

THE RWANDAN COFFEE SECTOR: OUT OF THE ORDINARY

Andrea Guariso
Centre for Institutions and Economic Performance (LICOS)
University of Leuven
andrea.guariso@kuleuven.be

Jean Chrysostome Ngabitsinze
Department of Agricultural Economics and Agribusiness
National University of Rwanda,
jeanchrysostome@hotmail.com

Marijke Verpoorten
Institute for Development Policy and Management (IOB)
University of Antwerp
marijke.verpoorten@ua.ac.be

Abstract

This paper studies the transformation of the Rwandan coffee sector from a supplier of ordinary coffee to a player on the market for specialty coffee. While this transformation is widely perceived as a success story, we show that it is far from complete. Although coffee washing stations have multiplied at an impressive rate, many stations are dysfunctional and only a small portion of the fully washed coffee qualifies as specialty coffee. We argue that the quality gap can only be closed through a sustained effort in improving coffee washing station management and providing farmers with positive incentives to improve coffee farm practices.

This article is published in *L’Afrique des grands lacs. Annuaire 2011-2012*
(URL: <http://www.ua.ac.be/main.aspx?c=.IOB&n=101946>)

The printed publication contained an error in the list of authors. The correct citation for this article is as follows:

Guariso, A., Ngabitsinze, C. J., Verpoorten, M. (2012) “The Rwandan Coffee Sector: out of the Ordinary”, in: Reyntjens F., Vandeginste S., et Verpoorten M. (eds.) (2012) *L’Afrique des grands lacs. Annuaire 2011-2012*, Paris, L’Harmattan: 397-426.

THE RWANDAN COFFEE SECTOR: OUT OF THE ORDINARY

by Andrea Guariso, Jean Ngabitsinze and Marijke Verpoorten¹

Résumé

Le présent article étudie la transformation du secteur caféicole rwandais d'ancien fournisseur de café ordinaire en compétiteur sur le marché du café de spécialité. Quoique cette transformation soit largement perçue comme une réussite, nous montrons qu'elle est loin d'être réalisée partout. Il est vrai que les stations de lavage du café se sont multipliées à un rythme impressionnant, mais beaucoup de celles-ci ne fonctionnent pas comme elles le devraient, et seule une petite partie du café entièrement lavé est qualifiée de « café de spécialité ». Nous estimons que l'écart de qualité ne peut être réduit que par un effort soutenu dans l'amélioration de la gestion de ces stations de lavage, et bien entendu par la fourniture aux agriculteurs eux-mêmes d'incitatifs les encourageant à améliorer les pratiques agricoles dans leurs plantations de café.

1. INTRODUCTION

In sub-Saharan Africa the majority of the poor live in rural areas and are engaged in the agricultural sector. Hence, rural development is key to the eradication of poverty. For instance, according to the World Development Report 2008 titled "Agriculture for Development", GDP growth originating in agriculture is about four times more effective in reducing extreme poverty than GDP growth originating outside the sector². However, despite the strong poverty elasticity of agricultural growth, on average a mere four percent of total government spending goes to agriculture³.

In at least two respects, Rwanda resembles the sub-Saharan African average. First, the Rwandan agricultural sector occupies close to 70 percent of the labor force and generates about one third of national income⁴. Second, poverty is far higher in rural than in urban areas, 48.7% versus 22.1% according to the latest figures⁵. Hence, also in Rwanda, agricultural investment is recognized as the main engine for poverty reduction⁶. Until recently

¹ We thank Nupur Parikh and two anonymous referees of the *Annuaire* for valuable comments. We also owe thanks to several people in Rwanda for providing us with data and information.

² WORLD BANK, *Agriculture for Development*, World Development Report 2008, Washington, The International Bank for Reconstruction and Development / The World Bank, 2007.

³ *Ibid.*

⁴ WORLD BANK, *Seeds for higher Growth*, Rwanda Economic Update, Kigali, The World Bank, Rwanda, 2011.

⁵ REPUBLIC OF RWANDA, *The evolution of poverty in Rwanda from 2000 to 2011: results from the household surveys (EICV)*, National Institute of Statistics, February 2012.

⁶ For instance, according to a 2007 IFPR study, agriculture contributes 50 percent of total GDP growth in Rwanda, but contributes over 60 percent to the reduction in the national poverty rate. The figures are based on a model simulation, assuming 6 percent annual growth in both agricultural and non-agricultural sectors. DIAO, X., FAN, S., KANYARUKIGA, S.,

Rwandan also shared SSA's dismal record of disproportionately low investment in agriculture. However, at present the Rwandan government allocates close to 10 percent of its national annual budget to the agricultural sector, up from 4.2 percent in the 2008 budget. The objective, made explicit in Rwanda's Vision 2020 is to "transform agriculture into a productive, high value, market oriented sector, with forward linkages to other sectors"⁷.

Rwanda's focus on agriculture may have contributed to marked agriculture growth rates and rural poverty reduction over recent years. For instance, over the period 2005-2006 and 2010-2011, the average annual growth in the rural sector reached almost 5% while headcount poverty fell from 61.9% to 48.7% in rural areas⁸. Although the impact of Rwanda's agricultural policy needs further analysis and other factors may play a role, such as slowing population growth and a good agricultural season in 2010-2011, in their rhetoric both the Rwandan government and donor institutions attribute at least part of the observed positive trends in growth and poverty reduction to the agricultural policies in place⁹. Other observers are much more sceptical about the agricultural policies pursued by the Rwandan government¹⁰.

Among the concrete policies pursued, the focus lies on crop intensification, increased commercialization of agriculture, farm wage employment and agro-business activity. Given that Rwanda is a land-locked country situated in a challenging neighborhood, investment in high-value crops that can be exported using air transport is especially high on the agenda. Besides their high value-to-weight, another advantage of high-value crops is that they are less prone to the downward price trend that characterizes many of the traditional export crops¹¹.

YU, B., "Agricultural Growth and Investment Options for Poverty Reduction in Rwanda", IFPRI Discussion Paper 00689, January 2007.

⁷ REPUBLIC OF RWANDA, *Vision 2020*, Ministry of Finance and Economic Planning, July 2000, p. 3.

⁸ REPUBLIC OF RWANDA, *The evolution of poverty in Rwanda from 2000 to 2011...*, *op. cit.*

⁹ For example, Omowunmi Lapido, World Bank Country Manager for Rwanda, states that "The fact that agriculture has been a key contributor to poverty reduction in Rwanda is of course not an accident". She attributes the success to "The articulation of a medium term economic development and poverty reduction strategy that included a focus on improving agricultural productivity; ... the articulation of a strategic plan for the transformation of agriculture; and ... the alignment of expenditure envelopes with this strategic plan so that today Rwanda is one of the few African countries that meets the CAADP recommended target of 10 percent of agriculture expenditure in the national budget". Quotes are taken from "One million more out of poverty in Rwanda", posted on February 10, 2012 on the World Bank's blog <http://blogs.worldbank.org/africacan/one-million-more-out-of-poverty-in-rwanda>.

¹⁰ ANSOMS, A., "Re-engineering rural society: the visions and ambitions of the Rwandan elite", *African Affairs*, Vol. 108, No. 431, 2009, pp. 289-309.

¹¹ JAFFEE, S., HENSON, S., "Agro-food Exports from Developing Countries: the Challenges Posed by Standards", in AKSOY, A. M., BEGHIN J. C. (eds.), *Global agricultural trade and developing countries*, Washington DC, The World Bank, 2005.

The increased attention for high-value agricultural exports is not unique to Rwanda. In the past years, there has been a considerable increase in developing country exports of higher-value agro-food commodities, including fruits and vegetables, meat products, fish products, nuts, spices, and floricultural products. In contrast, the traditional agro-food exports from developing countries have grown only modestly. As a result, the share of the exports of higher-value agro-food products in total agro-food exports has surged from less than 40 percent in 1980-1981 to about 80 percent in 2003-2004.¹²

Although coffee is a traditional export crop for which prices heavily fluctuate subject to international market conditions, there exist high-value niches for specialty coffee that fetch a higher and more stable price on the international market. Since Rwanda possesses excellent growing conditions for specialty coffee, the coffee sector was identified as an obvious candidate for a turnaround program. The first Rwandan Poverty Reduction Strategy Paper states that “Although coffee production in Rwanda has been stagnant at a low level for the last few years, the sub-sector has great potential, through replanting of the existing old bushes with new high-yielding varieties, and the construction and operation of washing stations to produce fully-washed coffee”¹³. The report envisaged that a turnaround of the sector could help reduce Rwanda’s structural trade deficit and have considerable effects on rural income, employment and poverty reduction as the sector is dominated by small-scale farmers.

In view of the highlighted potential of the coffee sector, the government adopted the 1999-2003 Coffee Strategy and Action Plan, which was subsequently reviewed and updated with the assistance of external donors such as USAID¹⁴. Several international donors provided funding, technical assistance and training, launching programs like the Sustaining Partnerships to Enhance Rural Enterprise and Agribusiness Development (SPREAD). Concrete policy measures included installing washing stations to produce high quality fully washed coffee and a marketing campaign abroad¹⁵.

Following these measures, coffee washing stations were built, new trees being planted and an international demand for fully washed Rwandan specialty coffee was created. Anno 2012, even though only a small minority of Rwanda’s 400,000 coffee growing households are involved in the specialty coffee sector, the turnaround is widely perceived as a success story, re-

¹² JAFFEE, S., SEWADEH, M., “The Changing Composition of Developing Country Agro-Food Trade and the Changing Standards Landscape”, Paper prepared for World Bank/USAID E-learning Course on Trade and Standards, Washington D.C., World Bank, 2006.

¹³ REPUBLIC OF RWANDA, *Poverty Reduction Strategy Paper (PRSP)*, Kigali, MINECOFIN, 2000, p. 24.

¹⁴ USAID, “Assessing USAID’s investments in Rwanda’s coffee sector: Best practices and lessons learned to consolidate results and expand impact”, April 2006, produced for the United States Agency for International Development by Chemonics International Inc.

¹⁵ *Ibid.*

ceiving positive coverage in popular media¹⁶ and even from the most notorious aid sceptics¹⁷. In an attempt to duplicate the success story, both government agencies and donor institutions take the turnaround program for the coffee sector as a model for the development of other high-value agricultural supply chains in Rwanda¹⁸.

It is against this background that this paper investigates the transformation of the Rwandan coffee sector from a supplier of ordinary coffee to a player on the market for specialty coffee. We highlight the determinants of the transformation, take stock of the current situation and evaluate the challenges ahead. What are the main drivers of the transformation? How complete is the transformation? What can be said about the future of the Rwandan coffee sector?

These questions will be addressed on the basis of data on coffee production, coffee prices, export earnings, coffee tree investment and washing station performance. The data are taken from coffee censuses and several government reports, but also from documents that are not (yet) in the public arena and were obtained from OCIR-CAFÉ¹⁹ and other actors in the coffee sector. The quantitative material is supplemented with qualitative observations obtained from on-site visits to washing stations and interviews with key actors in the Rwandan coffee production chain, including government agents, NGO representatives, members of coffee producing cooperatives, managers of washing stations, coffee farmers, and representatives of coffee exporters and roasters.

We start with an overview of coffee growing, processing and trading, for the purpose of filling in readers not familiar with the journey it takes before coffee ends up from the field in the cup. Then we present a narrative of the history and transformation of the Rwanda coffee sector, spanning the period 1904-2012. In section 4, we move to the more quantitative part of this study, illustrating the transformation of the Rwandan coffee sector on the basis of various data sources. In section 5 we discuss the duality of the sector, at the level of the coffee washing stations and the farmers. Section 6 concludes with a discussion of the future of the sector.

¹⁶ One of many examples: FRASER, L., "Coffee, and Hope, Grow in Rwanda", published: August 6, 2006. Taken from http://www.nytimes.com/2006/08/06/business/yourmoney/06coffee.html?_r=1.

¹⁷ EASTERLY, W., FRESCHI, L., "Rwanda's coffee success story", published May 12, 2010, on the aidwatchers' blog: <http://aidwatchers.com/2010/05/rwanda%e2%80%99s-coffee-success-story/>.

¹⁸ USAID, "Assessing USAID's investments in Rwanda's coffee sector: Best practices and lessons learned to consolidate results and expand impact", April 2006, produced for the United States Agency for International Development by Chemonics International Inc.

¹⁹ Recently, OCIR-CAFÉ was absorbed by the National Agricultural Export Development Board (NAEB). For this study, we chose to make use of the 'old' name, OCIR-CAFÉ.

2. FROM FIELD TO CUP: COFFEE GROWING, PROCESSING AND TRADING

The two main coffee varieties commercially cultivated in the world are Arabica and Robusta. The Arabica variety currently represents about 60% of world coffee output and is considered of better quality, has more flavor, contains less caffeine and is sold at a higher price on the international market. It is however more prone to diseases and requires higher altitudes and a more temperate climate than Robusta²⁰. The optimal conditions for Arabica coffee are temperatures of 18° C during the night and 22° C during the day, annual rainfall between 1400 and 2000 mm and a relative humidity around 60 percent²¹. The natural conditions in several areas of Rwanda match these optimal conditions closely, making Rwanda perfectly suitable for growing top-quality Arabica coffee. In fact, ninety-nine percent of the coffee grown in Rwanda is of the Arabica type.

How does Arabica coffee end up in your cup? The coffee trees need to be planted and nurtured, cherries need to grow, flourish, be harvested, processed, roasted and marketed. Acquiring and nurturing the trees is a large sunk cost for farmers. In addition, trees have a long gestation period, growing cherries only after three to four years. The investment is risky as the coffee harvest may spoil following plant diseases, most notably coffee leaf rust. Besides, in order to produce good quality coffee beans, fertilizer needs to be applied, and the coffee cherries need to be carefully selected during harvest (picking only the ripe cherries of good quality). Thus, in order to produce coffee of good quality favorable natural conditions must be accompanied by adequate input use and good farming practices.

Good coffee also needs careful processing methods. In particular, once cherries are collected, there are three main ways of processing them, resulting in unwashed, semi-washed or fully-washed coffee. The process leading to unwashed coffee is the simplest one: cherries are dried in their entirety and are then mechanically decorticated to produce the green beans²². The semi-washed coffee is instead the result of a labor-intensive process, during which coffee beans are pulped by hand at home, usually by the coffee farmers and their family members, before being dried with the mucilage (the sticky sugary fruit covering the beans) still adhering to the parchment skin²³. Finally, fully-washed coffee is processed by wet-mills or

²⁰ INTERNATIONAL TRADE CENTER, *Coffee – An Exporter’s Guide*, 2002. Available at <http://www.thecoffeeguide.org/>.

²¹ WINTGENS, J. N. (ed.), *Coffee: Growing, Processing, Sustainable Production. A Guidebook for Growers, Processors, Traders, and Researchers* (2nd ed.), Weinheim, Wiley-VCH, 2009.

²² *Ibid.*

²³ *Certification opportunities in the coffee sector*, SNV Rwanda Practice Brief, No. 2, December 2011.

washing stations: cherries are pulped and fermented to remove the mucilage and the beans and then washed and dried²⁴.

In Rwanda, coffee beans are either semi-washed or fully-washed. Semi-washing leads to lower quality of fermentation, drying and storage. The resulting coffee is sold as standard or ordinary coffee. Fully washing leads generally to higher quality coffee that can be sold at a higher price. This does not necessarily mean that fully washing also increases the profit margin because costs are considerably higher, at \$1.25 per kg of coffee processed, compared to \$0.5/kg for semi-washed coffee²⁵. Hence, it is only profitable to undertake such process when the final product can enjoy a special premium price on the market, i.e. the premium for specialty coffee.

This is not always the case: the distinction between semi- and fully-washed coffee not always mirrors the difference between ordinary and specialty coffee. While all specialty coffee is fully washed coffee, not all fully washed coffee is specialty coffee. According to the Specialty Coffee Association of America, coffee qualifies as specialty coffee if it is “notably good and has a distinctive character in the cup”. To obtain such a product, besides being fully washed, a careful selection of coffee cherries is needed. If instead washing stations process indistinctively the coffee cherries that they receive (including immature and overripe cherries, or cherries with the infamous “potato-taste defect”), a large proportion of the production may not qualify as specialty coffee and so, despite going through the expense of fully washing, no specialty premium is received.²⁶

In addition, marketing is an essential part of the specialty coffee business. Selling to the much smaller, but fast-growing and highly competitive market for specialty coffee requires building long-term relations with the specialized coffee brokers who buy on behalf of high-end specialty coffee roasters such as Starbucks, Green Mountain Coffee, Intelligentsia, Counter Culture Coffee, Wholefoods private label, and so on. This is because specialty coffee not only refers to the quality of the product, but also to the manner in which the coffee is positioned in the market, which is often highlighted by branding around origin, social and environmental certifications.²⁷

As mentioned in the introduction, international market prices for many traditional export crops are very volatile. Coffee is no exception. The international market price for coffee is given in Figure 1, on a monthly basis for the period 1980-2012. The figure distinguishes between wet-processed Arabica coffee, the variety that is predominant in Rwanda, and the cheaper African Robusta coffee. The price booms and busts are driven mainly by coffee harvest cycles and weather conditions in the main exporting countries

²⁴ INTERNATIONAL TRADE CENTER, *op. cit.*

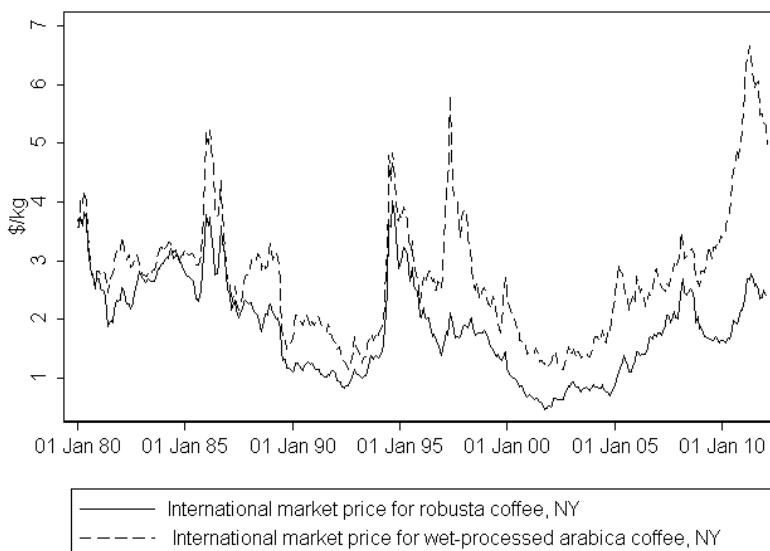
²⁵ MINISTRY OF AGRICULTURE & ANIMAL HUSBANDRY, MINISTRY OF TRADE & INDUSTRY, *Rwanda Coffee Strategy Update 2009-2012*, 2008.

²⁶ *Ibid.*

²⁷ *Ibid.*

(Brazil, Colombia, Indonesia, and Vietnam). For example, in the mid-nineties prices were high, following frost in Brazil²⁸. The drop of the coffee price after the 1989 dissolvent of the ICA quota system is also clearly visible. The two price peaks of 2008 and 2010-2011 coincide with the general international food price highs. Since the latest food price high, prices are slowly reverting downward again²⁹.

Figure 1. International coffee prices, 1980-2012



Source: New York Coffee Price Index

Part of the volatility of coffee prices stems from the natural coffee cycle. Because of the 18 to 24-months lag between plantation and harvest, with the yield of coffee trees peaking only after 5 to 7 years, the effect of increased supply as a response to high market prices comes with a delay. Very concretely, when coffee farmers receive high prices, they invest in additional coffee trees. Since these trees need time to mature, there is no immediate impact on market supply, so the price high is not moderated. Instead, the increased supply reaches the market much later, maybe even when

²⁸ VENKATACHALAM, L., “Perspectives on sustainability and globalization and the challenges for the coffee sector”, *Proceedings of the 2nd World Coffee Conference, 23-25 September 2005*, Salvador, Brazil.

²⁹ See for instance the “OIC Coffee Montly Report- March 2012” and the forecasts published in the following articles: “Arabica coffee prices – what does 2012 hold?”, 28 December 2011 (<http://www.agrimoney.com/feature/arabica-coffee-prices---what-does-2012-hold--128.html>); “Credit Suisse revises down coffee forecasts”, 29 February 2012 (<http://www.marketwatch.com/story/credit-suisse-revises-down-coffee-forecasts-2012-02-29>).

prices are again declining, thus intensifying the downturn³⁰. The biennial cycle of Arabica trees, with an alternation of high and low production years, contributes further to the volatility³¹.

Over the past few years, with the international coffee prices recovering, coffee farmers in most parts of the world have been able to make modest returns from production. This is true for both Arabica and Robusta coffees and especially for the specialty markets. The specialty coffee market has been the most rapidly growing market segment in the industry, growing by 20% in the United States alone. Aggregate price time series do not exist for specialty coffee, but the premium for specialty coffee with respect to normal coffee usually fluctuates between 20% and 50% per kg³².

3. THE RWANDAN COFFEE SECTOR, 1904-2012

3.1 From a traditional government-dominated export sector (1904-1999) ...

Coffee was introduced in Rwanda in 1904 by German missionaries and subsequently became a focal point of government policy and an important source of government revenue, both for the colonial and post-colonial authorities. In 1933 coffee cultivation was made compulsory by the Belgian colonial rulers, and in 1963 the post-colonial government passed a law that explicitly prohibited uprooting coffee trees. These coercive measures were complemented with a set of positive stimuli, such as the free distribution of seeds and fertilizers and by guaranteeing stable prices. Thus, a carrot-and-stick approach was used to stimulate and maintain coffee production³³. The coffee was purchased by a government agency called OCIR-CAFÉ and sold on the international market through RWANDEX and ETIRU, two companies in which the government held a high capital share.

This system worked relatively well until the end of the eighties, when the collapse of the International Coffee Agreement (ICA) made an end to the worldwide quota system³⁴. With the ICA quotas out of the picture,

³⁰ THE WORLD BANK, *Rwanda Economic Update – Seeds for Higher Growth*, April 2011.

³¹ See for instance the various editions of the OIC Monthly Coffee Market Reports.

³² REPUBLIC OF RWANDA, “Project for Rural Income Through Exports (PRICE) – Project Design Report”, 2011.

³³ TARDIF-DOUGLIN, D., NGIRUMWAMI, J.-L., SHAFFER, J., MUREKEZI, A., KAMPAYANA, T., “Finding the Balance Between Agricultural and Trade Policy: Rwanda Coffee Policy in Flux”, Food Security International Development Working Papers from Michigan State University, Department of Agricultural, Food, and Resource Economics, No. 54691, 1996.

³⁴ The first International Coffee Agreement entered into force in 1963 and was successively repeatedly extended and renegotiated. The agreement signed in 1983 established a system of exporting quotas to secure price stability within ranges agreed annually by exporting and importing members at meetings of the International Coffee Council. Quotas were suspended if prices rose above certain levels and subsequently reintroduced if prices fell. The strategy

worldwide production increases caused coffee prices to bottom out. As a result, the deficit of Rwanda's coffee marketing board soared tremendously, making less and less attractive the pursuing of this policy. At the same time, as part of a Structural Adjustment Program, a liberalization policy was introduced in Rwanda in the early 1990s³⁵. In 1995, the export market was opened to other exporters besides RWANDEX and ETIRU.

In 1998, OCIR-CAFÉ stopped fixing producer prices. This liberalization policy had three immediate consequences. Firstly, it directly exposed local producers to world market price fluctuations. Secondly, it forced farmers to start relying on private input and output markets. Finally, it released farmers from the obligation to produce coffee. Consequently, many farmers started uprooting their trees. The coffee sector inevitably was also affected by the civil war and genocide in the nineties. During the conflict and the huge refugee crisis, many trees were left unattended for several years. In addition, as poverty in the aftermath of the events was high and access to input and output markets for cash crops severely constrained, farmers turned to subsistence agriculture³⁶.

The combination of the fall in international coffee prices, the liberalization policy and violent conflict, led to a dramatic drop in coffee production during the nineties. By 2000 the country seemed trapped in a "poor quality – low productivity paradigm", with most coffee sold at prices below the international reference price for mild coffees³⁷. The low prices were keeping low the producers' incentives to invest their limited resources in coffee production. Many farmers uprooted the trees replacing them with food crops and many plantations were neglected as the efforts involved in harvesting did not seem warranted.

3.2 ... to a liberalized high-value sector (2000-2011)

As a response to the steady decline in production, in quality and in export earnings and in view of the recognized potential contribution that the coffee sector could make to increase economic growth, the Rwandan government adopted the 1999-2003 Coffee Strategy and Action Plan, which was subsequently reviewed and updated with the assistance of external donors such as USAID. This action plan developed a strategy of targeting production of high-quality coffee, entering a new niche product for which the price does not follow the downward trend of conventional coffee.

was supported by an obligatory system of controls that involved the issuance of Certificate of Origin for each export by the Organization.

³⁵ TARDIF-DOUGLIN, D., NGIRUMWAMI, J.-L., SHAFFER, J., MUREKEZI, A., KAMPAYANA, T., "Aperçu sur la politique caféicole au Rwanda", République Rwandaise, Ministère de l'Agriculteur et de l'Élevage, Division des Statistiques Agricoles, Publication DSA No. 39, December 1993.

³⁶ TARDIF-DOUGLIN, D. *et al.*, "Finding the Balance...", *op. cit.*

³⁷ USAID, *op. cit.*

International donors provided funding, technical assistance and training, launching programs like the Sustaining Partnerships to Enhance Rural Enterprise and Agribusiness Development (SPREAD). Concrete policy measures taken included installing washing stations to produce high quality fully washed coffee and a successful marketing campaign abroad³⁸. Following these measures, the sector started recovering, with the multiplication of washing stations and new trees being planted.

Today, competition in the sector is fierce, with over 200 washing stations and 48 different exporting companies. While the market is still very much concentrated, with the top 5 companies exporting more than 80% in 2009-2010, market concentration is markedly lower in the subsector of fully washed coffee, with the top 5 companies' export share standing at 44%. This is because many washing stations sell directly to the various coffee importers. The traditional trading partners of ordinary coffee still top the list of importing countries (Switzerland, Belgium, and to a lesser extent the UK), but new trading partners have emerged (such as the USA and Asian countries) and are expected to take a more prominent place as the production for specialty coffee increases.

The increased appeal of Rwandan coffee is confirmed by the awards assigned in international competitions. In May 2008, the coffee from Buremera washing station won the second price in a cupping competition organized by the SCAA (Specialty Coffee Association of Americas)³⁹. In the same year Rwanda hosted the first Cup of Excellence (CoE) competition ever hosted in Africa. After a very competitive selection and evaluation, which involves up to six different steps, the CoE assigns the most prestigious award in the coffee sector, called "Cup of Excellence", to lots that obtain more than 84 points. Lots obtaining more than 90 points are awarded the "Presidential Award". In 2008 twenty-four Rwandan lots obtained more than 84 points with two of them passing the 90-point threshold and being subsequently sold on the market for more than \$16/kg⁴⁰. Rwanda hosted the competition also in 2010, in 2011 and is planning to host it in 2012 as well.

This remarkable transformation in a very short time span is largely perceived as a success story. Popular media, especially in the UK and the USA, have taken up the story on the occasion of winning coffee cupping competitions and new contracts signed, e.g. with Starbucks.

The sector also received praise from donors. The International Fund for Agricultural Development (IFAD), a specialized agency of the United Nations qualifies the transformation as "A striking example of a country repositioning itself in the market from a 'filler and poor quality' origin to a specialty grade coffee". The report continues: "The coffee of this country

³⁸ *Ibid.*

³⁹ MINISTRY OF AGRICULTURE & ANIMAL HUSBANDRY, MINISTRY OF TRADE & INDUSTRY, *op. cit.*

⁴⁰ Information retrieved from the Cup of Excellence website www.cupofexcellence.org.

has repositioned itself from a poor quality coffee to a specialty grade coffee over the past 4 to 5 years. This aspect requires to be highlighted, especially considering that most coffees in East Africa still qualify only as 'Fair Average Quality or Commodity'".⁴¹

Maybe most noteworthy, the transformation is recognized as a success story by one of the world's most well-known aid sceptics. Pointing to the role of financial and technical assistance in the revival of the sector, Easterly and Reshef state that "Rwanda's coffee quality upgrade was a foreign aid success despite the usual poor record of aid".⁴² A study by Tobias and Boudreaux even puts forward the hypothesis that besides being a catalyst for poverty reduction and economic development the changes in the coffee sector foster increased intergroup contact and positive attitudes towards reconciliation. They provide evidence in support of this hypothesis based on self-reported data of members of a coffee cooperative that manages a washing station⁴³.

To the best of our knowledge, only one study has used quantitative data to assess the impact of the reforms on small-scale coffee farmers. Relying on a panel data set of 264 households of coffee farmers, interviewed in 2001 and 2007, Murekezi and Loveridge find that coffee farmers, and especially coffee farmers selling to washing stations (instead of the traditional middlemen) have relatively high consumption expenditures. The authors conclude that their results "suggest that the Government policy of promoting the production of high quality coffee has improved food security and the overall consumption expenditures of coffee growers"⁴⁴.

4. THE TRANSFORMATION OF THE RWANDAN COFFEE SECTOR IN FIGURES

The most impressive and visible aspect of the transformation of the Rwandan coffee sector is the multiplication of coffee washing stations, which increased in number from 2 to 213 in the period 2002-2012. As a result, the average distance from the center-point of a sector to the closest station decreased from more than 50 km in 2002 to less than 10 km in 2012⁴⁵.

⁴¹ REPUBLIC OF RWANDA, "Project for Rural Income Through Exports ...", *op. cit.*

⁴² EASTERLY, W., RESHEF, A., "African export successes: surprises, stylized facts and explanations", NBER Working Paper 16597, 2010.

⁴³ TOBIAS, J. M., BOUDREAUX, K. C., "Entrepreneurship and Conflict Reduction in the Post-Genocide Rwandan Coffee Industry", *Journal of Small Business and Entrepreneurship*, Vol. 24, No. 2, 2011, pp. 217-242.

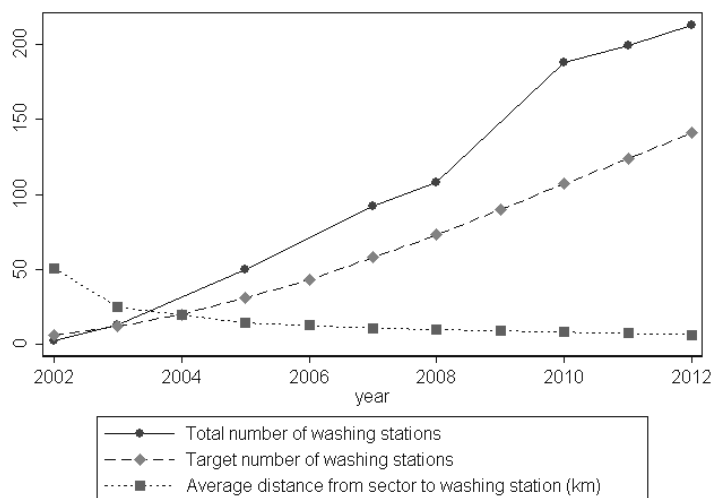
⁴⁴ MUREKEZI, A., LOVERIDGE, S., "Have coffee reforms and coffee supply chains affected farmers' income? The case of coffee growers in Rwanda", Agricultural and Applied Economics Association, Annual Meeting, July 26-28, 2009, Milwaukee, WI, No. 49597, 2009, p. 24.

⁴⁵ The distance measures are based on the sector boundaries from before the 2006 administrative reform, when the average size of a sector was approximately 14 km².

Figure 2 reports this impressive evolution, showing that the targets for the number of washing stations that were set in 2002 were easily met, and in fact surpassed. The target currently set for 2017 is 349, or an additional 150 washing stations in 5 years from now.

A smaller distance between the farm and the washing station should allow for a reduction in the time between harvesting and processing coffee beans, which is crucial for preserving the quality of the beans and for obtaining a final product of higher quality that is better priced on the market. The production of fully washed coffee is therefore expected to mimic the evolution of the coffee washing stations. However, the rest of this chapter will illustrate that the evolution in the production of fully washed coffee has remained far below expectations.

Figure 2. On-target increase in the number of washing stations



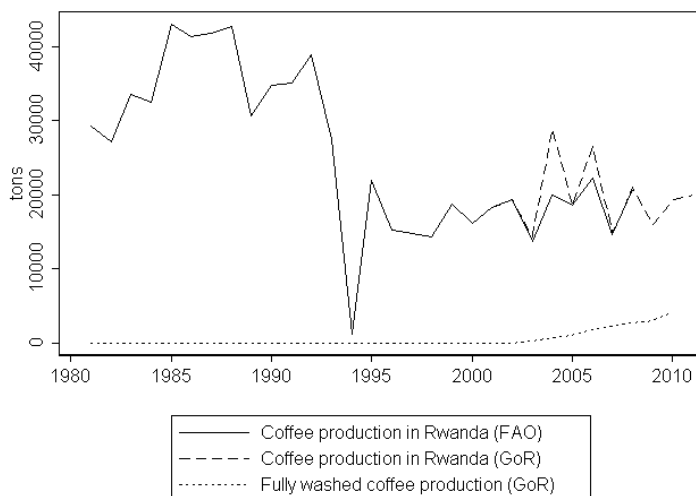
Notes: Data retrieved from overlapping a numerical map of administrative sectors with several maps of washing stations in time taken from OCIR-CAFÉ. Distances are calculated in GeoDa software in km from the center point of each sector to the center point of the sector in which the nearest washing station is located. We use sector boundaries from before the 2006 administrative reform. Data of targets for washing stations are taken from the Rwanda coffee strategy update 2009-2012. Two missing data points are extrapolated.

Figure 3 gives a first perspective on the production of Rwandan coffee for the years 1980-2011. We rely on FAO data for the period 1980-2005 (solid line), while OCIR-CAFÉ data is used for the most recent years (dashed line)⁴⁶. Overall, the figure shows a strongly decreasing production

⁴⁶ For the years for which both data sources provide information, there is a difference in the production with OCIR-CAFÉ reporting higher production. It is likely that OCIR-CAFÉ has better quality data. Easterly and Reshef write that “The Rwanda Comtrade data before 2003 is very patchy and unreliable, especially in the exporter reported data, with obvious signs of

after the liberalization of the coffee sector in the early nineties and a sharp drop in 1994, at the peak of the violence. In the years following the genocide production levels recover, but stay far below what they were in the heydays of the eighties. The dotted line indicates the production of fully washed coffee, which entered the market in 2002. Ten years later, in 2012, its market share stands at approximately 20%. Contrary to the number of washing stations, these numbers are not in line with targets set in 2002. As shown in Figure 4, top, national production levels remained far below the projected production figures set in 2002 and 2008. For fully washed coffee, for which data are displayed in Figure 4, bottom, the gap between targeted and actual production was even wider. The targets set in 2012 are still ambitious but seem to be more realistic compared to those set in 2002 and 2008.

Figure 3. Introduction of fully washed coffee without marked increase in coffee production

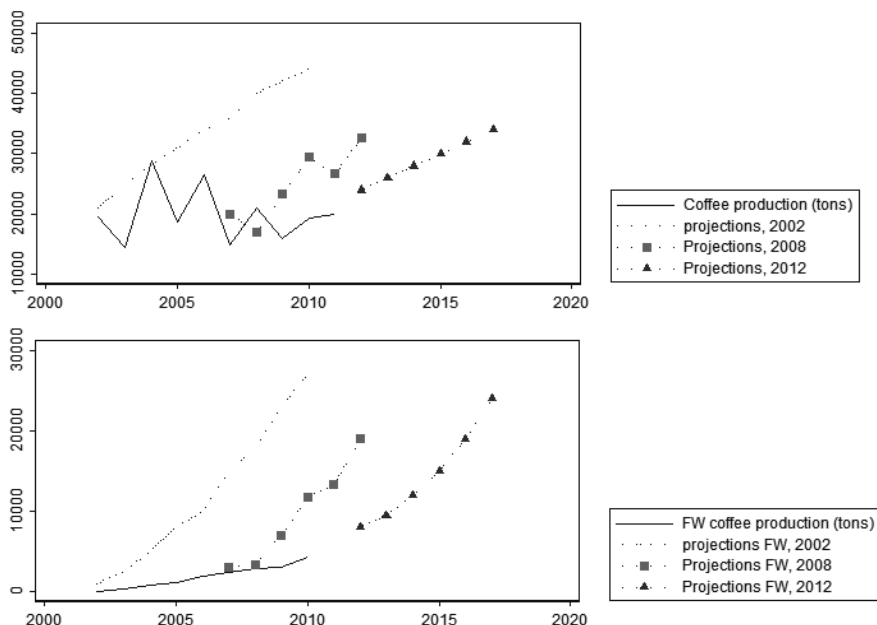


Note: Own compilation based on FAO time series data and data from the annual OCIR reports.

severe underreporting.” (EASTERLY, W., RESHEF, A., “African export successes...”, *op. cit.*).

Figure 4. Actual coffee production remained far below the targets set in 2002 and 2008

Top: total coffee production, bottom: fully washed coffee



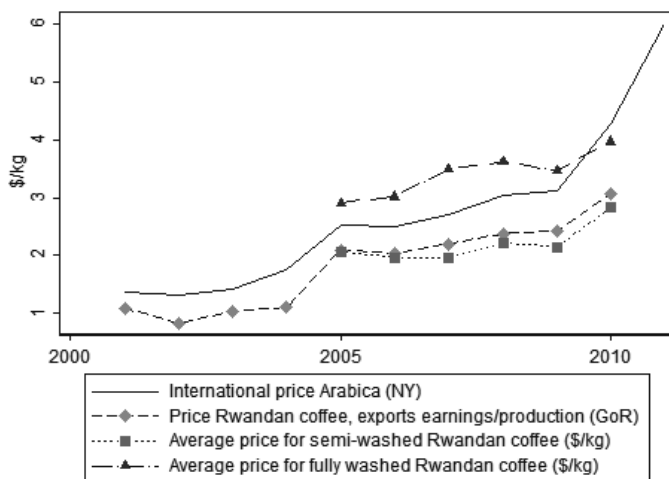
Notes: Own compilation based on figures taken from the Rwanda coffee strategy update 2009-2012. Projections of 2012 are taken from a January 2012 presentation by Dr. Celestin Gatarayiha, Head Coffee Division of the National Agricultural Export Development Board (NAEB) – formerly known as OCIR-CAFÉ.

Since Rwanda is a very small player in the global market for coffee, the country is a price taker. Given that more than 98% of all the coffees produced in Rwanda are Arabica, the reference price is represented by the international market price for Arabica coffee. Since Rwandan farmers were not rewarded for quality for more than a century, but instead received a fixed price for their product, the quality of Rwandan coffee is below average. This is reflected in the price paid for Rwandan coffee, which is displayed in Figure 5, joint with the international reference price for wet-processed Arabica coffee. On average, prices for Rwandan coffee are far below the reference price. However, the small share of fully washed coffee is sold at a higher price reflecting the mark-up to be gained from specializing in fully washed coffee. That being said, in 2010 even the price for fully-washed Rwandan coffee was below the international price⁴⁷. In section 5, we discuss the pricing of Rwandan coffee in depth.

⁴⁷ Although it was above the international coffee price index (ICO-composite index), which is composed of a weighted average of Robusta and Arabica coffee.

On the basis of various OCIR reports, we constructed time series data on coffee export earnings. We find that coffee export earnings dropped from \$58 million in 1991 to only \$15 million in 2003, but then almost entirely recovered amounting to \$52 million in 2011⁴⁸. However, most of the recovery from the 2003 low is due to an increase in international prices for coffee and not so much due to a recovery in production. Between 2003 and 2011, export earnings increased by 246%, prices by 269% and production only by 39%. To illustrate this, Figure 6 plots the series for export earnings, exported quantity and prices jointly after normalizing the series, taking 2003 as a base year.

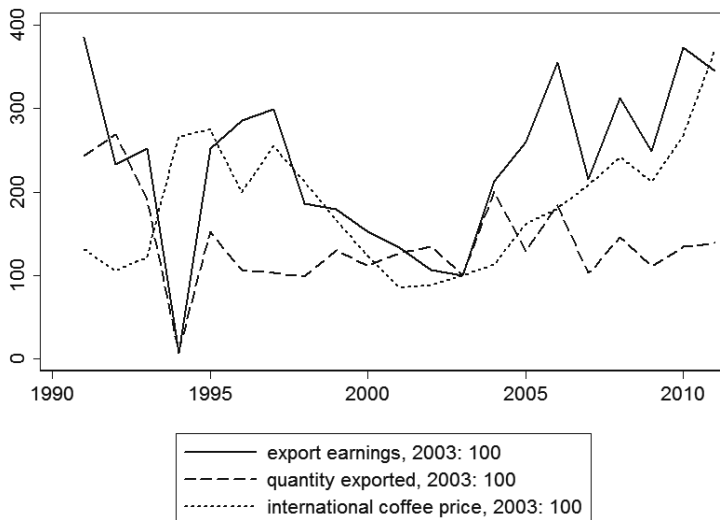
Figure 5. Price for Rwandan coffee still far below the international reference price, except for a small share of specialty coffee



Note: New York Coffee Price Index and various OCIR-CAFÉ reports.

⁴⁸ The figure of \$25 million is taken from the 2011 OCIR report and is based on figures for July 2010-June 2011.

Figure 6. The recovery of export earnings is entirely driven by the rise in the international coffee price



Note : New York price index, FAO time series data and various OCIR-CAFÉ reports.

In sum, the number of washing stations increased at an impressive rate, but production of fully washed coffee lagged behind projections, and the recovery of export earnings is almost entirely driven by an increase in world market prices. Yet, the transformation of the Rwandan coffee sector is perceived as a success story. We conjecture that this positive image is driven by the success of a small segment of the coffee sector. The next section will provide the evidence supporting our claim.

5. DIGGING DEEPER: THE HETEROGENEOUS PERFORMANCE OF WASHING STATIONS AND COFFEE FARMERS

5.1. Low capacity use of washing stations

The discrepancy between the exponential increase in the number of washing stations and the off-target production for fully-washed coffee relates in a large part to the fact that many stations operate well below their capacity. The capacity of the washing stations in 2008 ranged from 250 to 2000 tons, with an average of 523 tons. However, in 2008 the average washing station was using only 28.9% of its capacity. This, in turn, had serious consequences for profitability, with half of the stations running at a loss in that

year⁴⁹. The gap between potential capacity and the actual use of it has four main causes.

First, almost three out of four washing stations use traditional wet mill machines with uneconomical oversized capacity, irrespective of the quantity of coffee cherries that can be processed in the area⁵⁰. The large capacity in place explains the overly optimistic production projections. In fact, if coffee washing stations had been using full capacity, production targets set in 2002 and 2008 would have been easily reached. By now, lessons are drawn and newly built stations are much smaller. For instance, while the average capacity of the 36 washing stations built in 2007 was 436 tons, it was only 268 for the 14 newly built stations in 2012. This is illustrated in Table 1, which gives an overview of the average theoretical capacity and actual capacity use over time, showing a decrease in theoretical capacity from 529 tons in 2007 to 451 tons in 2012, and an increase in capacity use from 29% in 2008 to 51% in 2011⁵¹.

Second, the problem of low capacity use is exacerbated by the poor management of a large number of the washing stations. In particular, the stations are often unable to pay the farmers on the spot for their coffee cherries supply due to lack of funds caused by poor financial management or late disbursement of working capital loan proceeds by commercial banks. In fact, in a survey among all washing stations in 2007, credit-related problems were listed as the most common problem faced by the washing stations⁵².

⁴⁹ GOVERNMENT OF RWANDA, *Rwanda National Export Strategy*, 2011.

⁵⁰ REPUBLIC OF RWANDA, "Project for Rural Income Through Exports...", *op. cit.*

⁵¹ In a few cases capacity utilization exceeds 100%. This is due to the fact that theoretical capacity is calculated making certain assumptions on the number of days of operation, the hours of work per day and the kg of cherry processed per hour. If real values exceed these assumptions, the effective utilization will be more than 100% of the estimated capacity. When dropping the observations with capacity utilization above 100%, the utilization rate moves from 25% in 2008 to 40% in 2011.

⁵² We received the survey results from OCIR-CAFÉ in the form of an Excel table.

Table 1. Washing stations operate below capacity, certainly in the earlier years

YEAR	WASHING STATIONS (no.)	THEORETICAL CAPACITY			CAPACITY USE		
		mean	min	max	mean (%)	min	max
2007	112	528.6	250	2000	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>
2008	124	525.8	250	2000	28.9	0	182
2010	184	468.5	150	2000	45.5	0	238
2011	199	463.1	150	2000	50.5	0	166
2012	213	450.5	150	2000	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>

Source: Own calculation based on documents received by OCIR-CAFÉ.

Third, another reason for the low level of cherries processed at the washing station is the absence of a price premium for the supply of good quality cherries. By far most washing stations collect and process cherries indistinctively and pay farmers a fixed price irrespective of differential quality. Not rewarding farmers for quality destroys farmers' incentives to improve farming practices. In addition, mixing cherries of different qualities generally ruins chances of qualifying as specialty coffee and earning the price premium needed to cover the cost of fully washing⁵³. As a result, washing stations can afford paying only a low price to farmers, generating a perverse low-price low-quantity cycle. Besides, when the price paid by the washing station is too low, farmers not only disinvest in quality and produce less coffee, but they also find it more profitable to process their cherries at home and sell the semi-washed coffee directly to a middleman, who will then re-sell to large exporters of ordinary coffee.

This brings us to the fourth reason for the low capacity use of washing stations, i.e. the relatively high market price for ordinary coffee. The price increase for coffee in the past 10 years has helped washing station to recover the high start-up costs when firstly entering the market. On the other hand, since the upward trend covered both fully-washed coffee and semi-washed coffee, it may have hampered the take-off of specialty coffee, because it allowed washing stations and coffee farmers to make an "easy profit" selling ordinary coffee or fully-washed coffee of low quality⁵⁴. Hence, somewhat paradoxically, both the quality of fully-washed coffee and the

⁵³ MINISTRY OF AGRICULTURE & ANIMAL HUSBANDRY, MINISTRY OF TRADE & INDUSTRY, *op. cit.*

⁵⁴ *Ibid.*

supplies of cherries to washing stations may increase if international coffee prices decrease and the gap between prices for semi-washed and fully-washed specialty coffee widens. After all, only a sufficient price premium can justify the additional efforts required for the production of high-quality coffee⁵⁵.

Combined, the above reasons explain why many farmers in Rwanda prefer processing coffee themselves and sell to the traditional middlemen: contrary to the majority of washing stations that cannot pay on the spot and do not reward for quality, the middle men usually pay immediately, and although they neither pay a quality premium, the price that farmers receive for their semi-washed coffee is relatively high in the current climate of relatively high international prices for ordinary coffee. In order to turn the tide, farmers need to be offered positive incentives⁵⁶.

5.2. Heterogeneous performance of washing stations

The issues outlined above pose challenges to all washing stations. So far, only a handful of washing stations have successfully addressed them. For instance, the Maraba coffee washing station, located in the district of Huye in the Southern province, is a true success story. The station was built in 2002 with the support of USAID and the National University of Rwanda, and has a capacity of 500 tons, of which it uses over 60%. It is managed by a farmer cooperative counting 1371 members. Membership to the cooperative is conditional on paying a one-time fee of 50,000 RWF (which can be paid also over time) and on having at least 200 coffee trees. The origin of every coffee bean that reaches the station is recorded. The nearby laboratory is then used to test its quality and a double register is used to track the quality and the provenance of each lot. The washing station is internationally recognized, being awarded with the prestigious “Cup of Excellence” in 2008. As the secretary of the cooperative explained us, this success rests on a well-structured and well-trained administrative body, which keeps the flow of information between the cooperative and its members at the heart of the process. The cooperative, with support of Fair Trade, assists farmers by

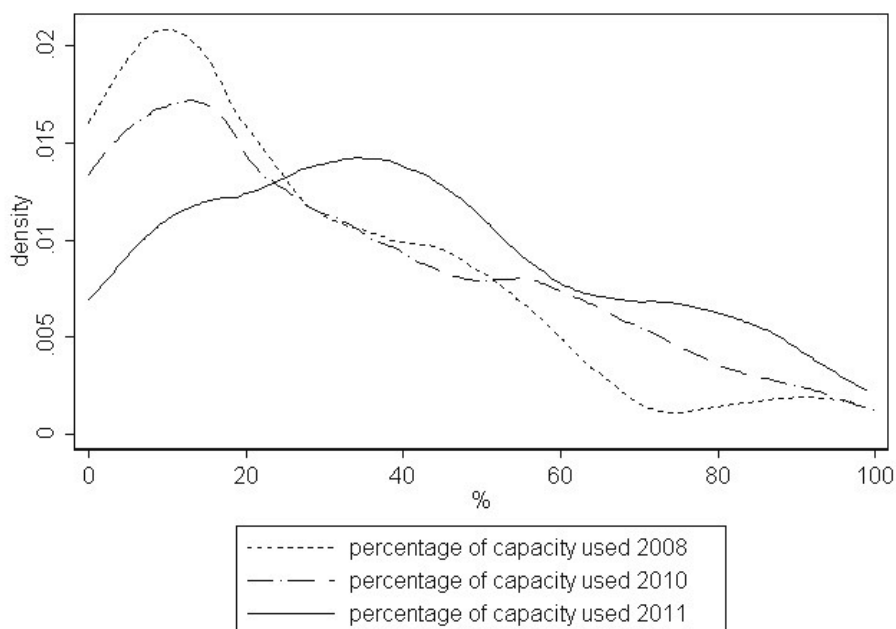
⁵⁵ Historical trends show that the prices of the different qualities of coffee co-move, but that the prices of fully-washed coffee display less volatility than the price of semi-washed coffee. Importantly, at times of decreasing prices, the gap between the two qualities tends to widen, while the gap closes when prices increase.

⁵⁶ From our qualitative fieldwork, we learned that in some cases, instead of ‘carrots’, ‘sticks’ are used. For instance, it is said that MINADEF operates nine coffee washing stations and sends out patrols to make sure farmers do not own coffee pulpers at home and do not uproot their trees. We do not have evidence that allows us to document the scale of these coercive measures. Other observers stress that the operation of washing stations is a strategy of MINADEF to generate money for the ministry and defense forces, that these activities create jobs for the local population and demobilized persons, and that all these operations are fully in line with government regulations.

providing seeds, fertilizer, pesticide and technical assistance. Farmers are made part of the key decisions adopted by the cooperative through their participation in regular meetings of the general assembly⁵⁷.

Much in contrast to this success story, most washing stations have not been able to address the issues outlined above. The kernel density⁵⁸ in Figure 7 displays capacity utilization for the years 2008, 2010 and 2011, indicating a wide variation in capacity use, with a large portion of washing station not being operational (capacity used equaling 0) and only a few running at full capacity (100%). On a positive note, Figure 7 indicates that the distribution of the 2011 capacity use lies to the right of the one for 2008, indicating the more realistic size and use of recently built washing stations.

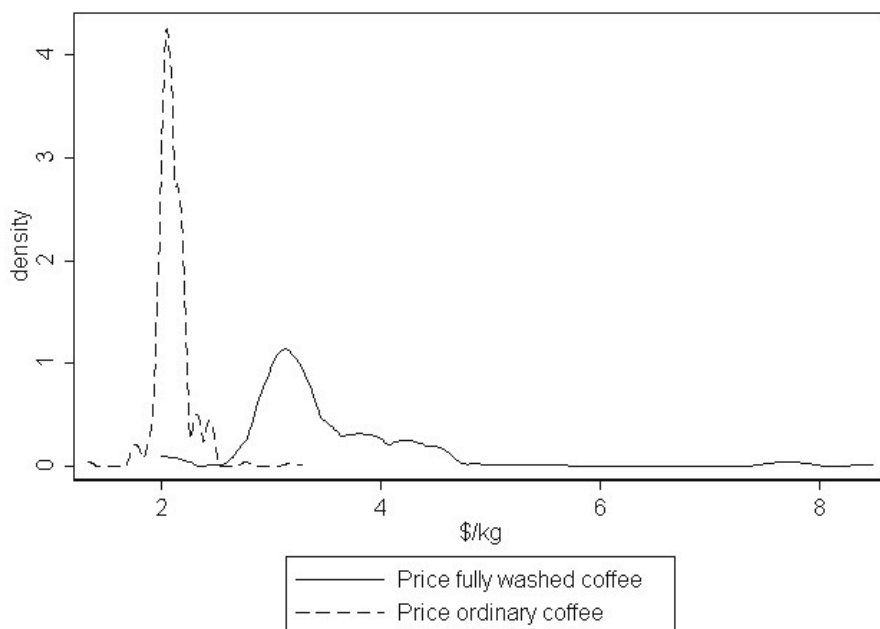
Figure 7. Capacity utilization varies a lot across washing stations



Notes : Own calculation based on documents received by OCIR-CAFÉ. Outliers with capacity utilization above 100% have been excluded from the graph. Data for 2009 are missing.

⁵⁷ More information and links can be found on the wikipedia page for Maraba coffee, http://en.wikipedia.org/wiki/Maraba_Coffee.

⁵⁸ Kernel density estimators approximate the density function $f(x)$ from observations on x . They basically give the probability of observing x_i in the sample. Consequently, the estimates of $f(x)$ integrate to 1. As opposed to frequency tables, kernel density estimates have the advantage of being smooth and of being independent of the choice of the origin. More formally, the data is divided into intervals and estimates of the density at the centre of the interval are produced. The intervals are allowed to overlap. The smoothness of the figure depends on the width of the interval chosen.

Figure 8. Prices for coffee lots exported in 2007

Notes: Own calculation based on an Excel sheet with price information on all coffee lots sold in 2007, which was obtained from OCIR-CAFÉ.

Figure 8 illustrates another aspect of the heterogeneous performance of stations, i.e. the large variation in the quality of fully-washed coffee produced which is reflected in very different prices paid for fully-washed coffee. It gives the density plots of prices paid for ordinary and fully washed coffee in 2007 on the basis of prices for all 785 lots of Rwandan coffee exported in 2007. Most of the ordinary coffee was sold at a price slightly above \$2/kg. The average price for fully-washed coffee was slightly above \$3/kg, but most noteworthy is the huge heterogeneity within the category of fully washed coffee. For instance, some lots were sold at \$2/kg whereas the long right tail indicates that others were sold at prices above \$8/kg. As explained above, this stems from the fact that not all fully washed coffee is specialty coffee and it clearly indicates that there still is large scope for quality improvement.

One possible source of the heterogeneous performance of washing stations is related to the different ownership structure that characterizes them. Washing stations can be owned and run either by cooperatives or by private entrepreneurs. In 2011, a small majority of the 199 washing stations were owned by cooperatives (106). Data reveal that the cooperative-owned washing stations have a much smaller theoretical capacity than the privately owned stations, 366 tons versus 574 tons. The overall quantity of cherries processed is however only slightly lower: 194 tons processed on average by

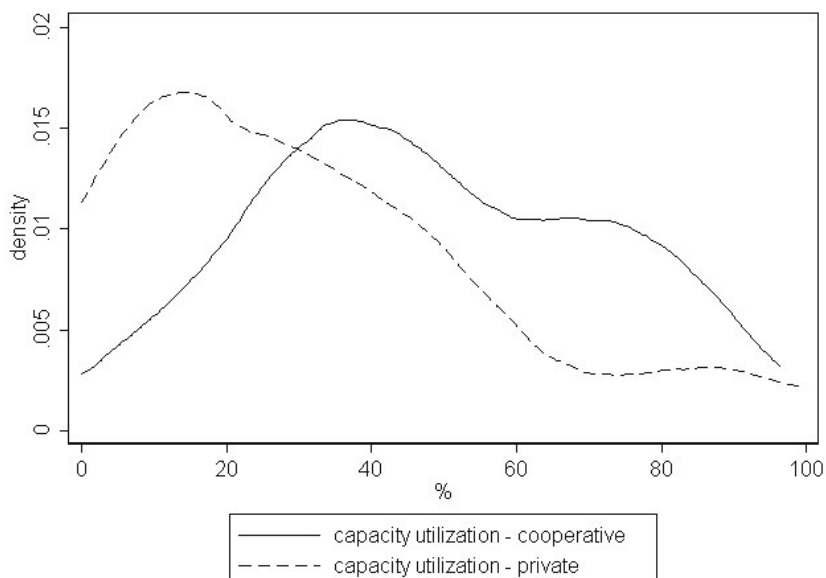
the cooperatives and 223 tons processed by the privates. This implies a more efficient use of the installed capacity by the cooperative-owned stations (59% versus 41%). But both within the category of cooperatives and privately owned stations, the variation in capacity use remains very large, as illustrated by the kernel distributions in Figure 9.

Table 2. Washing station performances in 2011, by ownership type

VARIABLE	OWNERSHIP	WASHING STATIONS (no.)	MEAN	STD.DEV.	MIN	MAX	DIFF COOP - PRIVATE
<i>theoretical capacity</i>	coop	106	366	275	150	2000	-207.7***
	private	93	573.7	339.3	150	2000	
<i>capacity used</i>	coop	106	193.3	194.7	0	1205	-29,2
	private	93	223.1	215.2	0	990	
<i>utilization (%)</i>	coop	106	58.7	35.8	0	166	17.4***
	private	93	41.3	37.8	0	164	

Source: Own calculation based on documents received by OCIR-CAFÉ.

Figure 9. Variation in capacity use, among cooperatives and privately owned washing stations



Notes: Own calculation based on documents received by OCIR-CAFÉ. Outliers with capacity utilization above 100% have been excluded from the graph.

To investigate further the impact of different management structure, we perform a multivariate analysis. Our unit of analysis is an administrative sector in which there is at least one washing station. Our dependent variable is the average capacity utilization of the washing stations installed in a certain sector. We analyze how this average capacity utilization is correlated with a set of sector-level characteristics⁵⁹. In Table 3, column one, we focus on the number of cooperative-owned stations present in the sector. The positive and significant coefficient suggests that administrative sectors that have a relatively higher number of cooperatives also display a relatively higher average capacity utilization. This result remains when we control for total sector capacity (in column 2) or total number of washing stations (column 3). However, when we control for the sector-level number of coffee trees, the result becomes very weak and, when including all controls simultaneously, the result disappears.

Table 3. Regression analysis of the link between ownership type and capacity use

DEPENDENT VARIABLE: AVERAGE CAPACITY USED BY THE WS IN THE SECTOR (%)						
	(1)	(2)	(3)	(4)	(5)	(6)
<i>number of cooperatives</i>	9.431**	10.360**	11.171**	7.654*	8.083*	6.104
	(4.258)	(4.438)	(5.319)	(4.337)	(4.490)	(5.922)
<i>total sector capacity (ln)</i>		-8.919**			-	-
		(3.455)			(3.743)	(4.703)
<i>number of WS in the sector</i>			-0.906			1.205
			(1.160)			(1.742)
<i>total coffee trees in the sector (ln)</i>				8.415***	12.906***	12.286***
				(2.841)	(3.860)	(3.940)
<i>constant</i>	41.775***	96.778***	42.440***	-63.625*	-38.431	-19.494
	(5.025)	(21.953)	(5.059)	(35.584)	(41.776)	(51.080)
<i>province fixed effects</i>	No	No	No	No	No	No
<i>observations</i>	130	130	130	130	130	130
<i>R-squared</i>	0.035	0.076	0.038	0.070	0.149	0.151
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

⁵⁹ We stress here our focus on correlations rather than on causality. The very simple regression framework adopted and the lack of more detailed data do not allow us to address reversed causality, omitted variables and other potential sources of bias.

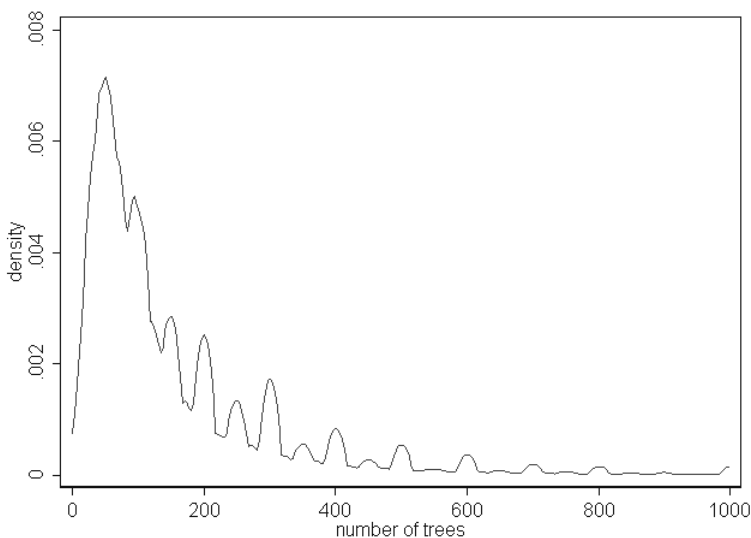
The estimated coefficient of the cooperative variables is also no longer significantly different from zero when we add province fixed effect (regressions not reported).

If we consider capacity utilization as a proxy for washing station performances and profitability, these estimates suggest that best-performing stations are those located where there are more coffee trees (and hence supply of cherries is higher) and where the total available capacity is lower⁶⁰. The ownership style does not seem to matter per se, but is correlated with these two significant determinants.

5.3. Heterogeneity at the farm level

In order to boost the development of the coffee sector it is of primary importance to address the issues related to the washing station management. As suggested by the analysis in section 5.2, a first necessary condition is increasing the quantity as well as the quality of the coffee cherry supply by farmers. According to the 2009 coffee census there are about 400,000 coffee farmers in Rwanda with on average 182 coffee trees. Most of these farmers are small-scale producers, with only a small fraction (1,3%) owning more than 1000 trees, and less than 100 farmers owning more than 10,000 trees. Even among farmers with less than 1000 trees, heterogeneity is very large. This is illustrated in Figure 10, which gives the kernel density of coffee trees per farmer for this subsample.

Figure 10. Distribution of number of trees per farmer, <1000 trees



Note: own calculation based on the 2009 coffee census.

⁶⁰ These results are confirmed and even reinforced when province fixed effect are introduced in the regression (available on request).

Since some cooperatives require a minimum number of coffee trees in order to become a member⁶¹, few among the very small farmers with less than 100 trees belong to a cooperative. In Table 4 we provide summary statistics of tree investment across members and non-members. Overall, the 20% of farmers who belong to a cooperative account for 29% of all coffee trees. Moreover, they hold a relatively large share of young trees (< 3 years), and a relatively small share of old trees (>30 years), suggesting that new investments and replacements take place especially among cooperative members.

Table 4. Farms and trees across members and non-members of cooperatives

	MEMBER OF COOPERATIVE			
	no		yes	
	no.	row %	no.	row %
<i>farms</i>	313,623	79.6%	80,584	20.4 %
<i>coffee trees</i>	50.9 m	70.7%	21.10 m	29.3%
<i>< 3 years</i>	11.8 m	67.4%	5.70 m	32.6%
<i>3-30 years</i>	26.3 m	70.5%	11.00 m	29.5%
<i>> 30 years</i>	12.8 m	74.1%	4.46 m	25.9%

Note: own calculation based on the 2009 coffee census; m = million.

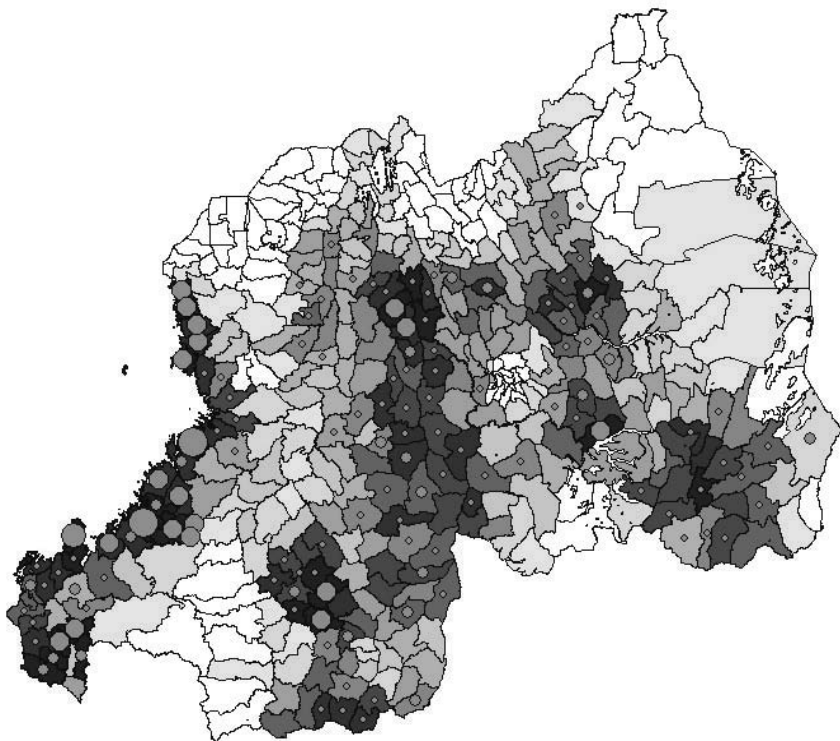
The heterogeneity at the farm level also has a spatial component, which is to a large extent determined by climate and soil type. Figure 11 shows the distribution of coffee trees per hectare and washing stations in the country. Darker sectors have a higher number of trees per hectare, while the size of the circle is in proportion to the number of washing stations in the sector. Coffee trees are unevenly distributed across the country, with a higher concentration in the west, the center and parts of the south. As expected, the distribution of the washing stations closely mirrors the distribution of coffee trees: in 2011 the top 20% districts (6 out of 30) with most coffee farmers accounted for approximately half of the farmers and half of the washing stations in the entire country.

Similarly to washing stations, coffee farmers display a wide heterogeneity in aiming at high quality coffee. The following map shows data taken from the 2003 coffee census, which includes records on the maintenance level of the coffee trees, divided across three categories: very good, good and bad. Sectors in which the level of maintenance is very good are in dark shade, those with a lighter shade have good or bad maintenance. For the sectors left white no data was collected.

⁶¹ During the interviews with the management of Maraba cooperative (which keeps a minimum requirement of 200 trees to obtain the membership), this has been justified by the fact that providing training and support to the members is costly and when the plot is small the returns of such investments are too low.

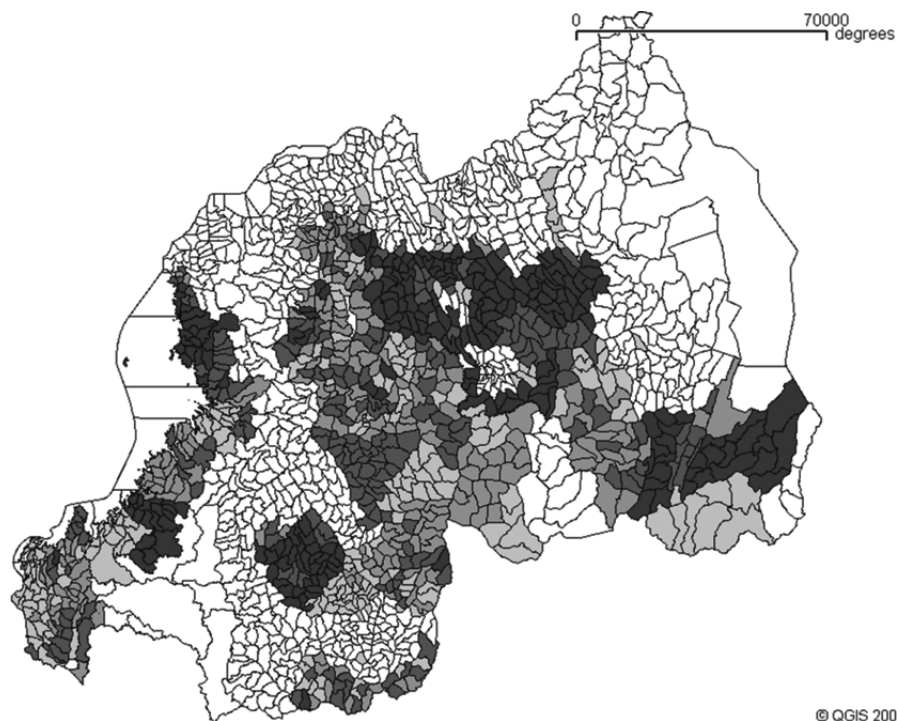
The clusters of well-maintained trees are located in parts of the west, in Nyanza district, in the southeastern corner and to the north of Kigali. Overall, only one third of trees are very well maintained, while 20% fall in the category of 'bad maintenance'. As outlined above, as long as farmers do not receive a reward for quality, effort will remain low. In addition, quality can be increased by organizing study tours and extension services for farmers and their cooperatives, as well as improving easy and timely access to pesticides and fertilizers. OCIR has made investments in this direction, employing professional agronomists to deliver technical support to the farmers. However, their limited number (one per district) and numerous tasks (monitoring the planting and development of seedlings, the distribution and application of fungicides, the distribution and application of fertilizers...) made their presence in the field almost unnoticed⁶².

Figure 11. Geographical distribution of coffee trees and washing stations



Note: Calculated from the 2009 coffee census and from documents received from OCIR-CAFÉ, plotted on an administrative map of sectors in Rwanda by means of GeoDa. The placement of the washing stations refers to 2011. Four washing stations were missing geographic references and are therefore excluded from the map.

⁶² MINISTRY OF AGRICULTURE & ANIMAL HUSBANDRY, MINISTRY OF TRADE & INDUSTRY, *op. cit.*

Figure 12. Spatial distribution of degree of coffee tree maintenance

Note: calculated from the 2003 coffee census, plotted on an administrative map of sectors in Rwanda by means of GeoDa.

Figure 11 and 12 show large variation across sectors. However, the across-sector variation is tiny compared to the within-sector variation. When regressing the total number of coffee trees on a full set of sector dummies, we find that across-sector variation only accounts for 2% of the total variation in the number of coffee trees, thus leaving almost the totality of the variation due to differences within sectors. Given that farmers living in the same sector are likely to face similar conditions (same climate, same infrastructures, same accessibility to washing stations etc), the result suggests that the new opportunities opened up by the transformation of the coffee sectors are taken up very heterogeneously by farmers. Future research should explore the reasons behind such heterogeneous investment decisions.

In sum, we have shown a wide heterogeneity in the performance of different washing stations, as well as in the way farmers respond to the new opportunities opened up by the transformation of the coffee sector. Taken together, these observations reveal the duality in the coffee sector as well as the fragility of the success reached by the country in recent years.

6. DISCUSSION

Rwanda has placed the transformation of the agricultural sector at the center of its development agenda. If agriculture is to offer pathways out of poverty, efforts have to be made to increase productivity in the staple foods sector, connect smallholders to rapidly expanding high-value horticulture, and generate jobs in the rural nonfarm economy. The transformation of the coffee sector feeds in the two latter aims, with a shift from producing merely ordinary coffee to supplying specialty coffee in a niche market, and creating nonfarm jobs at the level of coffee washing stations. With the help of financial and technical assistance, blessed with particularly good coffee-growing conditions and by booming demand in the developed world for specialty brews, Rwanda managed to put its coffee sector on the map of specialty coffee. However, the newly acquired position is fragile. Several issues remain.

First, the management of washing stations needs to be improved. The washing stations have multiplied at an incredible rapid pace, surpassing the targets set. On the surface, this multiplication gives the impression of a true success story. When digging deeper, however, one finds that only a small minority of washing stations is well-managed and is firmly established in the niche market of specialty coffee. The majority of washing stations are dysfunctional, operate at a very low capacity (or not at all) and produce fully-washed coffee that does not qualify as specialty coffee. The low supply of specialty coffee compromises the reputation of Rwanda on the international stage as a reliant provider of specialty coffee. On a positive note, the washing stations built more recently have installed smaller capacity better suited for the Rwandan context. In addition, in March 2010, the Rwandan government has launched a donor-supported turnaround program to assist unprofitable coffee washing stations by providing management, operational and governance support for a duration ranging from 3 to 12 months.

Second, farmers have to be given positive incentives to produce good quality coffee beans. This implies not only more effort in providing extension services and facilitating transport to the washing stations, but above all paying a price premium for good quality coffee beans. Currently, most washing stations do not have a system in place to pay variable prices to different lots of coffee beans, which compromises the quality of their output and the quality of the coffee bean supply. Experience from other high value chains has shown that, when good farm practices are required to obtain a high value product, vertical coordination increases along the supply chain⁶³. In the case of coffee this would mean a closer involvement between farmers, processors and exporters. In fact, in a number of cases, this model already exists in Rwanda in the form of the handful farmer cooperatives that suc-

⁶³ SWINNEN, J. F. M. (ed.), *Global Supply Chains. Standards and the poor*, Oxford, CABI Publishing, 2007.

cessfully manage coffee washing stations. An alternative model that is currently under study by the Rwandan government is to consolidate land and grow coffee on coffee estates⁶⁴. However, at the current stage of development in Rwanda, this may come at the very large costs of reducing land for farmers.

Third, the transformation has not yet passed the litmus test. If coffee prices decline, it remains to see if washing stations can cover costs. On the other hand, we argued that, a price decrease that mostly affects the segment of ordinary coffee may make Rwanda farmers more willing to sell coffee to the washing stations which can then fully wash the coffee and take advantage of the price gap between ordinary and fully-washed coffee. Currently, because of high prices for even mediocre coffee, many farmers prefer selling to the traditional channels.

These challenges were discussed at length above. There are a number of other challenges of which a lengthy discussion is out of the scope of this paper. For the sake of completeness, as well as to indicate paths for future research, we briefly highlight the three most important ones. (a) Most washing stations currently use high volumes of water and reject untreated effluents directly into water sources. To protect the environment and increase the chances of obtaining environmental certifications from labeling organization, best environmental practices need to be promoted. The recently built washing stations are equipped with smaller, environmental friendly eco-pulpers, which can pulp up to 150 tons of cherries in a coffee season, utilize less water and enable the waste to be used for composting. (b) Rwanda's landlocked geographical status and difficult terrain represent a disadvantage in terms of transport costs, and this will start playing when neighboring countries which enjoy a better geographic location make an entry in the specialty coffee market. To overcome this disadvantage, Rwanda will need to reposition itself in the market, aiming at even better quality and especially clever marketing in terms of product branding. In addition, road infrastructure needs to be improved so to "shorten the distance" from washing stations to farmers⁶⁵. The same remark can be made with respect to labor costs, which are higher in Rwanda than in neighboring countries⁶⁶. (c) While part of the answer to issues (a) and (b) include fulfilling the conditions for

⁶⁴ MINISTRY OF AGRICULTURE & ANIMAL HUSBANDRY, MINISTRY OF TRADE & INDUSTRY, *op. cit.*

⁶⁵ BOUDREAUX, K. C., "A better brew for success: economic liberalization in Rwanda's coffee sector", in CHUHAN-POLE, P., ANGWAFO, A. (eds.), *Yes Africa Can: Success Stories from a Dynamic Continent*, Washington D.C., World Bank, 2010, pp. 185-199.

⁶⁶ Since producing fully-washed high-quality specialty coffee is extremely labor-intensive, labor cost can make or break competitiveness in the niche market. For instance, as wages in Central America have increased, the quality of their fully-washed coffee exports has declined, and Eastern Africa has taken over part of the market. Thus, if wages increase (as one would hope they do), then the quality of the coffee exported from Rwanda may suffer. See EAST-ERLY, W., RESHEF, A., "African export successes...", *op. cit.*

special labels in order to secure a better market position, the administrative requirements and procedures to obtain special labels require skill and expertise that are currently far beyond the capacity of most washing stations. For instance, Fair Trade Organizations require washing stations to present records kept for all marketed coffee in order to check if all sold coffee belongs to members of cooperatives. The administrative and inspection cost are not only burdensome but also expensive, cancelling out the potential benefits from the Fair-trade market. A coordinated effort needs to be made to provide washing stations with the necessary skills and training to meet the requirements in a way that is cost-effective.

The government, NGOs, and other stakeholders are taking measures to deal with these various challenges. If they fail, today's success will remain at the surface of the coffee sector. If they succeeded, it would be a true achievement. The chances of succeeding will be higher if the measures taken go hand-in-hand with efforts to promote a "coffee-culture". The massive transformation that the coffee sector underwent in recent years did not leave time to create a coffee-culture comparable to those of traditional exporters, such as Brazil and Vietnam, where coffee fields and coffee practices are passed from one generation to another. Rwandans neither drink coffee, nor have yet developed a passion for growing it. For policymakers, it is useful to keep in mind that passion does not flourish in a climate of coercive measures.

Antwerpen / Butare / Stockholm, July 2012