee production as well as perceived business performance, scored significantly different on market innovation as a sub-scale. These differences were further investigated by means of a t-test on the LS-mean scores on the product innovation sub-scale. Farmers that were involved in coffee production for one

Table 14. Market innovation.

Independent variable	F	df	p > F
Gender	2.47	1	0.1213
Level of education	0.54	3	0.6582
Number of years attended in education	2.24	4	0.0752
Number of years involved in coffee production	7.22	2	0.0015*
Alternative sources of income	0.24	1	0.6272
Average coffee production in Kg	1.78	2	0.1775
Number of employees	0.05	2	0.9549
Total expenditure per hectare	1.42	3	0.2470
Profit per season	0.68	3	0.5694
Perceived business performance	6.10	4	0.0003*

*p = .05.

Table 15. Strategic innovation.

Independent variable	F	df	p > F
Gender	7.67	1	0.0074*
Level of education	3.78	3	0.0149*
Number of years attended in education	3.53	4	0.0117*
Number of years involved in coffee production	2.69	2	0.0758
Alternative sources of income	0.02	1	0.8883
Average coffee production in Kg	3.84	2	0.0268*
Number of employees	1.88	2	0.1620
Total expenditure per hectare	2.77	3	0.0491*
Profit per season	6.00	3	0.0012*
Perceived business performance	0.37	4	0.8259

*p = .05.

to three years scored higher on the market innovation sub-scale than farmers involved in coffee production for more than 4 years. Individuals that evaluated their business perfor-mance as extremely well scored the highest on the mar-ket innovation sub-scale than those who rated their performance as not so well, badly and improved accord-ing to previous years, but less than those evaluating their perceived business performance as quite well. Farmers that perceived their business performance as quite well, scored higher on the market innovation sub-scale than those perceiving their business performance as extremely well, not so well and badly.

The groups formed in terms of gender, level of educa-tion, number of years attended in education, average coffee production in kg, total expenditure per hectare, and profit per season scored significantly different on strategic innovation as a sub-scale. These differences were further investigated by means of a t-test on the LS-mean scores on the strategic innovation sub-scale. Significant differences were indicated between genders, with female participants scoring significantly higher on the strategic innovation subscale than male participants (Table 15).

Participants with no education scored significantly higher on strategic innovation than those with primary, secondary and tertiary or university education. Individuals with primary education also scored higher on the strategic innovation sub-scale than individuals with secondary and tertiary/university education. Those who attended between 7 and 8 years in education scored significantly lower on strategic innovation than those who had attended between 1 and 6 years and those above 9 years in education. Production above 20 kg of coffee per tree scored significantly higher on strategic innovation than those who produced less than 20 kg of coffee. Farmers who spent between Frw 110 000 and 200 000 per hectare scored significantly higher than those who spent less than Frw 110 00 and those who spent above 200 000. Participants whose profit per season was between Frw 610 000 and 700 000 scored significantly

Table 16. Process innovation.

Independent variable	F	df	p > F
Gender	3.82	1	0.0551
Level of education	5.53	3	0.0020*
Number of years attended in education	2.54	4	0.0488*
Number of years involved in coffee production	1.09	2	0.3435
Alternative sources of income	0.22	1	0.6415
Average coffee production in Kg	0.20	2	0.8208
Number of employees	0.55	2	0.5797
Total expenditure per hectare	1.47	3	0.2315
Profit per season	1.10	3	0.3570
Perceived business performance	1.15	4	0.3417

*p = .05.

Table 17. Behavioural innovation.

Independent variable	F	df	p > F
Gender	2.31	1	0.1339
Level of education	3.55	3	0.0194
Number of years attended in education	4.33	4	0.0038*
Number of years involved in coffee production	0.35	2	0.7095
Alternative sources of income	0.17	1	0.6809
Average coffee production in Kg	2.83	2	0.0669
Number of employees	0.87	2	0.4228
Total expenditure per hectare	1.38	3	0.2584
Profit per season	3.17	3	0.0306*
Perceived business performance	3.70	4	0.0092*

*p = .05

lower on strategic innovation than those whose profit per season was less than Frw 610 000 and above Frw 800 000. Table 16 illustrates the results of one way Analysis of Variance with factor four and the process innovation sub-scale as dependent variable (N = 100).

Only groups formed in terms of level of education and years attended in education scored significantly different on process innovation as a sub-scale. Further investigation by means of a t-test on the LS-mean scores indicated that individuals with secondary education scored significantly lower on the process innovation sub-scale than individuals with no education, primary and tertiary /university education. Individuals having more than seven years or education scored less on the process innovation sub-scale, than those with less than seven years of education. Table 17 illustrates the results of one way Analysis of Variance with factor five and the behavioural innovation sub-scale as dependent variable (N = 100). Groups formed in terms of number of years of education, profit per season as well as perceived business performance, scored significantly different on behavioural innovation as a sub-scale. Further investigation by means of a t-test on the LS-mean scores indicated that participants with secondary education scored less on the behavioural innovation sub-scale than individuals with no education, primary and tertiary/university education. Farmers indicating their profit per season as Frw 610 000 – Frw 700 000 scored lower on the behavioural innovation sub-scale than farmers indicating their profit per season as less and above Frw 610 000 to Frw 700 000. Farmers perceiving their business performance as extremely well scored significantly lower on the behavioural innovation sub-scale than farmers perceiving their business performance as quite well, not so well and badly. Farmers perceiving their business performance as quite well as well as improved according to previous years scored significantly lower on the behaviour innovation sub-scale, than those perceiving their business performance as not so well or badly. Farmers perceiving their business performance as not so well and badly scored higher on the behaviour innovation sub-scale than those perceiving their business

as extremely well and quite well.

DISCUSSION

The following findings are recorded based on the results conveyed, based on the research questions revisited.

Question 1: What is the relationship between the innovation factors and the different biographic variables?

None of the biographic variables showed any significant relationship with the product innovation sub-scale as dependent variable. According to Wang and Ahmed (2004:304) product innovation refers to the novelty and meaningfulness of new products introduced to the market at a timely fashion. Speciality coffee production is not a new product as per this definition because is not a new product but an improvement of existing product. Rwandan coffee farmers should therefore think of creative means of introducing new alternative agricultural products. This is supported by Stark (2000) who argues that the effect of a changing environment with product life cycles becoming increasingly shorter means that old products will have to be replaced with new ones. Those farmers with only a number of years involved in coffee production showed a significant relationship with market innovation as dependent variable. None of the other biographic variables showed a significant relationship with market innovation as dependent variable.

Farmers who were involved in coffee production for one to three years scored higher on the market innovation sub-scale than farmers involved in coffee production for more than four years. Market innovativeness refers to the newness of approaches that companies adopt to enter and exploit the targeted market (Wang and Ahmed, 2004:305). Market innovativeness also includes market research, advertising and promotion. This implies that farmers who use market innovations skills like advertising and market research performed better that those who are unaware or do not use market innovation skills. This is an indication that farmers should have been involved in coffee production for less than three years, they were more involved in coffee production than those who have been farming for four years and more. Innovation leads to faster growth, increased market share and better corporate positioning (Stark, 2000). Farmers who have been involved in coffee production for more than four years should be sensitised to be more active in market innovation aspects to enhance the marketing of their products.

Strategic innovation as dependent variable showed a significant relationship with the independent biographic variables of gender, level of education, number of years attended in education, average coffee production in kg, as well as total expenditure per hectare. Female participants scored significantly higher on the strategic innovation subscale than male participants. This could be due to the fact that in Rwanda majority of the population are women as a result of the war, and possibly also due to the fact that women composed of 57% of the total sample. Participants with no education scored significantly higher on strategic innovation than those with primary, secondary and tertiary or university education.

Participants who attended seven and eight years in education scored lower on strategic innovation than those who had less than six years education and scored higher than individuals that had more than nine years of education. Production above 20 kg of coffee per tree scored significantly higher on strategic innovation than those who produced less than 20 kg of coffee, which could be an indication that strategic innovation could improve coffee production. Participants spending between Frw 110 000 and Frw 200 000 per hectare scored significantly higher on the strategic innovation factor than those who spend above Frw 200 000. This could be an indication that participants spending between Frw 110 000 and Frw 200 000 per hectare were more aware of the advantages of strategic innovation and working on a low budget necessitated this action. Those whose profit per season was between Frw 610 000 and Frw 700 000 scored significantly lower on the strategic innovation factor as dependent variable than those whose profit per season was less than Frw 610 000 and above Frw 800 000.

Process innovation refers to the use of new production methods, new management approaches, and new technology to improve production and management processes (Wang and Ahmed, 2004:305). Only those groups formed in terms of “the level of education” and “years they spent in attaining education” scored significantly different on process innovation as a sub-scale at the 95% level of significance. Further analysis indicated that individuals with secondary education scored significantly lower on the process innovation sub-scale than individuals with no education, primary and tertiary/university education. Individuals having more than seven years of education scored significantly lower on the process innovation sub-scale, than those with less than seven years of education. The World Bank (2007b) encourages the coffee industry and the agricultural sector in Rwanda to invest in the use of modern technology in the production processes, since the agricultural sector employs 90% of the whole Rwandan population.

Behavioural innovativeness refers to individual, teams and management willingness to change (Wang and Ahmed, 2004:305). It is when people are receptive to new ideas and innovation. Only the “educational level” showed a significant relationship with behavioural innovation as dependent variable.

Question 2: What is the relationship between the different innovation factors and the profit level of coffee farmers?

Only two of the innovation factors, namely strategic

innovation and behavioural innovation showed a significant relationship with profit per season as independent variable. Participants whose profit per season was between Frw 610 000 and Frw 700 000 scored significantly lower on strategic innovation than who whose profit per season was less than Frw 610 000 and above Frw 800 000. Farmers indicating their profit per season as Frw 610 000 to Frw 700 000 scored lower on the behavioural innovation sub-scale than farmers indicating their profit per season as less and above Frw 610 000 to Frw 700 000. These findings are an indication that farmers having a profit per season of between Frw 610 000 and Frw 700 000 should be made aware of the possible strategic and behavioural innovation strategies that should be followed in order to improve their profit.

Question 3: What is the relationship between the different innovation factors and the perceived performance of coffee farmers?

Results indicated that individuals that evaluated their business performance as "poorly performing" scored the highest on the product innovation sub-scale. This implies that the farmers are aware of product innovation and yet their performance is bad. It could be argued that this is a result of farmers investing in improving their coffee and yet yielding low profits. Individuals that evaluated their business performance as extremely well scored the highest on the market innovation sub-scale than those who rated their performance as not so well, badly and improved according to previous years, but less than those evaluating their perceived business performance as quite well. It therefore seems that a significant relationship exists between extreme perceived business performance and market innovation.

RECOMMENDATIONS AND CONCLUSIONS

The case of coffee should serve as a model in the agricultural sector in Rwanda and elsewhere in poor developing countries to encourage creativity and innovation as a means of increasing production and adding value to products so as to be globally competitive. Building farmers' and communities' capacity to identify and develop market opportunities and experiment through the application of innovative participatory approaches, is critical for creating a sustained collective capacity for innovation and for creating new alternatives for resource-poor farmers, especially women (Sanginga et al., 2004:943). Through creative thinking, farmers will be able to come up with alternatives either through bringing improvements in existing products across production, marketing and consumption chain or developing new products that are desirable in the world market.

Innovation should be widely promoted by policy makers and practiced by all kinds of businesses, whether small or big in order to obtain the competitive benefits that it creates. Everybody is capable of being creative; it is just a matter of how individuals develop that creativity within them to produce the most favourable results (Nieman and Nieuwenhuizen, 2009). Globalisation and free trade compounds the competitive environment of small businesses. Protectionism is loosing ground and governments are compelled to open up national market to aggressive external producers. Rwigema and Venter (2004:10) note that globalisation exposes entrepreneurs everywhere to merciless competition as tariffs reduce and trading straddles national borders. Survival will depend upon the creativity and resilience of a country's entrepreneurs. The coffee industry operates in an environment that is extremely competitive with low technology and capital requirements, easy to copy processes and ideas and consequently high failure rates. Therefore distinguishing oneself from the crowd through creative and innovative ways is the key to success.

Rwandan farmers will survive stiff competition with continuous innovations to sustain their quality orientated speciality coffee production.

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