

Final report

Using a decision  
support  
model to  
identify export  
opportunities

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**Project title:**

# Using a Decision Support Model to identify export opportunities: Rwanda

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## **Abstract**

The main objective of this study is to identify new opportunities for exporting Rwandan goods and services using an alternative approach (also endorsed by the World Trade Organisation (WTO)) and tool called the 'Decision Support Model' (DSM) approach. This approach aims to map out relatively easy(ier)-to-access markets with low(er) barriers to entry that exhibit demonstrated import demand and is not too concentrated from an import supply perspective. For this purpose the TRADE-DSM<sup>TM1</sup> approach provides a scientific approach to also take into consideration more specific aspects of the target market and product(s) in question. The DSM was initially specifically designed to assist with the selection of the most promising markets for a given exporting country in order to assist export promotion organisations in planning and assessing their export promotion activities.

The Decision Support Model (DSM) is an analytical tool, incorporating a thorough screening process that facilitates systematic export market selection through the identification of realistic export opportunities for firms wanting to expand their sales reach into foreign markets. It also offers alternatives to exporters where they are facing saturation and/or declining growth in their traditional markets. The DSM methodology takes into consideration all possible worldwide product-country combinations and, using four filters, progressively eliminates less promising markets until those with the greatest prospects of success are revealed.

A purpose-built DSM for Rwanda was developed for the purpose of informing this study. Detail regarding key assumptions and the approach are discussed supported with contextual and relevant research. In this version of the DSM methodology applied for the Rwanda case, focus was placed on constructing logistics routing and costing assumptions reflecting a land-locked economy such as Rwanda's as well as a transit time cost component informed from empirical research by Hummels (2001, 2006, 2007, and 2012) and coined the "Hummels constant" for the purposes of this approach.

It must be noted that this analysis is based on a modelled outcome, as opposed to observations from relationships in the data. However, assumptions for the modelling are informed from various studies and fields over a period of the last twenty years, the majority which is documented in Cuyvers *et al.*

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<sup>1</sup> TRADE-DSM is a registered trade mark of TRADE research focus area at the North-West University, Potchefstroom Campus, South Africa.

2012. As with any model the outcomes are subject to defined structure and parameter assumptions. For this study the latest information on all relevant elements were incorporated where possible.

Outcomes from the analysis based on the DSM model for Rwanda indicates that more than 80 percent of the identified potential in terms of value of market-product line combinations are contained in 6 geographic regions (in descending order of potential value) of Western Europe, Eastern Asia, Northern America, Southern Europe, South-Eastern Asia and Northern Europe – not within the direct geographic vicinity of Rwanda. In terms of the number of opportunities, in addition to the first 6 regions, Western Asia, Eastern Europe and Western Africa contributes to reaching the 80 percent mark.

Close (to Rwanda) regional sub-Saharan markets in Middle Africa, Eastern Africa and Southern Africa overall do not pose large (relatively speaking) opportunities in either value or number of product lines in the short to medium term, with the combined markets in these regions accounting for only 1.4 percent of the potential and 7.7 percent of the number of opportunities.

By combining the outcomes obtained from the more detailed analysis on a country level for the focus countries with that of the rest of the world outcomes, a “portfolio” of focus products and markets was created in terms of guiding the focus of analysis and for the purposes of deriving policy implications. This research opens up alternative questions on research around diversification in terms of both markets and products for Rwanda, with three possible further focus sectors (aeronautic maintenance and repairs and related services, mining and drilling maintenance and repairs and related services and manufacture of plastics and related industries) highlighted by the outcomes of this approach.

The purpose of this paper is not to be exhaustive nor authoritative, but rather illustrative of how the outcomes from the DSM approach can be applied for decision making with specific relevance to Rwanda’s policy makers in their journey of planning and building the country’s economy. While an advantage is that the outcomes are provided at the HS6-digit product line detail, it can also pose a challenge since data quality and frequency of reporting at this level can be problematic for lesser developed countries as well as lesser traded products.

As an immediate priority it would be useful to cross-check key assumptions and possibly deepen the analysis of current findings to ensure robustness. Thereafter, to sensibly and responsibly inform strategic decisions, more detailed investigation and evaluation of each of the opportunities identified for Rwanda by the DSM approach is required.

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## Glossary of selected key concepts

**Ad valorem equivalent tariff:** An *ad valorem* equivalent tariff is used to express tariffs not defined in percentage form (so e.g. a tariff expressed in dollars per ton) through an estimated percentage of the price. This estimated percentage is then referred to as the *ad valorem* equivalent tariff.

**African Growth and Opportunity Act (AGOA):** The act has the objective of expanding United States of America's trade and investment with sub-Saharan Africa. AGOA provides duty-free market access to the United States for qualifying Sub-Saharan African beneficiary countries by extending duty-free preferences previously available under the US Generalised System of Preferences. Rwanda was declared AGOA eligible on 2 October 2000 and wearing apparel provisions were also included on 4 March 2003.

**Backhaul:** To haul a shipment back over part of a route which it has already travelled; a marine transportation carrier's return movement of cargo, usually opposite from the direction of its primary cargo distribution.

**Bulk cargo:** Loose cargo (dry or liquid) that is loaded (shovelled, scooped, forked, mechanically conveyed or pumped) in volume directly into a ship's hold; e.g., grain, coal and oil.

**Cost, insurance, freight (CIF):** Refers to the valuation of imported goods, i.e., including international transport and insurance costs.

**Common Market for Eastern and Southern Africa (COMESA):** A free trade area with twenty member states: Burundi, Comoros, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libyan Arab Jamahiriya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, Zimbabwe.

**Containerization:** The technique of using a container to store, protect and handle cargo while it is in transit. This shipping method has both greatly expedited the speed at which cargo is moved from origin to destination and lowered shipping costs.

**Digits or digit-level (for tariffs):** A reference to the codes used to identify products. Categories of products are subdivided by adding digits. See Harmonized System below.

**East African Community (EAC):** A regional intergovernmental organisation of 6 Partner States: the Republics of Burundi, Kenya, Rwanda, South Sudan, the United Republic of Tanzania, and the Republic of Uganda, with its headquarters in Arusha, Tanzania.

**Free on board (FOB):** Refers to the valuation of exported goods, i.e. excluding international transport and insurance costs.

**Free Trade Agreement (FTA):** Free trade agreements involve cooperation between at least two countries to reduce bilateral trade barriers – import quotas and tariffs – for the purpose to increase trade of goods and services with each other.

**General Agreement on Tariffs and Trade (GATT):** A legal agreement between many countries, whose overall purpose was to promote international trade by reducing or eliminating trade barriers

such as tariffs or quotas. For more information see [https://www.wto.org/english/docs\\_e/legal\\_e/06-gatt\\_e.htm](https://www.wto.org/english/docs_e/legal_e/06-gatt_e.htm).

**Generalized System of Preferences (GSPs):** A preferential tariff system which provides for a formal system of exemption from the more general rules of the World Trade Organization (WTO).

**Harmonized Commodity Description and Coding System (HS):** An internationally standardized system of names and numbers to classify traded products that came into effect for the first time in 1988. It has since been developed and maintained by the World Customs Organization (WCO) (formerly the Customs Co-operation Council), an independent intergovernmental organization based in Brussels, Belgium, with over 200 member countries. The lowest level of internationally consistent codes applied according to the system is at the HS 6-digit product level, however individual countries may extend the coding system as required. Some countries such as the United States of America applies a 10-digit classification for products.

**Most-favoured-nation (MFN) tariff:** Normal non-discriminatory tariff charged on imports (excludes preferential tariffs under free trade agreements and other schemes or tariffs charged inside quotas)

**Preferential trade agreement (PTA):** A preferential trade agreement typically applies to a trading bloc that gives preferential access to certain products from the participating countries. This is done by reducing tariffs but not by abolishing them completely.

**Revealed comparative advantage (RCA):** The RCA index is often used as an indicator of relative export advantage or proxy for export competitiveness of a country for a specific product relative to the world as a comparator. The literature suggests that an RCA of at least 1 indicates that a country is specialised in producing and exporting a particular product. One can therefore consider it a proxy for export production capability and capacity of the exporting country if considered in combination with the RTA (see below).

**Realistic export opportunities (REOs):** A realistic export opportunity based on the TRADE-DSM methodology is defined as an opportunity (a HS<sup>2</sup> 6-digit product line-country combination) for which demonstrated historical import demand exists in a given importing country (irrespective of the supplying country(ies) for such imports); and which also meet the requirement of not being too concentrated from a supplying trade partner perspective; while also being relatively (to other possible choices) accessibly from the home market into the target market based on aspects such as international transportation, border import costs and import tariffs applied on such products by the target market or country; and for which the home market (exporting country) exhibits a revealed comparative trade advantage (RCA – see above) of greater than 1 as well as an RTA (see below) of greater than zero.

**Revealed trade advantage (RTA):** While the RCA index (see above) is often used as an indicator of relative export advantage or competitiveness, it only accounts for exports without consideration of imports. The RTA index however accounts for exports and imports simultaneously and is used as an indicator of product-level competitiveness and productive capacity. An RTA>0 reveals positive

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<sup>2</sup> See glossary item on Harmonized Commodity Description and Coding System (HS).

comparative trade advantage or trade competitiveness. It can be assumed that an  $RTA > 0$  implies that the majority of the product exported is locally produced as it corrects for re-exports.

**Standard International Trade Classification Revision 4 (SITC4):** A classification of goods used to classify the exports and imports of a country to enable comparing different countries and years managed and maintained by the United Nations. The current classification that was promulgated in 2006 is at revision 4.

**Tariff line:** A product, as defined by a system of code numbers for tariffs.

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## 1. Introduction

Industrial development is fundamentally about bringing about structural change in an informed way. It therefore involves producing and exporting new goods with new technologies and transferring resources from traditional activities to these new ones with the aim of uplifting and advancing the overall economy (Dutt *et al.*, 2008). Empirical research suggests that stimulating new exports is one of the most efficient ways of improving firm capability. When faced with international competitive pressures and with new demand for higher quality and larger markets, firms tend to grow, become more productive, and invest in higher quality products (De Loecker, 2007; Bernard and Jensen, 1999; Van Biesebroeck, 2005; Bustos, 2011; Pavcnik, 2002; Kugler and Verhoogen, 2012; Lileeva and Trefler, 2010). Providing an evidence-based approach for governments to identify and stimulate export opportunities will thus provide important feedback both for Rwanda's policy makers as well as for the International Growth Centre's (IGC) Firm Capabilities research agenda.

Expanding exports has also become an urgent government priority in Rwanda in order to reduce a growing trade imbalance, ensure non-farm job creation, and improve economic growth. This is also reflected in Rwanda's strategic plans, with the national export strategy for 2015-18 proposing a 20 percent annual rate of export growth (MINICOM, 2015, p.6).

In 2015, Hausmann *et al.* (2015) conducted an analysis based on the product space approach to inform on possible export diversification paths for Rwanda in the presence of significant constraints. For a detailed description of the product-space methodology see Hausmann *et al.* (2011).

While the product space approach is an innovative approach to inform on these questions, one of the challenges is that the product space approach in isolation does not consider and inform on potential markets for products from a specific "home market" since it is predominantly supply-side focused (Kniahin, 2014).

Hausmann *et al.* (2015) however did recognise this shortcoming and subsequently conducted a further analysis on the outcomes of the product space analysis by combining it with a transport cost dimension to further inform not only on what Rwanda could potentially produce, but where potential markets are for such identified products (see Hausmann *et al.* 2015, p.26 for details on their approach).

Key observations from the analysis pointed to Rwanda's high transportation costs and limited productive knowledge that have held back greater export development and have resulted in excessive rural density. Based on the analysis they found that three basic commodities – coffee, tea, and tin – traditionally made up more than 80 percent of the country's exports and still drive the bulk of export growth today.

The purpose of their analysis was therefore to help identify new, scalable activities in urban areas that Rwanda could pursue in its strategy drive to enhance economic development. The Hausmann *et al.* (2015) study results identified more than 100 tradable products that lie at Rwanda's knowledge frontier while at the same time not being intensive in Rwanda's scarce resources, and economise on transportation costs.

Outcomes from this analysis highlighted three main areas with greatest potential for Rwanda to develop its global exports, namely:

- 1) Processed agricultural products, foods, beverages and agrochemicals
- 2) Specialised textiles and garments, and
- 3) Construction materials, metal and wood products.

From a regional perspective the analysis identified the following broad product groups to focus on for supply to regional (Burundi, the Democratic Republic of the Congo, Kenya, Tanzania and Uganda) import demand, namely:

- 1) Machinery and Electronics,
- 2) Construction Materials, Metal and Wood products, and
- 3) Chemical products.

The study concludes with some policy implications and suggestions focused around addressing major supply-side challenges through for example the creation of Special Economic Zones (SEZs) and investments in critical infrastructure outside of SEZs focusing on addressing the high cost of transporting goods to and from regional and international ports. Furthermore, it is recommended that attention be given to facilitating rural-to-urban migration and improving in agricultural productivity.

While exporters need not necessarily serve the local market since local demand may not exist or be sufficient, in activities economies of scale, producing for the domestic market may enable firms to expand output to an extent that reduces marginal costs below the threshold to export to overseas markets. Hence, policy variables that raise the fixed costs of entry into the local market and the marginal costs of selling domestically will affect the number of firms and the potential number of exporters. The observation around policy variables points to the importance of the overall incentive regime governing investment, the business climate, labour regulations and the costs of key inputs. The latter will be determined by the trade regime and the efficiency of ports and customs for those firms dependent on imported inputs as well as the provision of backbone services such as telecommunications, energy, water and finance.

It is worth noting that more recently, a consensus seems to be emerging that the deeper determinants of economic development are not simply policies (such as trade and macroeconomic policies) but rather the characteristics of the underlying institutions in a country. Dutt *et al.* (2008) highlights the collective observation from various other studies that institutional indicators such as the constraints on executive decision-making, the rule-of-law, and bureaucratic corruption have been shown to have a much more significant impact on economic growth and level of development than the aforementioned policies. The author further states that the prevailing consensus is that institutional quality also trumps both the role of geography and economic integration with the rest of the world in accounting for cross-country differences in income levels.

Rwanda can probably be classified as an example in the making of how changes in institutional focus and efficiency and concentrating on economic enabling infrastructure and economic integration can compensate for geography. This study for Rwanda forming the basis for this policy brief, however, only considers the more direct aspects of demand, international trade and transport costs.

## 1.1. Objective of this study

The Hausmann *et al.* (2015) analytical approach and study outcomes provide a robust platform to inform economic development and more specifically export diversification for Rwanda. However, since the approach is predominantly informed from the supply-side as the starting point, the need was identified to compliment this work with more focus from a demand-side perspective.

The main objective of this study therefore is to identify new opportunities for exporting Rwandan goods and services using an alternative approach (also endorsed by the World Trade Organisation (WTO)) and tool called the 'Decision Support Model' (DSM) approach. This approach aims to map out relatively easy(ier)-to-access markets with low(er) barriers to entry that exhibit demonstrated import demand and are not too concentrated from an import supply perspective. For this purpose, the TRADE-DSM<sup>TM3</sup> approach provides a scientific approach to also take into consideration more specific aspects of the target market and product(s) in question. The DSM was specifically designed to assist with the selection of the most promising markets for a given exporting country in order to assist export promotion organisations in planning and assessing their export promotion activities.

The Decision Support Model (DSM) is an analytical tool, incorporating a thorough screening process that facilitates systematic export market selection through the identification of realistic export opportunities for firms wanting to expand their sales reach into foreign markets. It also offers alternatives to exporters where they are facing saturation and/or declining growth in their traditional markets. The DSM methodology takes into consideration all possible worldwide product-country combinations and, using four filters, progressively eliminates less promising markets until those with the greatest prospects of success are revealed:

- **Filter 1** of the DSM assesses countries from the point of view of their political and commercial risk, and macroeconomic size and growth performance.
- **Filter 2** assesses the market potential of the various product groups for the remaining countries, as determined by the size and growth of import demand.
- **Filter 3** examines the accessibility of the remaining countries in terms of their different barriers to entry (including shipping time and cost, logistical efficiency, and tariffs and non-tariff barriers) and degree of market concentration.
- **Filter 4** categorises the final round of potential export markets according to the "home" market's (in this case Rwanda) current export performance in these markets compared to the performance of the top six competitors in each market. An "unconstrained" potential export value is also assigned to each identified product-market combination with a view to prioritising the shortlisted export opportunities.

More details on the methodology follow later in this report.

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<sup>3</sup> TRADE-DSM is a registered trade mark of TRADE research focus area at the North-West University, Potchefstroom Campus, South Africa.

## 1.2. Outcome reporting dimensions

While the TRADE-DSM approach focuses on evaluating all potential markets in the world, the requirement for purposes of this study is to focus on 3 specific dimensions, namely:

- a) Identified potential products and how they compare with the product outcomes obtained in the Hausmann *et al.* (2015) study;
- b) Further away markets in the global economy, and
- c) specific focus on geographically close markets in the region such as Congo Brazzaville, Democratic Republic of the Congo, Burundi, Tanzania, Uganda, Kenya, South Sudan and Somalia.

This report therefore is constituted as follows. Section 2 addresses methodological issues, section 3 considers the aspect of skill- and technology intensity of exports, while section 4 provides a brief contextual overview of the latest developments in Rwanda's import and export trends as reflected in the underlying trade data used for the modelling; section 5 deals with the outcomes obtained from the DSM approach while section 6 provides observations and policy recommendations. The report is concluded in section 7 while references and appendices are duly provided in sections 8 and 9.

## 2. Methodology applied

This section provides an overview of the TRADE-DSM approach, as well as specific adjustments to the approach for the purposes of modelling the Rwanda case.

### 2.1. Brief overview of the TRADE-DSM approach

This method was initially developed (Cuyvers, *et al.* 1995) in order to identify the product-country combinations with the highest export potential for a single country. It was specifically designed to provide export promotion agencies with a more scientific way of determining those products and destination countries on which to focus their scarce export promotion resources.

Further refinements to the approach have been introduced over the past decade by TRADE research focus area at the NWU and the outcomes of this analysis are based on this subsequent refined approach.

In a nutshell, the method involves evaluating all worldwide country and product combinations, and screening these using various intelligent 'filters' to eliminate export opportunities that are not potentially viable.

The method uses four consecutive filters that sequentially eliminate less realistic/interesting product-country combinations in an effort to categorise and prioritise realistic export opportunities (REOs) in different positions on a grid (referred to as the REO Map<sup>TM 4</sup>), for the country/company for which the analysis is applied.

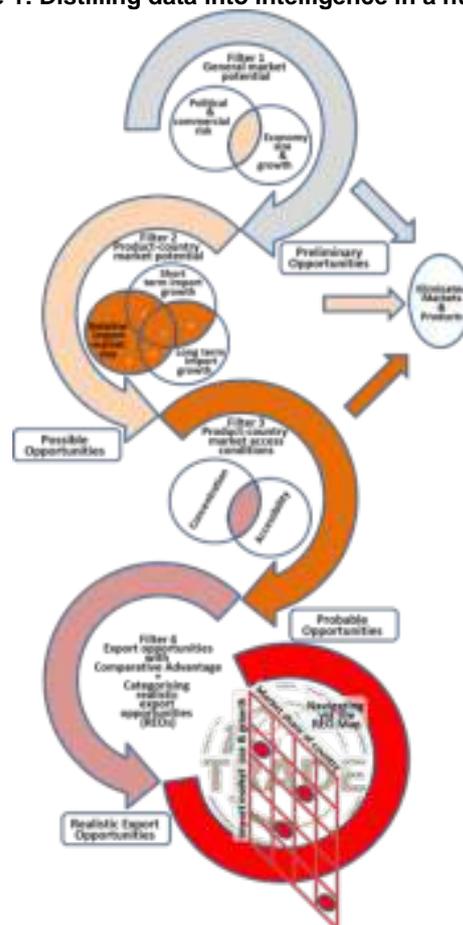
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<sup>4</sup> REO-Map is a registered trade mark of TRADE research focus area at the North-West University, South Africa.

These filters can be categorised in broad terms as:

- a) **Filter 1:** Broad general market potential as reflected in economic size, growth, and political and commercial risk;
- b) **Filter 2:** Product-country market potential characteristics;
- c) **Filter 3:** Product-country market access conditions, including aspects such as market concentration (sub-filter 3.1) and accessibility (sub-filter 3.2); and lastly
- d) **Filter 4:** Categorisation of outcomes based on the revealed comparative advantage (RCA), revealed trade advantage (RTA) and ‘home market’ and ‘target market’ product-level trade characteristics. Potential export markets are categorised according to the “home” market’s (in this case Rwanda) current export performance in these markets compared to the performance of the top six competitors in each market. An “unconstrained” potential export value is also assigned to each identified product-market combination with a view to prioritising the shortlisted export opportunities. This potential export value is considered as the average market value of the top six competitors in each market, excluding imports from the “home” market if the “home” market happens to be one of the top six sources of imports for the target market for a given product.

**Figure 1: Distilling data into intelligence in a nutshell**



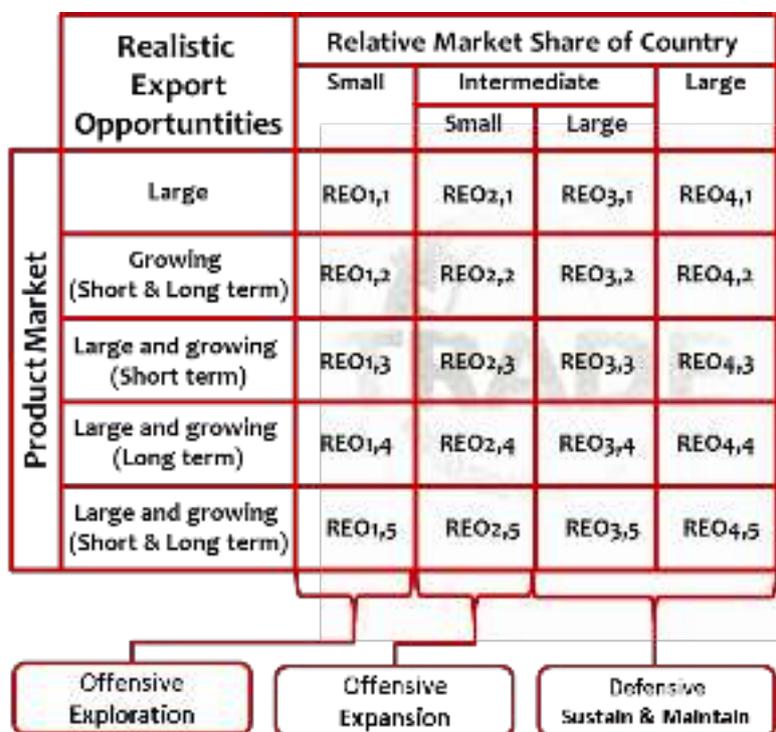
Source: Cameron and Viviers (2015), adapted from Jeannet and Hennessey (1988: 139)

This measure provides a relative indication of the potential “additional” size of different export opportunities relative to one another from the perspective of the “home” market relative to its existing exports to the target market. It is possible that the actual export value from the “home” market can be higher than this indicative potential export value, which means that the exporting country (“home” market) is one of the main exporters into a particular target market and its share in total imports into the target market exceeds the average market value for the same product supplied into this same target market by its top six competitors. This approach therefore provides a realistic indication (all else constant) of the potential market value that the “home” market could “target” to obtain, in addition to its existing exports to the target market. Under the “all else constant” assumption it would imply that the “home” market would need to win away market share<sup>5</sup> from the group of other countries already supplying this product into the target market in question.

<sup>5</sup> Note that this refers to market share at a country level and not on a company level and that this measure does not consider existing supply or production capacity in the “home” market – hence referred to as “unconstrained”.

For ease of understanding and reference, the outcomes are translated into a realistic export opportunities map as depicted in Figure 2.

Figure 2: REO Map™



Source: Authors

### 2.1.1. REOs' 'home market' market share characteristics

Evident from the map is that the characteristics of the REOs (which are the result of the process described at a high level above) can be used to inform appropriate, though still broadly defined, export promotion or marketing strategies, as follows:

- a) **REO<sub>1,1</sub> to REO<sub>2,5</sub>**: The 'home market' (in this case, Rwanda) has a non-existent to low market share for various reasons, and an offensive market **exploration** strategy is appropriate for products where a comparative advantage exists or can be developed;
- b) **REO<sub>3,1</sub> to REO<sub>3,5</sub>**: The 'home market' has a relatively medium-large market share and REOs are situated in large and/or growing market segments; therefore, an offensive market **expansion** strategy can be advocated; and
- c) **REO<sub>4,1</sub> to REO<sub>4,5</sub>**: The 'home market' has already gained an important relative market share; therefore, a defensive market **sustain and maintain** strategy seems most appropriate.

### 2.1.2. REOs' 'target market' characteristics

The target (or importing) market's characteristics in terms of both size and growth can also be used to inform strategies.

- a) **REO<sub>1,1</sub>; REO<sub>2,1</sub>; REO<sub>3,1</sub>**: ‘Breaking into’ a large, ‘relatively’ new market, especially when the market share of the ‘home market’ is still relatively small (REO<sub>1,1</sub> and REO<sub>2,1</sub>);
- b) **REO<sub>1,2</sub>; REO<sub>2,2</sub>; REO<sub>3,2</sub>**: ‘Taking advantage of a growing market’, i.e. opportunities in target markets that are growing in both the short and long term;
- c) **REO<sub>1,3</sub>; REO<sub>2,3</sub>; REO<sub>3,3</sub>**: ‘Growing and consolidating’, i.e. opportunities in target markets that experienced growth in the recent past/emerging opportunities;
- d) **REO<sub>1,4</sub>; REO<sub>2,4</sub>; REO<sub>3,4</sub>**: ‘Leapfrogging’, i.e. opportunities in target markets that exhibit long-term growth;
- e) **REO<sub>1,5</sub>; REO<sub>2,5</sub>; REO<sub>3,5</sub>**: ‘Jumping on the bandwagon’, i.e. opportunities in target markets that show large import volumes and growth in both the short and long term.

For a more detailed explanation of the methodology refer to appendix 9.1.

## 2.2. The international trade data used

The international trade data that informs the TRADE-DSM outcomes as applied in this study is based on the CEPII BACI world trade database (2017 – HS2007 revision). According to CEPII the BACI reported export values exclude re-exports, unlike the usual international trade data such as COMTRADE.

The CEPII data applied in this report contains Southern African Customs Union (SACU) aggregate data. In practice, South Africa accounts for the majority of transactions. However, we have made adjustments to the data to reflect Botswana, Namibia, Lesotho and Swaziland separately.

Although later (2016) data is available from the Division’s UNCOMTRADE database and the ITC’s TradeMap, the modelling requirement for reconciled data places a limit on the currency of the data.

The current DSM analysis and outputs as applied in this report therefore make use of data for the period 2011-2015.

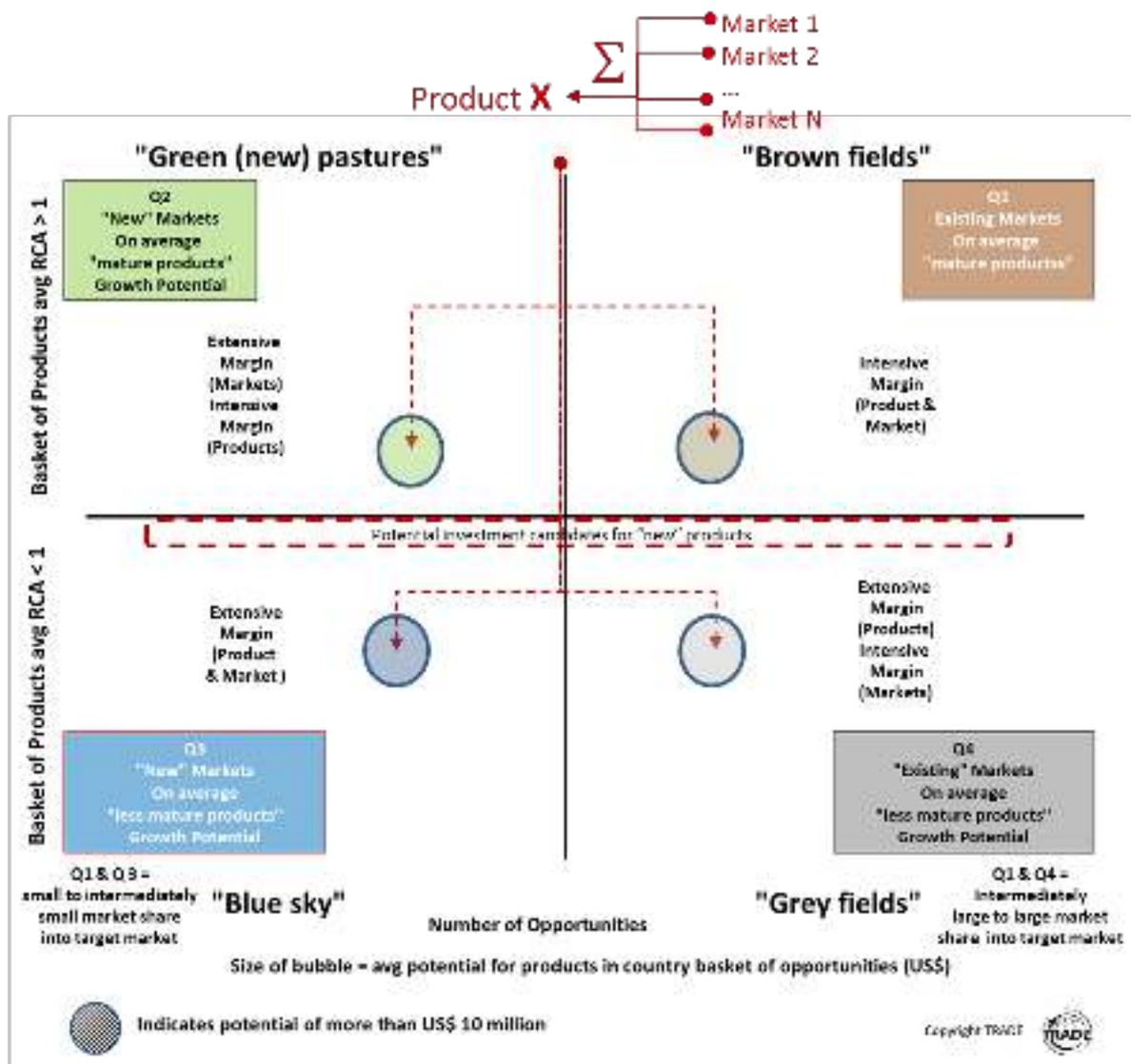
## 2.3. Considering intensive and extensive margins

Policy-makers need to be correctly informed to use the right tool for the right policy question, since e.g. policies aimed at increasing diversity of exports in terms of products versus diversifying destination markets are obviously very different (Carrere *et al.* 2011). To this effect Brenton and Newfarmer (2007) defines expansion of existing products in existing markets as growth at the intensive margin, while introduction of “new” products and new geographic markets as growth at the extensive margins.

The authors find that the expansion of existing products in existing markets has greater weight in terms of explaining export growth than the diversification of new products or new markets. They also show that expanding trade into new geographic markets contributes more to export growth than the development of new products. It is therefore important for government to facilitate the identification and addressing of market failures prohibiting exporters to grow and even more so to facilitate growth into existing markets.

In this context, the concepts of intensive and extensive margins are an important policy dimension to inform on and outcomes from the TRADE-DSM approach aligns with this policy information requirement.

Figure 3: REO export maturity, market share, and growth and diversification conceptual model



Source: Adapted from Cameron and Viviers (2015)

The REO Map™ produces an outcome that makes it possible to evaluate realistic export opportunities and, in turn, inform the nature of the export promotion strategy to be developed based on the specific allocated REO<sub>xy</sub> category. The results from the methodology are arranged so as to reflect (as opposed to eliminate) the REOs based on average market potential per opportunity, while the relative (existing) specialisation (or not) of Rwandan exports represented by the RCA is shown in a conceptual framework similar to that of the well-known Boston Consulting Group (BCG) growth-share matrix (also applied by ITC Trade Map), as depicted in Figure 3.

The conceptual framework applied is underpinned by the following logic. The REOs have already been 'filtered' through the DSM methodology, which considers many factors, including market share

and growth (as per the BCG approach). Thus, the intention is to inform decision makers of the additional attributes associated with each opportunity as it passes through the DSM filtering process. The authors therefore present the products being evaluated/investigated and their associated opportunities (based on the identified REOs), which are further categorised according to five existing DSM attributes, namely (i) export potential (average per opportunity); (ii) maturity (as indicated by the RCA); (iii) market diversification potential (as indicated by the number of different markets for which the REO indicates an opportunity for a specific product); (iv) relative market share (REOs in columns 1 and 2 indicating relatively low market share are associated with 'new' markets in Q2 and Q3, while REOs in columns 3 and 4 are associated with 'existing' markets for which the exporting country in question already has an intermediately-large to large market share); and (v) market growth potential (as indicated by the DSM methodology classification of the market characteristics of these potential markets).

The REOs are therefore plotted on the basis of the above dimensions, as follows (a) X-axis contains the number of potential markets (diversification); (b) the Y-axis contains relative competitiveness (more or less mature [RCA]); (c) the bubble size represents the market potential per product (aggregated across markets); (d) Q2 and Q3 contains REOs in columns 1 and 2 indicating low market share, termed 'new' markets; and (e) Q1 and Q4 contains columns 3 and 4 indicating intermediately-large to large market share, termed 'existing' markets. The outcome is therefore that the various REOs are positioned in one of the four quadrants, namely (i) quadrant 1 termed 'Brown fields' representing mature export products<sup>6</sup> with growth potential in markets already well-served by the exporting country (product-market combinations classified into columns 3 and 4 of the REO MAP<sup>TM</sup>, depicted in Figure 3); (ii) quadrant 2 termed 'Green (new) pastures' representing mature products with growth potential in new markets (product-market combinations classified into columns 1 and 2 of the REO MAP<sup>TM</sup>); (iii) quadrant 3 termed 'Blue sky' representing less mature export products<sup>7</sup> with growth potential in new markets; and lastly quadrant 4 termed 'Grey fields' representing less mature products with growth potential in markets already well-served by the exporting country.

Figure 3 illustrate both the elegance and power of the TRADE-DSM methodology - elegance in that it allows for a quick visual inspection and comparison of high-ranking REOs, and power in that it points to where, with additional investment and/or support, promising export opportunities could become true winners. To help policy makers from a diversification related to either the extensive or intensive market perspective as articulated by Brenton and Newfarmer (2007) the different margins combinations as pertains to the 4 quadrants are also indicated.

This framework was therefore applied to develop a view of all the potential product-country combinations that policy makers in Rwanda may be interested in analysing for the purposes of strategic decision making regarding industrial development and export promotion activities. The approach can therefore inform on both a product-centric or market-centric approach, as well as a combination of the two.

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<sup>6</sup> Mature export products are identified as those products with a Revealed Comparative Advantage (RCA) of greater than 1, indicated on the vertical axis in Figure 3.

<sup>7</sup> Less mature export products are identified as export products with a Revealed Comparative Advantage (RCA) of less than 1, indicated on the vertical axis in Figure 3.

## 2.4. Rwanda specific adjustments for the TRADE-DSM analysis

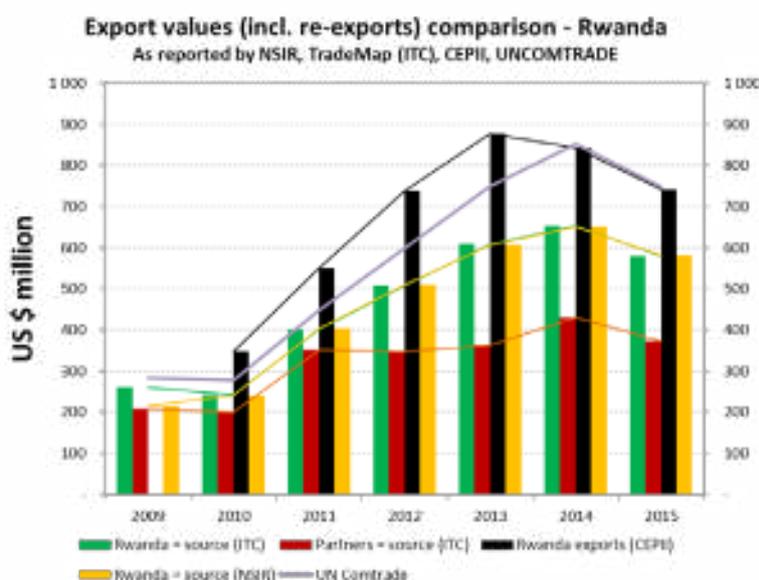
For context we provide a high level overview of the recent trends in Rwanda's trade based on the ASYCUDA<sup>8</sup> data received. Part of the reason to do so is that most of the data underlying the Hausmann *et al.* (2015) study was up to 2011 or 2010 and it provides more recent context. Furthermore, we also use this section to compare the country-reported data with information as processed and available from the International Trade Center (ITC) TradeMap (based on UN Comtrade data) and the Base Analytique du Commerce International (BACI<sup>9</sup>) data set which is a reconciled version of UN COMTRADE database provided by CEPII (Centre d'Études Prospectives et d'Informations Internationales).

We then conduct the rest of the analysis based on the BACI data for the purposes of this analysis, as this forms the basis of the TRADE-DSM methodology applied for this study.

### 2.4.1. Comparing Rwanda national reported export data with TradeMap and BACI

While the DSM modelling for Rwanda is conducted on the basis of the BACI adjusted international trade data set Figure 4 provides a high level comparison of total merchandise exports according to various sources for what is assumed to be the same information.

Figure 4: Comparison of total goods exports from different sources



Source: Authors representation from ITC, UN COMTRADE, National Institute of Statistics of Rwanda (NISR).

Evident from this analysis is that there is no 100 percent consistency between the different sources. It would seem that the NISR data and that available via the ITC Trade Map is very similar. The challenge is that when comparing what partner countries report they imported from Rwanda, the values differ to the extent that partners only report around 60 percent of Rwanda's reported export values. Add to this the fact that the Rwanda exports is supposed to be reported in FOB terms, while

<sup>8</sup> Automated SYstem for CUstoms DAta.

<sup>9</sup> See Gaulier and Zignago, 2010. For further information also [http://www.cepii.fr/CEPII/en/bdd\\_modele/presentation.asp?id=1](http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=1).

the partners imports from Rwanda is reported in CIF terms – one would expect the difference to be the other way around.

CEPII BACI data on the other side reports around 130 percent of the ITC TradeMap values – one would expect that based on the CEPII approach the value should be between Rwanda exports and partner reported imports. However, BACI is much better aligned with the latest UN COMTRADE (which is the source for both the ITC and CEPII BACI data) in the last 2 years (2014 and 2015).

To understand the problem better, we then look into the information received on Rwanda. On investigating in more detail the provide “raw” ASYCUDA data from Rwanda, the problem seems to potential be with two aspects. One, the way FOB and CIF are reported, and two the fact that there seems to be a lot of duplication in the value of exports in the way it is captured / reported.

We don’t investigate further into these discrepancies since the fundamental data set used for this analysis is the CEPII BACI data set, with some assumptions based on ratios informed by the ASYCUDA data.

#### **2.4.2. Trade barriers with respect to Rwanda specific context**

In Africa, the Middle East and Asia, trade by value with direct (border) neighbouring countries account for only around 1 and 5 percent of these regions’ trade. For Latin America the share is around 10 to 20 percent while for Europe and North America it is as high as 25–35 percent. In total only around 23 percent of global trade in value terms occurs between countries that share a land border. While this ratio varies widely across continents, it has been nearly constant over recent decades (Hummels, 2007:132). While this state of trade relates to various aspects such as development status and economies’ levels of sophistication and patterns of demand for imported goods, barriers to trade also impacts on the ability of a country or company to trade (near and far) and typically include aspects such as tariffs, non-tariff barriers, trade costs, trade time, distance, infrastructure and logistics.

According to Cuyvers *et al.* (1995:180), it holds true that for a target market being selected on the basis of size and growth does not necessarily mean that such markets can be easily penetrated. Therefore, in filter 3 of the TRADE\_DSM methodology, trade restrictions are considered to further screen the remaining possible export opportunities. Two main categories of barriers are considered in this filter, namely the degree of concentration (filter 3.1) and trade restrictions (filter 3.2) (Cuyvers *et al.*, 1995:180; Cuyvers, 1997:7; 2004:261).

In the original approach an index for ‘revealed absence of barriers to trade’ is used as a proxy in this filter. The hypothesis is that if the neighbours of the exporting country for which the model is applied could establish a relatively strong market position in a particular market, then it would not be too difficult for the exporting country to overcome trade barriers in this market (Cuyvers *et al.*, 1995:181; Cuyvers, 1997:7; 2004:262).

However, a challenge occurs where neighbouring economies are not necessarily adequate similar proxies for a specific home market (country). The first alternative treatment for filter 3.2 was in the 2007 application of the method for South Africa (see Viviers and Pearson, 2007 and Pearson *et al.* 2010) followed by a more comprehensive approach incorporating distance, transport cost, the

World Bank Logistics Performance Index, average applied tariffs per country and the frequency coverage ratio of non-tariff barriers per country (see Steenkamp *et al.* 2009; Viviers *et al.* 2009).

In the 2010 application of the DSM for South Africa (see Cuyvers *et al.* 2012) further refinements to this approach included the following elements:

- a) International shipment time (Linescape, 2010) ;
- b) International shipment cost – only ocean freight;
- c) domestic time to import (Doing Business Report from the World Bank);
- d) domestic cost to import (Doing Business Report from the World Bank);
- e) logistics performance index (Doing Business Report from the World Bank);
- f) *ad valorem* equivalent tariffs per product-country combination (Market Access Map, ITC Comtrade database); and
- g) *ad valorem* equivalent non-tariff barriers per product-country combination (Kee, Nicita & Olarrega, 2008).

The World Economic Forum's Enabling Trade Report (2014) states that "data on non-tariff barriers are very outdated and the absence of a comprehensive, rigorous and global measure of non-tariff measures (NTMs) leaves a gap in any research regarding market accessibility. The assessment of NTMs should not stop at the border, but also focus on behind-the-border measures, such as product standards, conformity assessment regulations and subsidies. The International Trade Centre (ITC) is engaged in an effort to collect data for the elaboration of an indicator on the presence of NTMs affecting international trade. Having to rely on surveys by experts in the field, the process is inevitably slow and extremely costly. The ITC is not yet in the position of providing an updated data set with a global coverage. To date, these data are available for only approximately 61 countries."<sup>10</sup>

Coverage, datedness of the information and the challenge of translation of NTMs into *ad valorem* equivalents led to the exclusion of the non-tariff barriers from the latest application of the DSM approach.

According to the OECD (2011) the globally growing interdependence of countries has often been largely attributed to lower trade barriers and to a decline in communications and transportation costs combined with technological developments. Successive rounds of multilateral trade negotiations have also contributed to lowering of tariff barriers. However, as the levels of tariffs overall declined, other trade costs have taken on greater significance. In contrast to the level of understanding as well as knowledge and stylized facts regarding lower levels of tariffs, the evolution and impact of other types of trade costs are not well informed.

It is argued that total cost of shipment (including the cost associated with of international transportation, all documentation, inland transport and handling, customs clearance and inspections, port and terminal handling and official costs) together with the tariffs charged on the product by the importing country, encapsulates the restrictive impact that time, distance, infrastructure and logistics would have on trade.

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<sup>10</sup> A recent verification with the ITC shows coverage of 90 economies, for which most information was collected for 2012 and further back, supporting the statement around datedness of information.

Further refinement of the approach emerged from this study due to the fact that Rwanda is a landlocked country. Due to this locational characteristic a more detailed land-based travel component also needed to be developed. In addition, recent findings from various different sources point to how the differential in transport costs and time impacts on determining trade flows and comparative advantage of countries (e.g. Nordås *et al.* 2006; Hummels 2007, Blyde 2010, OECD 2011 and Hummels *et al.* 2012).

Blyde (2010) finds that domestic transport (within country) costs significantly affect the prospects of exporting for a Colombian case study. The study finds that regions within the country with transport costs in the 25th percentile export around 2.3 times more than regions with transport costs in the 75th percentile, once other factors are controlled for.

On the international side another quantitative case study demonstrates how relatively lower transport cost and quicker delivery time coupled with a slightly lower unit value of the exported product has contributed to make Australia's iron ore more competitive in China than Brazil's (OECD,2011:20). Nordås *et al.* (2006) observes that "geography ... matters less when time for exports is controlled for, suggesting that geography matters partly because it is related to time. Countries can therefore to some extent overcome geographical disadvantages by reducing the behind the border time for exports." Transit time is found to be more closely correlated with freight rates than is direct maritime distance (Wilmsmeier *et al.*, 2008).

Further back in earlier research Limão and Venables (2001) found that shipping an extra 1000 kilometres by sea raises transport costs by an estimated US\$ 190 per container. When the additional distance is overland they find a much larger increase in transport costs. Overall these authors found that using distance alone as a proxy for transport costs only explained around 10 percent of its variation.

While gravity models, the "workhorses" of trade flow models, generally use distance as a proxy for transport and other trade costs, Clark (2007) and Martinez-Zarzoso and Nowak-Lehmann (2007) find that distance is a poor proxy for transport costs and incite other analysts to refrain from using distance as a proxy for such costs in gravity models. The OECD (2011) has found that distance is imperfectly correlated with transport costs, especially distance measured between the capitals of each of the two countries in a bilateral trading pair "as the crow flies". The OECD (2011) study shows that distance is in fact a highly inaccurate proxy for transport costs. In light of these suppositions, some trade analysts have started to emphasize the importance of obtaining better data on transport costs.

According to Hummels (2007) understanding modern changes in transportation costs is complex. Types of products imported and exported, transportation service intensity of such products, and mode of transport (road, rail, marine or air freight) all affect measured costs. However, two main approaches are prevalent in the literature; that of direct quotes from the shipping industry or transport and logistics operators and derived information. The derived information approach is based on the national customs data in the form of the difference between import (CIF) export (FOB) values. The import (CIF) value is divided by the export (FOB) value to obtain an indication of bilateral transport costs between an origin and destination pair. The OECD (2011) study found that CIF/FOB ratios are too imprecise to be used as a proxy for transport and insurance costs.

While detailed data on the value of imports and exports by different modes of transport are sparse, U.S. and Latin American data suggest that trade between country neighbours is mostly via modes like truck, rail and pipeline. Perhaps 10 percent of such trade gets transported via air or maritime transport Hummels (2007). In contrast the author finds that for nonadjacent trading partners, most merchandise trade moves via maritime and air modes. Traditional bulk commodities such as petroleum (including crude oil) products, coal, iron ore and grains are almost exclusively shipped via maritime cargo.

Hummels (2001, 2006, 2007) estimates the tariff (*ad valorem*) equivalent in transit is 0.8 percent per day. As an example this translates to a tariff equivalent of 16 percent on a 20 day voyage, whether by ocean or land. As such it is clear that the cost of time represents potentially a more significant barrier to trade than estimates for most trade policy variables. Hummels (2007) postulates that for each maritime travel day a supplying country is further from the importing country, the probability that the importing country will source manufactured goods from the exporting country decreases by one percentage point.

In an independent study by Djankov *et al.* (2006) the authors find that each additional day in transit reduces trade by one percent. An alternative way to interpret this is that for each additional day of transit required it is equivalent to the country distancing itself from its trading partners by around 70 kilometres. In the case of traded products that are “time-sensitive” in nature, delays have an even more direct effect. Therefore the authors find that a 10 percent increase in the relative time of moving such products results in a five percent reduction in relative exports of such products.

Added to these observations the fact that mostly remote nations with very small markets face relatively high transport costs (OECD, 2011) it becomes evident that maritime transport costs represent insurmountable barriers to trade in some cases that they represent a significant drag on most exports. Given these extremely high transport costs, these countries may need to consciously strategize to develop exports of goods with very high value to weight ratios and for which transport costs play a small role. Hausmann and Chauvin (2015) echoed this recommendation for the case of Rwanda.

Transport and related trade costs are often viewed as technologically determined and therefore resorts under non-policy barriers. Pomfret and Sourdin (2010) opinions that port infrastructure, corrupt customs officials and other costs clearly are policy-related, while other variables may be indirectly policy related. For example levels of competition among shippers may be due to low volumes or due to non-implementation of anti-monopoly policy or a combination. For all countries and companies trade risks always exist, but according to these authors country variations are more related to institutions such as poor law enforcement. Even with ideal institutions, of course, some trade costs will remain because there are real costs to moving goods over any distance.

Due to the importance of shipping costs (both domestic and international marine as well as land-based transits, especially for landlocked countries) the DSM approach for this study therefore was extended to compile detailed routing tables and mode switches (only marine versus road trucking) to all major country destinations, including border crossings. This has the effect of creating a relative cost index that not only considers the international (marine) shipping cost and domestic cost to import (as reported by the Doing Business Report 2016 which only considers activities, time and cost at the port of entry and does not include transport within or between countries between such port

and transits to the destination). In terms of deviance from the original methodology, it is only relevant to discuss changes to the trade restrictions (filter 3.2) in the case of Rwanda, as the rest remains the same as described in Cuyvers *et al.* (2012).

The DSM approach therefore attempts to ensure that the rest of aspects such as tariffs, trade costs, trade time, infrastructure and logistics (some differentiation between road truck and marine freight) are still considered, not as explanatory variables but rather as part of the filtering process in order to ensure most realistic opportunities are identified. Other research as demonstrated in this section points to the explanatory power (or not with reference to distance and costs) of these elements.

As the unit of determining the costing for land and maritime transport a shipment of 15 metric ton (or 20-foot container) of automotive parts<sup>11</sup> (heavy) is used that is valued at US\$ 50 000 (for comparability, as the latest Doing Business Report 2016 uses US\$ 50 000). The origin of routing transactions assumed is Kigali, Rwanda. To arrive at an *ad valorem* equivalent international shipping cost, the cost to import into each individual target market was divided by the \$US 50 000 value of the cargo. The purpose of this *ad valorem* conversion is to get a relative answer, as no values are explicitly related to the nominal value assigned (it is purely a common denominator). While a difference in this value will result in nominal differences in *ad valorem* percentages, it will not result in overall relatively different outcomes from the DSM approach.

To this effect the latest iteration of improvements on the approach therefore not only considers trade cost as a measure of trade barriers but includes (i) tariffs, (ii) international shipping cost and both domestic and international transit times as well as transit country border cost approximations and (iii) the domestic cost to import. These are each calculated as an *ad valorem* equivalent (percent) on the value of the goods and added together to arrive at the total *ad valorem* equivalent of trade cost per product-country combination.

#### **2.4.2.1. *Ad valorem* equivalent tariffs per product**

The International Trade Centre's Market Access Map (MacMap) was used to gather tariff information on HS 6-digit product level for all potential product-country combinations from Rwanda's perspective. *Ad valorem* equivalent tariffs were used due to the difficulty of comparing specific duties (e.g. five Euros per kilogram of sugar) with *ad valorem* tariffs (e.g. 5 percent of the total value of the imports) across countries.

According to the IMF (2005:14), the MacMap database is unique and extremely accurate<sup>12</sup> to measure the tariff levels faced by individual country exports due to the fact that it accounts for bilateral, regional and preferential tariff systems. The MacMap database is also specifically suitable for this study due to the fact that the data are available on a HS 6-digit level and also considers different tariff regimes such as Most Favoured Nations (MFN) and specific agreements such as between EAC members and COMESA members.

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<sup>11</sup> In order to be closely comparable with the World Bank Doing Business approach using a standardized shipment of 15 metric tons of containerized auto parts (HS 8708).

<sup>12</sup> The authors have however found that there are a number of HS-6 digit codes with data in the BACI data set that do not have entries in the ITC MacMap data. The treatment of these instances is covered under the tariff section.

#### **2.4.2.2. International shipping cost and domestic and international transit time per country**

In the general empirical trade literature trade costs are determined to be a main determinant of the amount of trade between countries (see e.g. Limão and Venables, 2001). According to Bosker and Garretsen (2007) trade costs are also a crucial element of new economic geography (NEG) models. The authors state that the size of trade costs crucially determines the relevance of market access and thereby of inter-regional spatial interdependencies. One of the challenges around international shipping costs is that there is no single consistent and “authoritative” source of information to use for research and related purposes. This is not only due to the fact that there are many players in the market determining prices, but also a function of various variables impacting on pricing e.g. partner country trade imbalances; infrastructure capabilities and availability; and risks such as piracy and weather.

Directional imbalance in trade between trading partners implies that many carriers have to backhaul empty containers on their return voyages. Pricing of shipping in one direction is therefore not the same as that of the return trip.

Much literature exists on the importance of port infrastructure and its implications for maritime as well as inland transport and time costs. Port infrastructure is a key building block of transport costs and also influences aspects such as the size of ship that can enter any given port plus the time needed to load / unload ships.

Piracy is a very real threat to ship owners and mariners in particular parts of the ocean. While the numbers of ships actually attacked may seem minimal, their potential risk cause shipping rates to increase as a result of increased insurance as well as additional costs due to security measures on the ships themselves.

The OECD has a project on maritime transport costs<sup>13</sup> to collection data that combines maritime transport cost data from a variety of different sources. The challenge is that this data is only available for a limited number of countries (Argentina, Australia, Brazil, Bolivia, Chile, Colombia, Ecuador, New Zealand, Paraguay, Peru, United States and Uruguay) and that the data is also dated (the data set is only available for the period 2003 to 2007).

For these reasons this study had to follow a somewhat “eclectic” approach and very manual process to compile routing tables, distances, travel times and associated costs for Rwanda into all the destinations in the world for which data international trade and economic was available.

Information sources for cost estimates, route options and scheduling used in this process includes online sources such as World Freight Rates<sup>14</sup>, Searates.com<sup>15</sup>, Mediterranean Shipping Company (MSC)<sup>16</sup>, Maersk, CMA CGM<sup>17</sup>, Pacific International Lines<sup>18</sup>, the Logistics Cluster<sup>19</sup> and Google Maps<sup>20</sup>.

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<sup>13</sup> See <https://stats.oecd.org/Index.aspx?DataSetCode=MTC>.

<sup>14</sup> See <http://www.worldfreightrates.com/en/freight>

<sup>15</sup> See <https://www.searates.com/>

<sup>16</sup> See <https://www.msc.com/routefinder>

Furthermore Rwanda's own detailed international trade data<sup>21</sup> was analysed and used to inform initial routing form within the country, border exit points and neighbouring countries. South Africa's detailed import statistics including border entry points from the South African Revenue Services' department of Customs and Excise were used to determine most probable flows from Rwanda into Southern Africa.

More specific information regarding routing costs and times within the East Africa Northern and Central Corridors were obtained from the latest reports published by Central Corridor Transit Transport Facilitation Agency (CCTTFA, 2016) and the Northern Corridor Transit and Transport Coordination Authority (NCTTCA, 2016).

While this process may not yield accurate actual commercial costs for actual shipment purposes, by comparing various sources with each other the authors have confidence in the relative outcome from routing, cost and time estimates from Rwanda to different parts of the world. This approach needs to be contextualised relative to the purpose of the DSM - to have a mechanism for relative discrimination between different options, not absolutely accurate commercial values in absolute real world terms.

The drawback of this approach is however that most of the information is only relevant relative to the specific home market at a specific point in time and is not created for all routes between all trading partners for general international trade and transport studies.

Examples of actual routes and outcomes are discussed in the sections to follow.

#### **2.4.2.3. Domestic cost to import per country**

The World Bank's cost to import estimates (Doing Business Report, 2016) information from the Trading Across Borders section was used to obtain the domestic cost associated with transporting and clearing goods for all the target countries under investigation.

These "cost to import" estimates include the cost associated with all documentation, inland transport and handling, customs clearance and inspections, port and terminal handling and official costs (no bribes) (The World Bank, 2014). In calculating the cost to import for each country, the fees levied on a 20-foot container of general cargo valued at US\$50 000 were used. The cost does not include tariffs or costs related to ocean transport. Although Doing Business collects and publishes data on the time and cost for domestic transport, it does not use this data in the calculations, hence the need to construct routing tables and cost estimates for both domestic and international road truck transport as well as maritime shipping routes and costs.

#### **2.4.2.4. Creating a composite relative market access index**

The total *ad valorem* equivalent percentage of the cost to transport goods from the harbour in the exporting country to the final destination in the importing country is calculated by adding

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<sup>17</sup> See <https://www.cma-cgm.com>

<sup>18</sup> See <https://www.pilship.com/en-pil-pacific-international-lines/1.html>

<sup>19</sup> See <http://www.logcluster.org/>

<sup>20</sup> See <https://www.google.co.za/maps>

<sup>21</sup> Provided by Mr Victor Steenberg, country economist for Rwanda, International Growth Centre.

(unweighted) the *ad valorem* equivalent tariff per product-country combination to the *ad valorem* equivalent international shipping cost, the *ad valorem* equivalent (based on what we term the “Hummels *ad valorem* equivalent assumption” of 0.08 percent per 24 hrs) international shipping time and domestic cost to import.

Therefore the composite relative market access index  $MAI_{ij}$  constructed from the home market  $i$  (exporting country) for each potential target market  $j$  (importing country) and HS6-digit product ( $k$ ) in the world for which economic and international trade data exists and for which the relevant tariff and shipping and time costs have been compiled can be expressed as:

$$MAI_{ijk} = (avet \times AVET_{ijk} + aves \times AVES_{ij} + aveh \times AVEH + aved \times AVED_j) \leq C_{MAI} [eq. 1]$$

The current assumption applied  $avet = aves = aveh = aved = 1$  and where:

$AVET_{ijk}$  = *ad valorem* equivalent tariff for home market (exporter)  $i$  into target market (importer)  $j$  for product  $k$ ;

$avet$  = weighting coefficient for  $AVET_{ijk}$  overall for all combinations in population of possibilities;

$AVES_{ij}$  = *ad valorem* equivalent international shipping cost for home market (exporter)  $i$  into target market (importer)  $j$ ;

$aves$  = weighting coefficient for  $AVES_{ij}$  overall for all combinations in population of possibilities;

$AVEH$  = Hummels *ad valorem equivalent* time cost constant assumption overall for all combinations in population of possibilities;

$aveh$  = weighting coefficient for  $AVEH$  overall for all combinations in population of possibilities;

$AVED_j$  = *ad valorem* equivalent domestic cost to import for target market (importer)  $j$ ;

$aved$  = weighting coefficient for  $AVED_j$  overall for all combinations in population of possibilities;

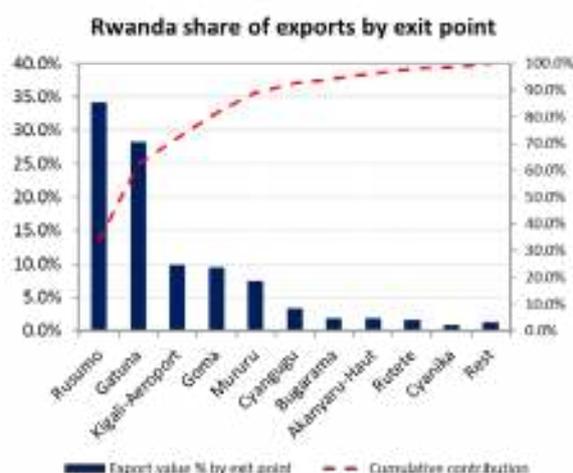
$C_{MAI}$  = Pareto informed cut-off point for the relative market access index (MAI);

All product-country combinations that passed filter 3.2 therefore had to conform to a cut-off point (C) for transport costs informed by the classic eighty-twenty Pareto principle. Therefore such product-country combinations must have an *ad valorem* equivalent percentage of transport cost of less than or equal to the 80th percentile of the total *ad valorem* equivalent trade costs over the total population of product-country combinations that passed filter 2.

### 2.4.3. Rwanda national reported export data informing export flow assumptions

Based on analysis of information obtained for Rwanda’s detailed imports and exports, it is evident that more than 80 percent of Rwanda’s export in value terms flows through four border exit points namely Rusumo (Tanzania border), Gatuna (Uganda border), Kigali-Aeroport (international) and Goma (Border with the Democratic Republic of the Congo (DRC) border). In total value terms just less than 10 percent of exports leave the country by air, while the rest is mainly on land and maritime once through the ports of Mombassa (Kenya) and Dar es Salaam (Tanzania).

Figure 5: Rwanda exports major border exit points



Source: Google Maps constructed from CCTFA (2016) and NCTTA (2016) – not to scale. Shares calculated from Rwanda’s ASYCUDA data received.

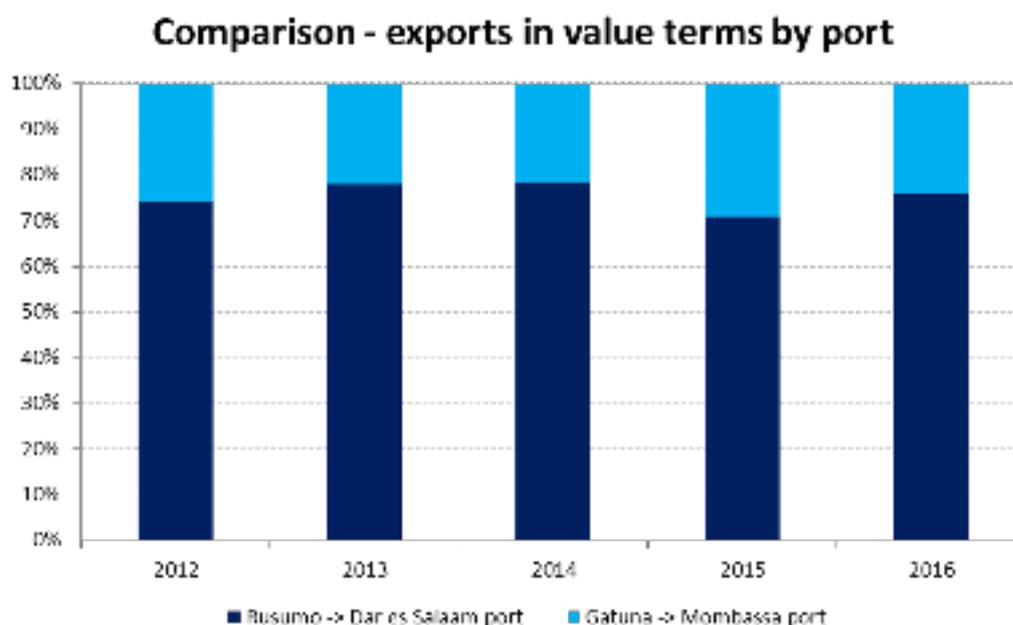
Based on the assumption that exports via Rusumo destined for countries other than Burundi, the DRC, Tanzania or Kenya can either flow to Dar es Salaam port, or by road to neighbouring countries to the South (Botswana, Malawi, Zambia, Zimbabwe) an estimate of the export in value terms that is transported via the Dar es Salaam port can be derived.

Similarly, for exports leaving the country through Gatuna not bound for Uganda, the DRC, South Sudan, Tanzania or Kenya it is assumed that these exports will travel via maritime transport from Mombassa.

Based on these assumptions it is evident that while various other sources<sup>22</sup> indicate oscillation of overall trade of cargo in tonnage terms between Mombassa and Dar es Salaam, for Rwanda it seems that in value terms Dar es Salaam over time has handled between 70 and 80 percent of Rwanda’s exports on a consistent basis.

<sup>22</sup> See e.g. “East Africa: Dar es Salaam and Mombasa Ports Fight for Rwanda Business”, <http://allafrica.com/stories/201309161873.html> - 13 SEPTEMBER 2013 [accessed June 25 2017]; and “Mombasa port loses business as exporters opt for Dar es Salaam”, <http://www.nation.co.ke/business/infrastructure/Mombasa-port-loses-business-as-exporters-opt-for-Dar-es-Salaam/1959776-1959816-90rwus/index.html> - 29 August 2013 [accessed June 25 2017]; and “Tanzania traders ditch Dar port for Mombasa”, [http://www.the-star.co.ke/news/2016/04/07/tanzania-traders-ditch-dar-port-for-mombasa\\_c1317331](http://www.the-star.co.ke/news/2016/04/07/tanzania-traders-ditch-dar-port-for-mombasa_c1317331) – 7 April 2016 [accessed June 25 2017]; and “Drought, poll fears take toll on East African trade”, <http://www.businessdailyafrica.com/economy/Drought--poll-fears-take-toll-on-East-African-trade/3946234-3991546-hg0mo0z/index.html> - 29 June 2017 [accessed June 30 2017].

Figure 6: Rwanda exports major border exit points



Source: Shares calculated from Rwanda's ASYCUDA data received.

Based on this information of Rwanda's international logistics and maritime shipping flows is therefore assumed to be mainly through the port of Dar es Salaam for the purposes of this study. With the model constructed it is possible to investigate the impact of alternative scenarios in this regard, but the author is of the opinion that this will have an insignificant impact on the overall results, while it may have more of an impact for the economies of Kenya and Tanzania.

#### 2.4.4. Treatment of landlocked countries

While most of the countries in the world are serviced by maritime ports, currently 48 countries (including four partially recognized states) are completely surrounded by at least one other country (e.g. Lesotho in South Africa). In this context Rwanda is also totally landlocked. With the exception of two countries in South America (Bolivia and Paraguay) the rest of these 46 countries are located in Africa, Europe, and Asia. It is therefore key to account for this dimension of international transport costs to specific target markets (importing countries).

Due to the importance of shipping costs (both domestic and international marine as well as land-based transits, especially for landlocked countries) the DSM approach for this study therefore was extended to compile detailed routing tables and mode switches (only maritime versus road trucking) to all major country destinations, including border crossings.

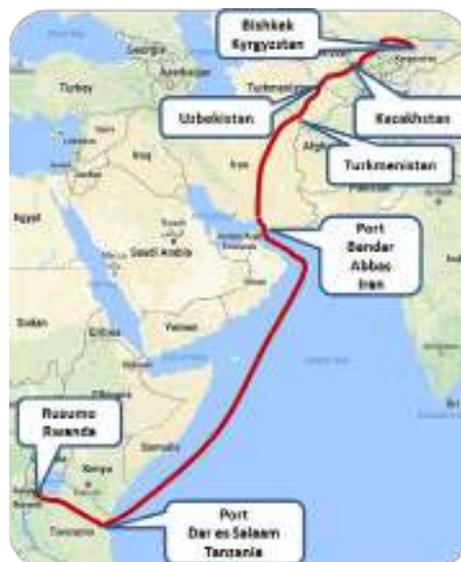
The implication for such landlocked countries is that transport costs in general are higher and modal changes in the transport of goods adds both time and costs to the overall transport costs into such markets. An example from Dar es Salaam to Belarus is shown in Figure 7.

**Figure 7: Example of landlocked country routing**



Source: Searates.com

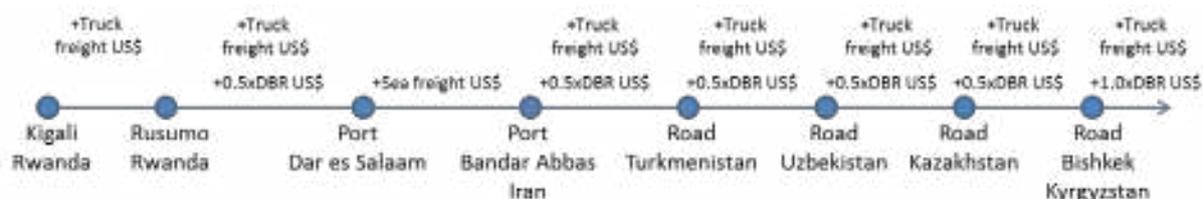
**Figure 8: Actual example of costing elements applied routing**



Source: Google Maps, Searates.com, author annotations

Figure 8 and Figure 9 demonstrate the approach that was applied to construct detailed routing, time, border crossing and mode switches with associated cost and time implications. These adjustments have the effect of creating a relative cost index that not only considers the international (maritime) shipping cost and domestic cost to import (as reported by the Doing Business Report 2016 which only considers activities, time and cost at the port of entry and does not include transport within or between countries between such port and transits to the destination), but also voyage and transit duration and cost implications.

**Figure 9: Logistics routing chain for costing example**



Source: Authors

Evident from Figure 8 the routing from Kigali in Rwanda to Bishkek in Kyrgyzstan transits 5 countries through 7 border entries/exits, 3 transport mode switches (from road to maritime and back to road). The assumption for import costs into Kyrgyzstan applied is from the Doing Business Report (2016). However, transit costs through the various countries on the route are not generally available. The approach applied was to make use of a weighted<sup>23</sup> cost of import (from the Doing Business Report) into each of the transit countries.

<sup>23</sup> For an initial assumption a mechanistic weight of 0.5 is applied. More research around this element may be required for future refinements. In the case where countries either were neighbours of Rwanda's or part of the EAC or COMESA, this weight was set to 0.1 only to reflect the fact that administrative costs within the common

While this may not be 100 percent accurate, it does provide for a realistic mechanism to differentiate cost impacts between e.g. landlocked and non-landlocked target countries. The relative difference between transits for landlocked countries within the European Union (much lower drag) versus e.g. Middle Africa or Central Asia is also reflected well with this approach.

### 2.4.5. International logistics and shipping costs as applied for the Rwanda case

In terms of compiling the components of the composite relative market access index, assumptions informed by most probable transport routes (maritime and road truck) needed to be formulated.

While the following illustrative routing maps provide a general indication of routes from Dar es Salaam to all countries in the world, in the actual model a specific route for each and every possible target market was applied. In total therefore 231 individual routes were constructed.

Figure 10 shows the typical maritime leg of the routing from Dar es Salaam to most Western and Northern European countries, namely:

- Austria
- Belgium
- Belgium-Luxembourg
- France
- Germany
- Netherlands
- Denmark
- Estonia
- Finland
- Greenland
- Iceland
- Ireland
- Latvia
- Lithuania
- Norway
- Sweden
- United Kingdom

**Figure 10: Most probable maritime routing from Dar es Salaam to Western and Northern Europe**



Source: Searates.com

The average route distance from Kigali in Rwanda for this group of countries is around 13 494 kilometres and 68 days total travel time.

While Switzerland is classified as geographically located in Western Europe, this country is assumed to be accessed from Southern Europe via Italy (see Figure 160 in appendix section 9.5.1). The average route distance for this group of countries from Kigali in Rwanda is around 9 924 kilometres and 48 days total travel time.

A high level overview of the aspects considered in this context is provided in Appendix 9.5 for the rest of the different regions, as well as more detail focused more specifically on Rwanda's neighbouring countries and Southern Africa.

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economic areas should be providing a lower cost for member countries' trade with each other versus trade from non-member countries.

## 2.4.6. Global tariffs applicable to exports from Rwanda

Various studies confirm that market access matter and that, for example, GATT membership, access through PTAs and GSPs, and geographic proximity to major markets all lead to an increase in export diversification (Davis and Weinstein, 2003) and Melitz and Ottaviano (2008) highlights the potential pro-competitive effects often associated with episodes of trade liberalization.

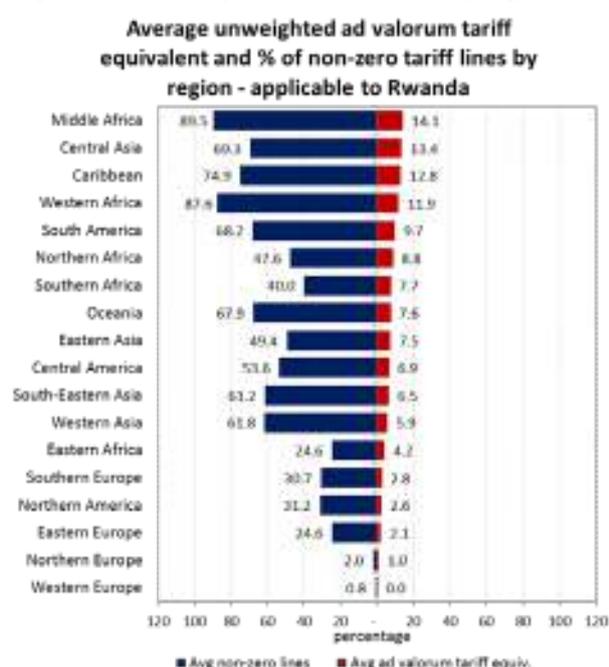
The last cost component in terms of the composite relative market index is therefore that of import tariffs faced by exports from Rwanda into different target markets. While Rwanda is a member of the EAC and COMESA, various other agreements also inform the levels of tariffs that some or all of Rwanda's export products will face. As discussed in a preceding section, information used for this purpose is the International Trade Centre's Market Access Map (MacMap) *ad valorem* equivalent tariff rates. The purpose of this study is not to include detail on all the relevant applicable trade agreements and rules of origin (for more information on this refer to the International Trade Centre's Market Access Map web site).

An analysis based on the information obtained from MacMap from Rwanda's perspective from all possible trading partners in the world for each HS 6-digit product level occurring in the BACI data set used for the modelling finds that there a number of country-product lines for which the ITC MacMap data has no entries. The approach to handle this was to revert to tariffs calculated based on average (unweighted) higher level aggregates. So first a set of HS 4-digit unweighted average tariffs for all country-product combinations were calculated, followed by a HS 2-digit (chapter) unweighted average tariffs. For any HS 6-digit product level country-product entries in the BACI data that had no corresponding entries in the ITC MacMap data therefore a high level hierarchy average tariff was obtained from the calculated HS 4-digit unweighted average tariffs. In the event that no HS 4-digit unweighted average tariffs existed, the HS 2-digit (chapter) unweighted average tariffs as applied.

The outcomes were aggregated by region for illustrate discussion purposes, as in total there are more than 1 million country-product HS 6-digit product level combinations. Figure 11 provides two summarised pieces of information relevant to this analysis.

The first is the number of HS 6-digit product level on which a tariff exists (for any non-zero item irrespective of the value). Evident is that Middle Africa has the largest number of lines with an associated tariff at 89.5 percent of all tariff lines, followed by Western Africa at 87.6 lines. The second is the unweighted average tariffs for each region. In the case of Middle Africa, again countries in this region not only have on average the most tariff lines, but also the highest *ad valorem* equivalent tariff equivalent (unweighted) at 14.1 percent. Northern and Western Europe has the lowest both in terms of number and average percentage.

Figure 11: Tariff equivalent outcomes by region



Source: Authors' calculations from ITC MacMap *ad valorem* equivalent data.

### 2.4.7. Composite relative market access index outcomes for Rwanda

The outcomes obtained based on the data, assumptions and calculations as discussed in the preceding sections are then applied to calculate equation 1 - the composite relative market access index  $MAI_{ij}$  constructed from the home market  $i$  (exporting country) for each potential target market  $j$  (importing country) and HS6-digit product ( $k$ ).

The outcomes averaged by region for the *ad valorem* equivalent international shipping cost for home market (exporter)  $i$  into target market (importer)  $j$  ( $AVES_{ijk}$ ); the Hummels *ad valorem* equivalent time cost constant assumption (AVEH) and the *ad valorem* equivalent domestic cost to import for target market (importer)  $j$  (AVED<sub>j</sub>) are shown in Figure 12. Evident is that Eastern Africa on average in absolute terms exhibits the lowest overall cost component for the index.

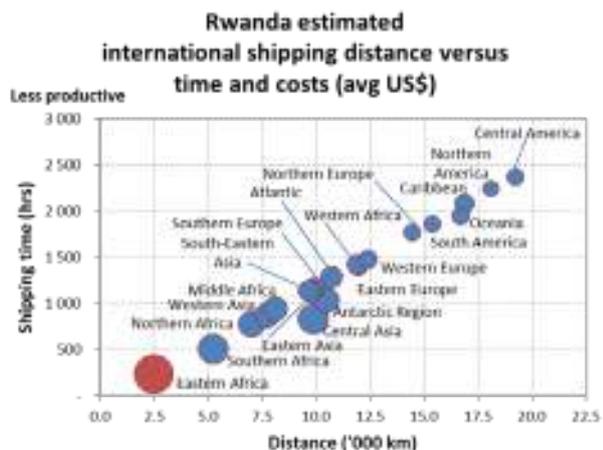
Figure 12: Average overall cost outcomes by region



Source: Authors' calculations

While the absolute average cost for a shipment from Kigali into the East African region is the lowest overall, Figure 13 clearly shows that in terms of distance covered versus time and cost spent, the East Africa region in relative terms (size of the bubble) are the most expensive to export to (around 19.67 US\$ per hour).

Figure 13: Average distance, time and cost per hour relationship



Source: Authors' calculations

On the opposite end of the scale, while the Central American region, North America and the Caribbean are some of the furthest regions from Rwanda, the relatively lower rates of logistics services in these areas plus lower import costs and time yields the cheapest or most productive shipments in terms of relative costs (around 3.94 US\$ per hour).

Figure 14: Overall logistics average time productivity by region



Source: Authors' calculations

The relative relationship in terms of cost per hour and distance is illustrated in Figure 14. The relative difference in magnitudes is better observable in this representation.

However, as mentioned in section 2.4.5 with the example of Mongolia, it must be kept in mind that there can be significant variances of these outcomes within regions and these illustrations simply serve to provide some contextual understanding of the implications and outcomes of the modelled approach.

The final element to be added is therefore the *ad valorem* equivalent tariff for home market (exporter) *i* into target market (importer) *j* for product *k* ( $AVET_{ijk}$ ).

Evident is that overall the import tariff informed component of the *ad valorem* equivalent relative market access index is relatively small compared to the international administrative and shipping logistics cost and time component.

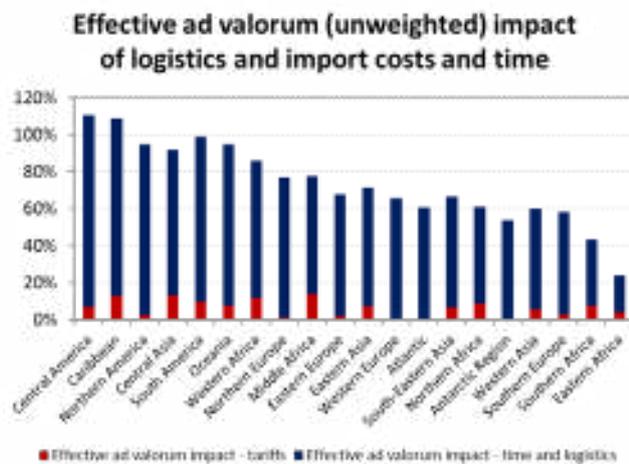
In layman’s terms the index implies that for a container with contents valued at 50 000 US\$ shipped from Kigali, the effective cost to transport such a container to Central America will equate to around 105 427 US\$, while the same container will have an effective *ad valorem* equivalent cost of around 61 986 US\$ on average in the East African region.

So it will be nearly double the cost to take the container to Central America relative to somewhere in East Africa, considering all the various cost direct and proxied cost elements associated with all documentation, inland transport and handling, customs clearance and inspections, port and terminal handling and official costs, international road and maritime shipping and the time value of the consignments (Hummels constant).

However, it must be kept in mind that these are relative costs to differentiate potential destination market-product combinations for modelling and strategy information purposes – not actual commercial rates that will be applicable for a similar real world transaction.

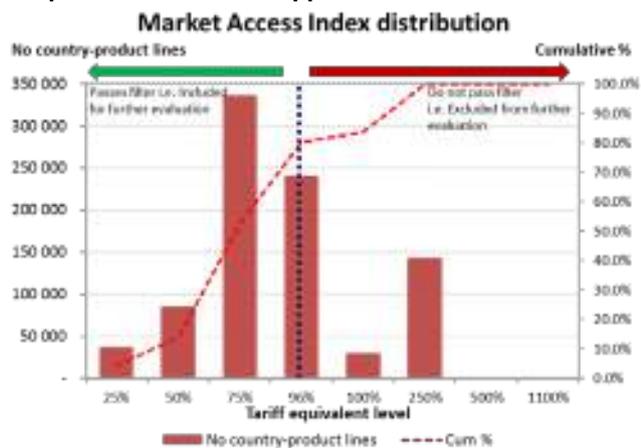
The last element in the equation is then the Pareto informed cut-off value ( $C_{MAI}$ ) which is calculated (see Figure 16) across the population of all HS 6-digit product level country-product lines that could be considered to be exported from Rwanda to the rest of the world (irrespective of Rwanda’s current production and export capabilities). To this effect the DSM approach differs from the product space approach in that all potential is evaluated based on demonstrated import demand for all countries and all products. Specialisation in terms of RCA and other parameters are used as filters to help define interpretation of outcomes – we do not exclude options with RCAs < 1 as in the case of the product space approach. Based on the set of assumptions as explained and described in this section, the Pareto informed cut-off value for Rwanda is therefore  $C_{MAI} = 0.9625$ .

**Figure 15: Overall *ad valorem* impact of the relative market access index**



Source: Authors’ calculations

**Figure 16: Market Access Index outcomes distribution and pareto cut-off value applied**



Source: Authors’ calculations

Therefore all HS 6-digit product level country-product lines that will pass the accessibility filter (sub-filter 3.2 see section 2.1) have an accessibility tariff equivalent index of 96.25 percent or less. This translates into around 700 000 HS 6-digit product level country-product lines that meet this criterion. The median accessibility tariff equivalent index is around 74 percent, while the maximum is in excess of 1000 percent. While in Figure 15 it was shown that on average the import tariff informed component of the ad valorem equivalent relative market access index is relatively small compared to the international administrative and shipping logistics cost and time component, in exceptional cases the reverse holds. There are more than 140 000 HS 6-digit product level country-product lines (16.4 percent of the total population of product-country lines) that have an accessibility tariff equivalent index of 250 percent or more, which would mean in such instances that the import tariff informed component far outweighs the international administrative and shipping logistics cost and time component.

A practical example is that of e.g. Fiji in Oceania. While the international administrative and shipping logistics cost and time component for Fiji is 89.5 percent, for selected HS 6-digit products Fiji has 1 329 HS 6-digit product lines with import tariffs in excess of 100 percent, and 15 in excess of 250 percent. Examples are provided Table 1.

**Table 1: Examples of tariffs applied by Fiji**

<p><b>Product:</b> 22072010 - Undenatured ethyl alcohol of an alcoholic strength by volume of 80% vol or higher; ethyl alcohol and other spirits, denatured, of any strength : Ethyl alcohol and other spirits, denatured, of any strength : Of an alcoholic strength by volume of 57.12% vol or less  <b>Partner:</b> Rwanda  <b>Data source:</b> ITC (MAcMap)  <b>Year:</b> 2013  <b>Nomenclature:</b> HS Rev.2012  <b>AVE Methodology:</b> AVE based on the World Tariff Profile (WTP)</p>	<p><b>Tariff regime</b>  MFN duties (Applied)    Applied tariff (as reported)  \$52.01/lt    Applied tariff (converted)  28971.13 \$/Ton    Total ad valorem equivalent tariff  1,000.00%</p>
<p><b>Product:</b> 24022000 - Cigars, cheroots, cigarillos and cigarettes, of tobacco or of tobacco substitutes : Cigarettes containing tobacco  <b>Partner:</b> Rwanda  <b>Data source:</b> ITC (MAcMap)  <b>Year:</b> 2013  <b>Nomenclature:</b> HS Rev.2012  <b>AVE Methodology:</b> AVE based on the World Tariff Profile (WTP)</p>	<p><b>Tariff regime</b>  MFN duties (Applied)    Applied tariff (as reported)  \$169.14/Kg or 1000 cigarettes. whichever is the greater    Applied tariff (converted)  94216.05 \$/Ton but not less than 0.09 \$/Ton    Total ad valorem equivalent tariff  814.71%</p>

Source: ITC Market Access Map

### 3. Skill and technology intensity

A key insight for industrial policy making flowing from more recent research in the international trade research environment is that policy makers have to be aware that it also does matter “*what*” specifically the economy produces and “*how*” it produces. Trade can help stimulate growth but this depends on what countries export rather than on how much they export (UNDESA, 2010). Various studies have informed this question and one of the better known studies on this topic is that of Hausmann *et al.* (2007).

While the benefits of international trade are often stressed, the more complex question of what types of exports are most beneficial for human capital accumulation is empirically investigated by Blanchard *et al.* (2017). The “*how*” the economy produces question also has some profound implications. In a study published by UNCTAD (Basu and Das, 2011) focusing on export structure and economic performance in 88 developing countries (during the period 1995–2007), the outcomes supported the notion that, in general, higher levels of skill- and technology-intensive manufactures (as opposed to lower) could help increase GDP per capita in developing countries (i.e. moving up the value chain).

The research also supported the view that countries with higher quality export products together with better institutional quality, human capital and financial markets are in a better position to derive benefits from trade integration and economic policies than countries with low skill- and technology-intensive products, weak institutional quality, low levels of human capital and a lack of financial resources. Blanchard and Olney (2017) further demonstrate that growth in less skill-intensive exports depresses average educational attainment while growth in skill-intensive exports has the opposite effect.

To assist in understanding this dimension of opportunities identified with the DSM methodology, the same approach in terms of mapping skill- and technology intensive export products based on the initial work<sup>24</sup> by Basu *et al.* (2011) is applied as an additional dimension. The classification considers the mix of different skill, technology, capital and scale requirements at the final product stage. Based on this approach the Harmonized System (HS) trade data<sup>25</sup> in this case at the 6-digit level is mapped in order to identify products in terms of six different levels: Non-fuel primary commodities (A), Resource-intensive manufactures<sup>26</sup> (B), Low skill- and technology-intensive manufactures (C), Medium skill- and technology intensive manufactures (D), High skill- and technology intensive manufactures (E) and Mineral fuels (F).

For manufacturing a relatively detailed classification can be achieved on this basis, however the underlying UNCTAD classification used designates all industries in the Agricultural sector as “Non-fuel primary commodities”. We have not attempted to distinguish more detail for agriculture in this regard; therefore agricultural industries are treated as homogenous and no separate more or less skill-intensive agricultural exports are indicated. This is a potential area for future refinement.

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<sup>24</sup> Also available from the World Bank (see <http://mec.worldbank.org>).

<sup>25</sup> Data obtained from the International Trade Centre Trade Map online data at <http://www.trademap.org>.

<sup>26</sup> Resource intensive products according to the UNCTAD classification are products associated with e.g. tobacco, textiles (wearing apparel), certain paper, furniture (including made from wood), non-fuel petroleum products, basic metals and non-metallic mineral products (other mining).

#### 4. Contextual analysis – overview of Rwanda’s import and export trends

This section provides a brief contextual overview of Rwanda’s more recent trade developments based on the CEPII BACI data set used for the underlying modelling and analysis. For purposes of determining whether any major structural shifts have developed since the Hausmann *et al.* (2015) evaluation we compare the structural make-up of Rwanda’s trade in 2010 with that of 2015. This provides for contextualisation of developments over the 5 year period since the Hausmann *et al.* (2015) evaluation was conducted.

While the DSM approach provides information at the HS 6-digit product level, the overview provided is based on SITC4 for comparative purposes.

Evident from Figure 17 is that Rwanda is a net importer, with the trade balance having worsened between 2010 and 2012, after which it seem to have stabilised. Since 2013 the ratio of imports to exports is more than 240 percent.

The change in export shares by major SITC4 section is shown in Figure 18 in terms of 2010 versus 2015.

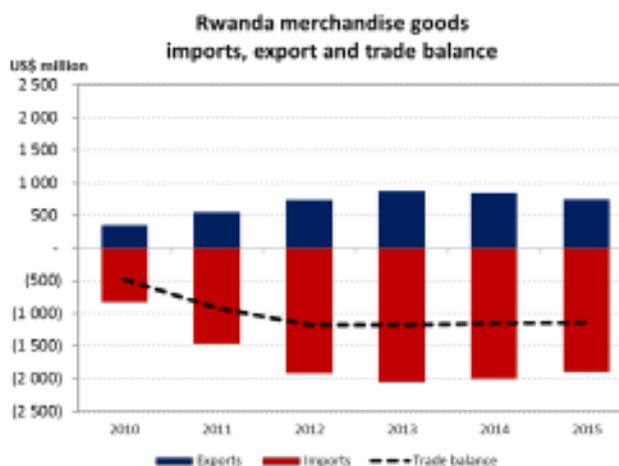
Notably Crude materials, inedible, except fuels (S2), Manufactured goods (S6) and Food and live animals (S0) as well as Beverages and tobacco (S1) have shown declines in contribution to overall exports.

Crude materials, inedible, except fuels (S2) lost its place as largest export group with a decline of 15.8 percentage points, from 48.5 percent down to 32.8 percent.

In terms of increased shares Mineral fuels, lubricants and related materials (S3), Miscellaneous manufactured articles (S8), Animal and vegetable oils, fats and waxes (S4) and Machinery and transport equipment (S7) how shown relative increases in the overall basket of exports for Rwanda between these two years.

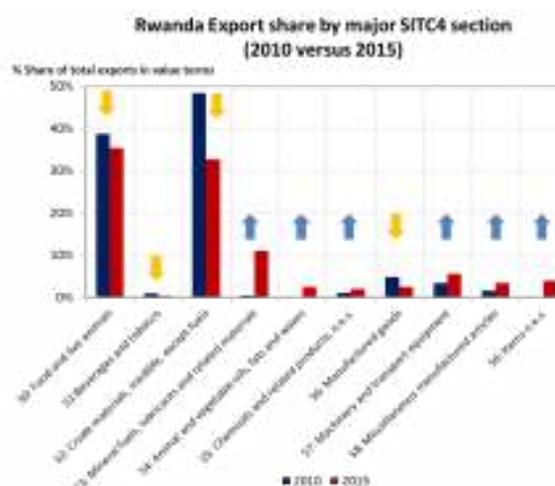
Mineral fuels, lubricants and related materials (S3) have shown the largest relative increase – from 0.5 percent up to 11.1 percent (a 10.6 percentage point increase).

**Figure 17: Rwanda total trade and trade balance (2010-2015)**



Source: Authors’ calculations based on BACI data

**Figure 18: Rwanda change in export shares by SITC4 main section (2010 versus 2015)**



Source: Authors’ calculations based on BACI data

On the import side, Machinery and transport equipment (S7) is the largest group of imported products in value terms and also has shown the largest growth in share of imports over the period.

Manufactured goods (S6) follows and while Chemicals and related products, n.e.s. (S5) is the third largest group, it has experienced the largest decrease in share of total imports of the period (from 22.6 down to 14.1 percent, a decrease of 8.5 percent).

The composition of Rwanda's 2015 trade balance is provided in Figure 20. Evident is that the largest contributor to the overall negative trade balance is Machinery and transport equipment (S7), followed by other Manufactured goods (S6) and Chemicals and related products, n.e.s. (S5).

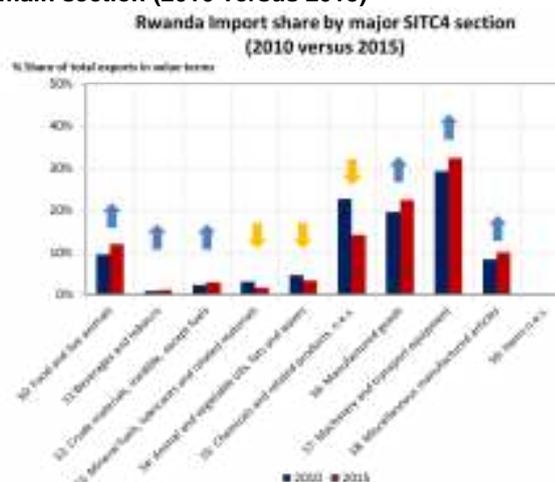
Crude materials, inedible, except fuels (S2), Mineral fuels, lubricants and related materials (S3), Food and live animals (S0) and Items n.e.s. (S9) are next foreign exchange earners for Rwanda.

On closer inspection it would seem that petroleum related products dominate this item and is mainly imported and then re-exported in the region. The fuel storage capacity the government has jointly built with the private sector has made Rwanda attractive to oil marketers who store the fuel before exporting it to Eastern Democratic Republic of Congo and Burundi.<sup>27</sup>

However, as per the Hausmann *et al.* (2015) analysis it is evident that Rwanda specialises in “non-complex” and low-value added export products.

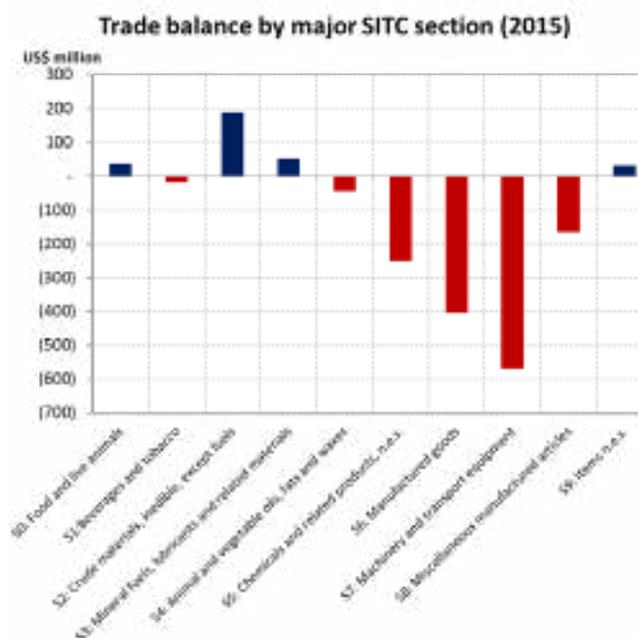
These observations are further confirmed when the merchandise exports from Rwanda is classified according to skills and technology intensity as explained in section 3.

**Figure 19: Rwanda change in export shares by SITC4 main section (2010 versus 2015)**



Source: Authors' calculations based on BACI data

**Figure 20: Composition of Rwanda's trade balance (2015)**



Source: Authors' calculations based on BACI data

<sup>27</sup> Rwanda's fuel storage capacity has grown from 74 million liters in 2015 to 96 million liters in 2016 after Societe Petroliere added a 22 million liters fuel storage facility in 2016 ("Rwanda's exports to EA rise 31pc" in The East African, 22-03-2017, available at <http://www.theeastafrican.co.ke/business/Rwanda-exports-EA-rise-/2560-3860116-lpxkrz/index.html>.)

Evident from Figure 21 is that more than 80 percent of Rwanda’s exports are classified as non-fuel primary commodities, which in general are less complex and requires lower skills and skills intensity.

The manufactured component of exports is relatively small at around 10.7 percent only, of which only 6.6 of the 10.7 percent refer to medium and higher skills and technology manufactures.

While this may be the case, as explained in section 2.3 Brenton and Newfarmer (2007) highlights that expansion of existing products in existing markets contributing more to export growth than the diversification of new products or new markets.

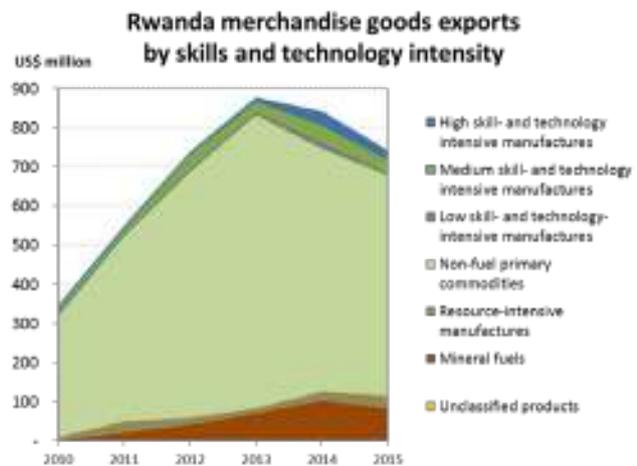
A country’s comparative advantage is not only dependent on factor endowments. Countries, equipped with the correct information and strategies can also “leap” to different trees in the words of Hausmann *et al.* (2015). However the choice of branches and trees to be pursued also needs to be informed by what the market demands. In the search for new markets or new product opportunities in existing markets to inform both trade policy and business decision making, a major challenge is to optimise policy choices in terms of products and markets to pursue to achieve effective export growth. This is where the DSM approach contributes to help with decision-making in this regard. The next section provides outcomes as informed by the approach adjusted for the case of Rwanda as discussed in the preceding sections.

## 5. Overview of outcomes obtained

Note that while the approach normally applies Filter 1 including the sub-filter on political and commercial risk, the political and economic risk component was ignored for this analysis due to the fact that in relative terms 21 African countries would be excluded based on this filter including neighbours to Rwanda such as Burundi, the DRC, Malawi, Mozambique, Zimbabwe and South Sudan. This filter sub-filter was therefore not applied in the filtering process described in section 5.1, followed by an overview of outcomes from a product perspective is presented in section 5.2., then grouped by international geographic regions in section 5.3 and some more detail for specific neighbouring countries in section 5.4. Lastly, a high-level view of outcomes categorised by skill- and technology intensity type and aggregated by economic sector is provided in section 5.5.

Some discussion for interpretative purposes is provided, but it is beyond the scope of this study to analyse and document each of the individual product-market lines in detail. More detail is provided in the tables contained in the appendices in section 9.6.

**Figure 21: Rwanda exports by skills and technology intensity**



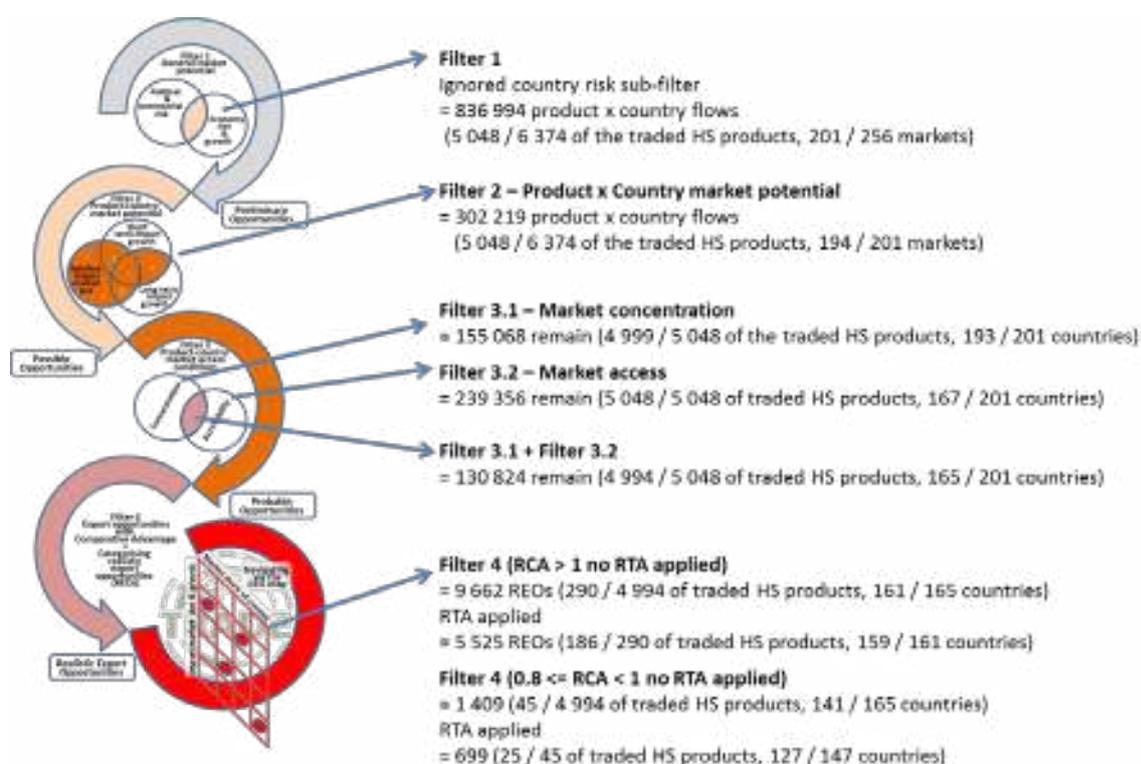
Source: Authors’ calculations based on BACI data and Basu et al. (2011) adjusted classifications

## 5.1. DSM filtering approach applied - outcomes per step

The following diagram (Figure 22) provides the resulting outcomes for each of the filtering steps applied. Based on possible on all HS 6-digit product level country-product lines for which data exists the initial population of possibilities are 873 243 (consisting of 256 markets and 6 374 HS 6-digit product lines). The theoretical possible population is  $256 \times 6\,374 = 1\,631\,744$  possible combinations. However, not all areas import all products or record trade on all product lines in practice, hence the lower than theoretical actual population of possible outcomes.

The application of Filter 1 sub-filter for economic size and growth only applied for all markets therefore eliminates 55 markets in total.

**Figure 22: DSM filtering approach applied - outcomes per step**



Source: Authors' calculations based on the DSM approach applied for each filter stage.

In filter 2 the requirement for relative size and growth is applied for each individual HS 6-digit product level country-product line and as a result the combination of country-product lines that are retained is 302 219 combinations.

In filter 3's sub-filter 3.1 the import supply country concentration measure (an adjusted Herfindahl-Hirshmann index calculation based on Hirshmann (1964) – see appendix 9.1.3.1 for a more detailed discussion) is applied, resulting in 155 068 combinations of country-product lines remaining.

The application of sub-filter 3.2, the composite relative market access index (the construction of which for Rwanda's case is discussed in detail in section 2.4), results in 239 356 combinations of country-product lines remaining.

However, the methodology requires the intersection of the outcomes from these two sub-filters as the overall result for this filter, which leaves 130 824 country-product lines (of the original starting point of 836 994 possible combinations requiring consideration – around 15.6 percent of initial possibilities).

In the last step (filter 4) the outcomes are categorised in various ways. Firstly, based on Rwanda's existing demonstrated export capabilities in term of focus for export promotion in the intensive (for products – quadrants 1 and 2 in the export maturity, market share, and growth and diversification conceptual model explained in section 2.3 and Figure 3) and extensive (for existing markets – quadrant 1) context. This approach shares the same starting point than that of the product space in terms of using the RCA. Where it deviates is that products that are “close” to having an RCA of greater than 1 are also included in the final analysis from an extensive margins perspective for products (quadrant 3 for extensive products and markets and quadrant 4 for intensive markets and extensive products), as these may point to potential products that may need some assistance from an export development and investment perspective to become the next success stories. Opportunities where Rwanda has an RCA of less than 1 ( $<1$ ) and greater or equal to 0.8 ( $\geq 0.8$ ) are therefore also included in the outcomes analysis.

Another point of deviance from the product space analysis is that, in order to adjust for the fact as to whether the product under consideration is probably locally produced or possibly only re-exported, the Revealed Trade Advantage (RTA) index of Vollrath (1991) is employed. It can be assumed that an  $RTA > 0$  implies that the majority of the product exported is locally produced as it corrects for re-exports (refer to appendix section 9.1.7 for more detail).

In terms of the outcome “categorisation” step in filter 4 of the DSM methodology therefore there are 9 662 country-product line opportunities that can be classified for which Rwanda has a revealed comparative advantage. This set of outcomes is made up of 290 HS 6-digit product lines. When the re-export test ( $RTA > 0$ ) is applied, this drops to 186 product lines at the HS 6-digit level with a final tally of 5 525 country-product line combinations. This group of opportunities will be dissected at a high level in the following sections with a focus on export promotion prioritisation by potential target market (informed by relative potential of such opportunities, see appendix section 9.1.6 for more detail on the potential calculation).

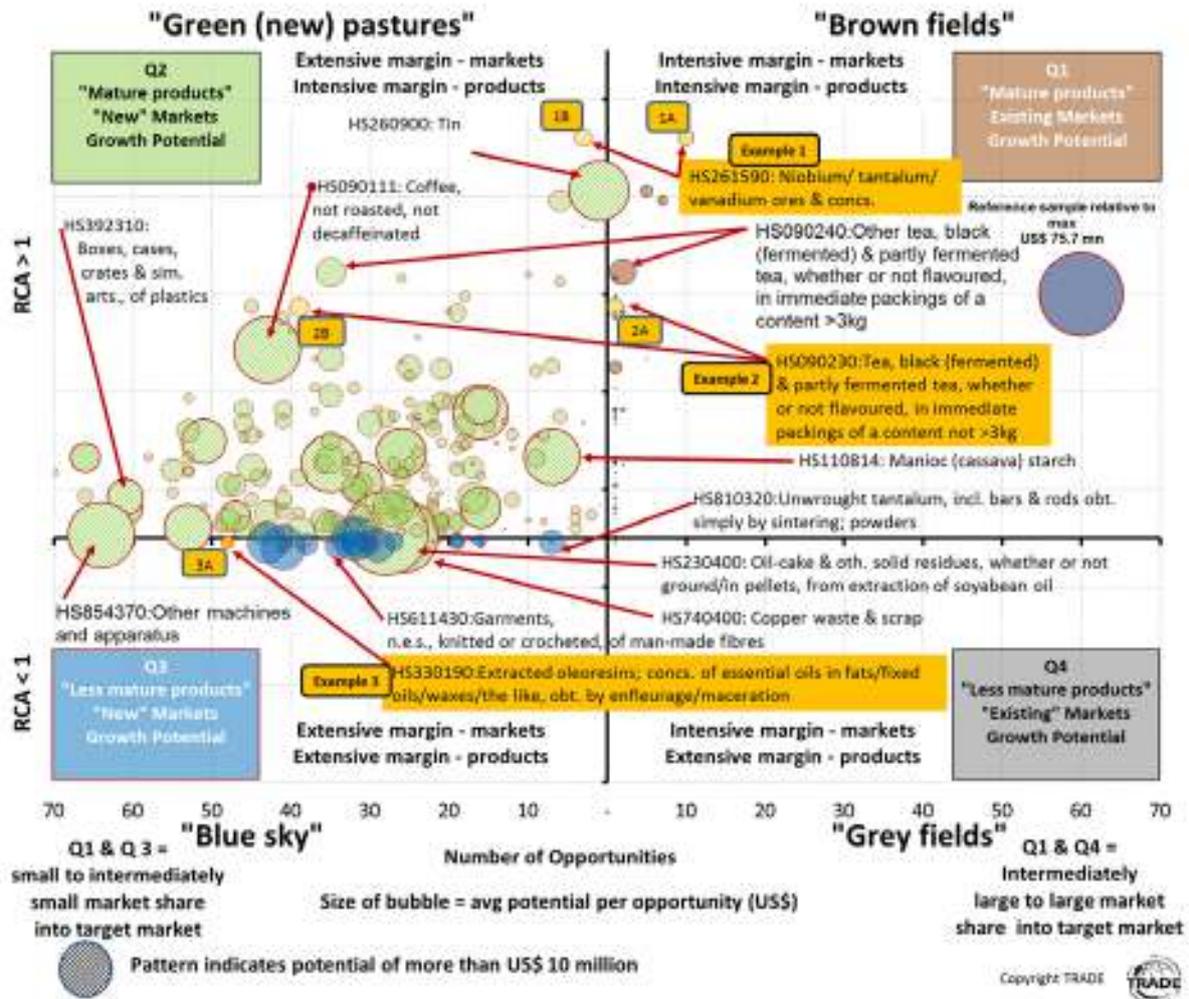
For export development and investment purposes a second set of outcomes based on the “immature” or “near mature” products (as measured in terms of  $0.8 \leq RCA < 1$ ) is also discussed. The outcome of this “categorisation” step yields only 45 HS 6-digit product lines. When the  $RTA > 0$  test is applied only 25 products remain, with a total of 699 country-product line opportunities.

## **5.2. Outcomes by HS 6-digit product level (excluding petroleum and gold) including export development and investment “immature” or “near mature” products**

In order to assist with more granular decision-making information the DSM approach provides outcomes at the HS 6-digit product level. The export maturity, market share, and growth and diversification matrix representation as explained in section 2.3 in context of extensive and intensive margins are employed in this discussion to demonstrate the application thereof for the Rwanda case. Figure 23 provides a picture of what this matrix looks like when populated with the outcomes

as obtained for the Rwanda case (including the additional 699 country-product line opportunities that are classified as export development and investment candidates due to “immature” or “near mature” products – those with RCAs less than 1 but equal or more than 0.8 discussed in section 5.1).

Figure 23: Overall DSM export maturity, market share, and growth and diversification matrix for Rwanda



Source: Authors, TRADE-DSM

Only some products have explicitly been indicated on the matrix, but for information clarity purposes the rest are not labelled in this “static” representation (in electronic format it is easier to investigate details of specific products).

Three examples<sup>28</sup> are highlighted to facilitate interpretation. The first [Example 1 in Figure 23] is that of *HS261590: Niobium/tantalum/vanadium ores and concentrates*, with an extremely high RCA (12 708.17). For this reason the representation in Figure 23 applies a log-scale to the vertical (RCA) axis.

<sup>28</sup> Only some products have explicitly been indicated on the matrix, but for information clarity purposes the rest are not labelled in this “static” representation (in electronic format it is easier to investigate details of specific products).

This product is exported to existing markets such as China, the USA, Hong Kong etc. and therefore is placed in Q1 – “brown fields”, which implies that the strategy around these markets for this product should be informed around the intensive margin from both a product and market perspective. The number of markets (10) is indicated on the horizontal (X) axis. The size of the bubble represents the average potential (average of the US\$ 23.2 million therefore US 2.3 million). More details regarding the trade with these existing markets are provided in Table 2.

**Table 2: Major existing export markets for HS 2615.90 supplied from Rwanda in Q1**

Item	Country	[A] Realistic Export Potential to Target Market(s) `000 US\$	[B] Total Exports from Rwanda to Target Market(s) `000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s) Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) `000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) `000 US\$	[G] Target Market(s) Total Imports `000 US\$
		<b>23 284.71</b>	<b>115 910.49</b>	<b>39.1%</b>	<b>139 657.26</b>	<b>40 960.35</b>	<b>296 528.09</b>
1	China	11 339.68	32 480.21	23.9%	68 038.06	35 290.88	135 809.16
2	United States of America	7 371.79	12 900.42	21.5%	44 230.71	2 948.83	60 079.96
3	Hong Kong (SARC)	2 427.25	11 443.73	40.6%	14 563.47	2 207.54	28 214.74
4	Kazakhstan	1 617.72	11 330.67	52.7%	9 706.29	461.51	21 498.46
5	Japan	416.32	913.17	26.7%	2 497.93	5.88	3 416.98
6	Belgium- Luxembourg	59.85	3 192.17	88.7%	359.13	45.71	3 597.00
7	Australia	38.08	49.04	20.5%	190.42	0.00	239.46
8	Czech Republic	11.24	44.59	44.2%	56.18	0.00	100.77
9	Switzerland	2.23	10 945.60	99.9%	13.39	0.00	10 958.99
10	Tanzania	0.55	32 610.89	100.0%	1.66	0.00	32 612.55

Source: Authors, TRADE-DSM

At the same time, the DSM approach (in line with the intensive margin for products, extensive margin for markets) identifies that there are 3 potential “new” or “lesser served” (from Rwanda’s perspective) markets for the same product as indicated in Q2 [1B in Figure 23] – “green pastures”. These are Thailand, Germany and Spain – details provided in Table 3. Spain is the only real “new” potential market, while the share of Rwanda’s exports to Thailand and Germany is much lower than that of the more mature markets indicated in Q1. In line with intensive margins thinking, these markets could be developed more from Rwanda’s perspective.

**Table 3: Major potential new export markets for HS 2615.90 to be supplied from Rwanda in Q2**

Item	Country	[A] Realistic Export Potential to Target Market(s) `000 US\$	[B] Total Exports from Rwanda to Target Market(s) `000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s) Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) `000 US\$	[F] Target Market(s) Imports from Rest o market (Excl Rwanda & top competitors) `000 US\$	[G] Target Market(s) Total Imports `000 US\$
		<b>8 937.70</b>	<b>10 745.20</b>	<b>16.0%</b>	<b>53 626.18</b>	<b>2 919.31</b>	<b>67 290.69</b>
1	Thailand	7 183.27	9 395.45	17.0%	43 099.65	2 771.21	55 266.31
2	Germany	1 437.29	1 349.75	13.3%	8 623.73	145.94	10 119.42
3	Spain	317.13	0.00	0.0%	1 902.80	2.16	1 904.96

Source: Authors, TRADE-DSM

Another example [Example 2 in Figure 23] along similar lines is that of *HS090230: Tea, black (fermented) & partly fermented tea, whether or not flavoured, in immediate packings of a content not >3kg*. This product has an RCA of 233.98 and therefore is a relatively “mature” export product from Rwanda’s perspective, hence appears in Q1 [2A in Figure 23] – but only for a single target market, namely Kenya (see Table 4). It is possible that the formal statistics do not capture trade in tea accurately as anecdotal evidence suggests that products are sold in border areas and “informally” exported (small transactions) by a large number of small traders (Development Alternatives Incorporated, 2016).

**Table 4: Major existing export markets for HS 0902.30 supplied from Rwanda in Q1**

Item	Country	[A] Realistic Export Potential to Target Market(s) `000 US\$	[B] Total Exports from Rwanda to Target Market(s) `000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s)Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) `000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) `000 US\$	[G] Target Market(s) Total Imports `000 US\$
		<b>2 949.02</b>	<b>14 354.07</b>	<b>44.7%</b>	<b>17 694.13</b>	<b>64.98</b>	<b>32 113.18</b>
1	Kenya	2 949.02	14 354.07	44.7%	17 694.13	64.98	32 113.18

Source: Authors, TRADE-DSM

According to the DSM approach however there are another 39 potential “new” or “lesser served” markets from Rwanda’s perspective for the same product as indicated in Q2 [2B in Figure 23] – “green pastures”.

**Table 5: Major potential new export markets for HS 0902.30 to be supplied from Rwanda in Q2**

Item	Country	[A] Realistic Export Potential to Target Market(s) `000 US\$	[B] Total Exports from Rwanda to Target Market(s) `000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s)Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) `000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) `000 US\$	[G] Target Market(s) Total Imports `000 US\$
		<b>148 078.42</b>	<b>475.01</b>	<b>0.0%</b>	<b>888 470.50</b>	<b>125 442.44</b>	<b>1 014 387.94</b>
1	Saudi Arabia	25 358.90	453.76	0.3%	152 153.39	11 067.37	163 674.52
2	United States of America	17 100.51	13.22	0.0%	102 603.08	20 103.62	122 719.92
3	Russian Federation	14 551.93	0.00	0.0%	87 311.55	8 657.61	95 969.16
4	Australia	13 008.06	0.00	0.0%	78 048.37	6 964.68	85 013.05
5	France	11 001.84	0.00	0.0%	66 011.06	14 824.05	80 835.11
6	Netherlands	7 311.32	0.00	0.0%	43 867.94	8 224.83	52 092.77
7	United Kingdom	7 118.69	0.00	0.0%	42 712.15	8 137.33	50 849.47
8	Ukraine	6 652.64	0.00	0.0%	39 915.83	1 144.74	41 060.57
9	Japan	6 219.66	1.01	0.0%	37 317.97	6 625.01	43 943.98
10	Belgium- Luxembourg	5 713.78	0.00	0.0%	34 282.68	3 712.24	37 994.92
11	Italy	5 651.03	7.02	0.0%	33 906.17	3 522.32	37 435.51
12	Germany	4 596.80	0.00	0.0%	27 580.81	12 531.22	40 112.03
13	Hong Kong (SARC)	4 362.14	0.00	0.0%	26 172.82	3 604.23	29 777.04
14	Jordan	4 093.49	0.00	0.0%	24 560.92	316.41	24 877.33
15	China	3 739.81	0.00	0.0%	22 438.87	2 441.84	24 880.72
	Rest (24)	11 597.82	0.00	0.0%	69 586.90	13 564.95	83 151.84

Source: Authors, TRADE-DSM

Major potential markets include Saudi Arabia, United States of America, Russian Federation, Australia and France – details for the top 15 markets from a potential perspective is provided in Table 5. As an example, while this product line is not eligible under the African Growth and Opportunity Act (AGOA), it has free access under Generalized System of Preferences (GSPs) to the United States and this fact should be capitalised upon by Rwanda to export directly to this market.

Saudi Arabia, the United States of America, Japan and Italy demonstrate some historical imports from Rwanda, but in relative terms these markets are extremely small. Again, in line with intensive margins thinking, these markets could be developed more for this product from Rwanda’s perspective.

The last example [Example 3 in Table 22] in this discussion involves a product located in Q3 [3A in Figure 23] – “blue sky”. The product is *HS330190: Extracted oleoresins; concentrates of essential oils in fats/fixed oils/waxes/the like, obtained by enfleurage/maceration*, with an RCA of only 0.89. The fact that this product has an RCA of less than 1 will cause the product space approach to ignore it, while in the DSM approach products with RCAs of between 0.8 and 0.99 are also included for analysis with a focus on future investment and export development in line with extensive margin products. Furthermore, empirical data at the HS 6-digit level can be challenging and while a specific products data calculation provides a result for an RCA, in cases where the result is close to 1 care should be taken to simply discard such products.

**Table 6: Major potential new export markets for HS 3301.90 to be supplied from Rwanda in Q2**

Item	Country	[A] Realistic Export Potential to Target Market(s) `000 US\$	[B] Total Exports from Rwanda to Target Market(s) `000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s)Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) `000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) `000 US\$	[G] Target Market(s) Total Imports `000 US\$
		<b>72 124.63</b>	<b>0.29</b>	<b>0.0%</b>	<b>432 747.78</b>	<b>104 684.26</b>	<b>537 432.33</b>
1	United States of America	17 951.24	0.00	0.0%	107 707.47	18 569.41	126 276.88
2	India	6 113.62	0.00	0.0%	36 681.74	3 599.30	40 281.04
3	China	5 652.61	0.00	0.0%	33 915.63	6 614.61	40 530.24
4	United Kingdom	5 301.97	0.00	0.0%	31 811.81	9 846.18	41 658.00
5	Germany	5 117.20	0.00	0.0%	30 703.18	12 608.03	43 311.21
6	France	5 032.04	0.00	0.0%	30 192.22	13 883.08	44 075.30
7	Japan	3 363.96	0.00	0.0%	20 183.75	5 576.38	25 760.13
8	Spain	2 813.05	0.00	0.0%	16 878.30	3 955.61	20 833.92
9	Belgium-Luxembourg	2 758.71	0.00	0.0%	16 552.26	3 355.74	19 908.00
10	Netherlands	2 536.28	0.00	0.0%	15 217.67	6 821.56	22 039.23
11	Australia	1 779.82	0.00	0.0%	10 678.90	1 460.90	12 139.80
12	Hong Kong (SARC)	1 677.47	0.00	0.0%	10 064.83	2 374.54	12 439.37
13	Saudi Arabia	1 558.96	0.00	0.0%	9 353.75	2 913.28	12 267.03
14	Singapore	1 523.90	0.00	0.0%	9 143.42	3 319.61	12 463.03
15	Austria	1 489.90	0.00	0.0%	8 939.39	2 116.98	11 056.37
	Rest	7 453.91	0.00	0.0%	44 723.46	7 669.04	52 392.80

Source: Authors, TRADE-DSM

Evident is that while this specific product according to the trade data calculation does not exhibit an  $RCA > 1$ , there are 48 potential markets that would be accessible to Rwanda's exports of this product, which should be further investigated. The only markets where some of the product shows existing but extremely small trade is Democratic Republic of the Congo and Kenya, but these do not feature in the top markets from a potential perspective. Again only the top 15 results are provided in Table 6.

This discussion based on the DSM export maturity, market share, and growth and diversification matrix representation for Rwanda clearly demonstrates that existing products from Rwanda exhibiting RCAs  $> 1$  have a number of potential untapped, or not yet sufficiently penetrated (in the case where export trade with Rwanda already exists on specific product-country lines) opportunities. From a market perspective it therefore stands to reason that while the intensive margins from a market perspective should be pursued, in the case of Rwanda there is also a dire need to diversify export markets (extensive margin) since there are a variety of products with a comparative advantage but low number of current or existing markets.

While this may be the case, it would be advisable for policy makers in Rwanda to follow a two-pronged strategy. For the short to medium term focusing export and investment promotion efforts on the intensive margin (in terms of both products and markets) as well as extensive margin in terms of development and marketing efforts on opportunities in the "green pastures" or Q2 quadrant more aggressively.

At the same time the second focus should be on items in the "blue sky" quadrant (Q3) that could potentially become comparatively competitive with focused assistance from government and other support programmes.

Both these approaches should however also consider the move up the value chain in terms of skills- and technology intensity and add this dimension to prioritisation drives from both a market as well as a product perspective.

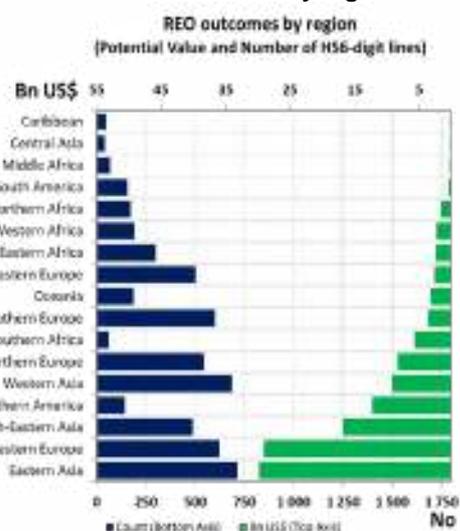
The next section will provide more specific details at a regional level and neighbouring markets.

### 5.3. Summary overview from both a product and market perspective

The following high level overviews are provided to contextualise the outcomes obtained from the filtering process as explained in the preceding section. More detail with a focus from a product perspective and then from a market perspective follows, while this section is concluded with more detail by regional focus and neighbouring countries.

#### 5.3.1. Outcomes - global overview

Figure 24: Global outcomes by region

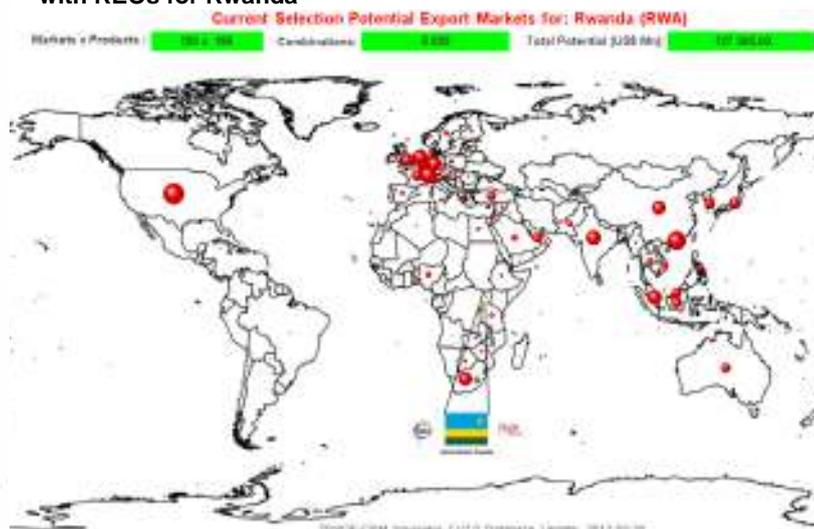


Source: Authors, TRADE-DSM Navigator

As mentioned and explained in the preceding section around the step-wise application of the DSM filtering approach, in total only 159 markets (countries or territories such as islands) remain from an initial 256 possible options. Figure 25 provides a geographic view of these markets, as well as the overall potential associated with the 186 HS 6-digit level country-product lines (with RCA>1) that remain at filter 4. Eastern Asia and Western Europe are the major potential markets identified based on the DSM approach (Figure 24).

Notably 98 to 99 percent (Table 7) of both the number and associated potential of these opportunities are in the first column (1), meaning these are opportunities that Rwanda does export and can supply to such markets, but currently is not exporting to such potential markets.

Figure 25: Overview of global distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

Table 7: REO Map outcomes for global opportunities for Rwanda

Map of Realistic Export Opportunities (REO) by type (Number and % of Total Number)	Relative Market Share (s) of home market (exporter country) into target market(s)				Grand Total
	Intermediate				
	Small: 1 (0-10%)	Small: 2 (10-20%)	Large: 3 (20-50%)	Large: 4 (50-100%)	
Large: 1 (Potential Value (Bn US\$) and % of Total Value)	401 (7.28%) Mn US\$ 20 500.8 (16.10%)	1 (0.02%) Mn US\$ 2.8 (0.00%)	14 (0.25%) Mn US\$ 3.1 (0.00%)	1 (0.02%) Mn US\$ 0.0 (0.00%)	403 (7.29%) Mn US\$ 20 503.7 (16.10%)
Growing: 2 (short & long term)	5 989 (72.58%) Mn US\$ 32 115.6 (25.22%)	18 (0.33%) Mn US\$ 12.1 (0.01%)	34 (0.25%) Mn US\$ 3.1 (0.00%)	36 (0.55%) Mn US\$ 5.1 (0.00%)	4 067 (73.61%) Mn US\$ 32 135.9 (25.23%)
Large & Growing: 3 (only short term)	96 (1.77%) Mn US\$ 7 650.5 (6.02%)	2 (0.04%) Mn US\$ 41.0 (0.03%)	1 (0.02%) Mn US\$ 0.5 (0.00%)	1 (0.00%) Mn US\$ 0.0 (0.00%)	101 (1.85%) Mn US\$ 7 697.8 (6.04%)
Large & Growing: 4 (only long term)	211 (3.82%) Mn US\$ 14 619.8 (11.48%)	5 (0.09%) Mn US\$ 6.7 (0.01%)	1 (0.02%) Mn US\$ 0.0 (0.00%)	3 (0.05%) Mn US\$ 0.0 (0.00%)	219 (3.95%) Mn US\$ 14 640.7 (11.50%)
Large & Growing: 5 (both short & long term)	724 (13.10%) Mn US\$ 52 290.6 (41.06%)	4 (0.07%) Mn US\$ 66.6 (0.05%)	4 (0.07%) Mn US\$ 26.0 (0.02%)	4 (0.07%) Mn US\$ 4.3 (0.00%)	736 (13.32%) Mn US\$ 52 387.5 (41.13%)
Grand Total	5 433 (98.32%) Mn US\$ 127 177.1 (99.85%)	28 (0.51%) Mn US\$ 129.3 (0.10%)	20 (0.38%) Mn US\$ 49.8 (0.04%)	44 (0.80%) Mn US\$ 48.3 (0.04%)	5 525 (100.00%) Mn US\$ 127 965.5 (100.00%)

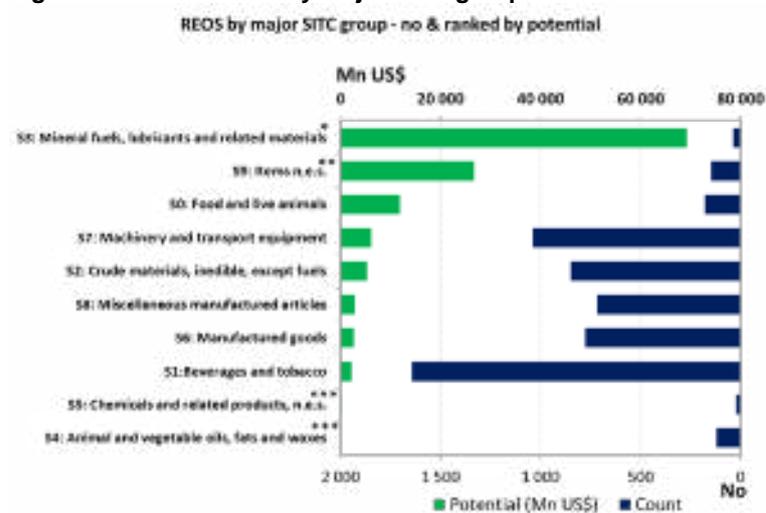
Source: Authors, TRADE-DSM Navigator

Around 41 percent of the potential is associated with markets classified as REO<sub>1,5</sub> meaning markets that exhibit import demand for these product lines that are both relatively large and growing in the short and long term (refer to section 2.1 for detailed explanation of the REO Map matrix).

For the overall set of outcomes Figure 26 provides a view of both potential value as well as number of lines identified as possible opportunities for Rwanda to pursue grouped according to major SITC group as opposed to HS.

The items Animal and vegetable oils, fats and waxes (S4\*\*\*) and Chemicals and related products, n.e.s. (S5\*\*\*) in relative terms have small relative potential and due to scale do not appear to have any values on the chart.

**Figure 26: Global REOs by major SITC group**



Source: Authors, TRADE-DSM Navigator

Evident is that petroleum related products in the group Mineral fuels, lubricants and related materials (S3<sup>29</sup>) dominates in terms of potential, while relatively low in terms of number of opportunity. This is due to most countries in the world having to import petroleum related products, and that Rwanda in terms of its export statistics do have an RCA>1 for this group of products. However, further analysis shows that the petroleum extraction sector in Rwanda is not a very well developed sector and the only petroleum extraction related activity is the extraction of dissolved methane from the waters of Lake Kivu (World Bank 2009). Recently (2016) Rwanda is reported to have resumed its search for petroleum deposits in Lake Kivu to join regional countries that are already looking forward to start commercial oil production<sup>30</sup>.

Similarly for Items n.e.s. (S9\*\*) a more in depth analysis shows that this item is dominated by non-monetary gold<sup>31</sup> (excluding gold ores and concentrates).

While for consistency of comparisons in this section these items are kept in the results set for sections 5.3.2 to 5.3.10, for section 5.4 on specific focus and neighbouring countries these product groups and lines are excluded from the further analysis.

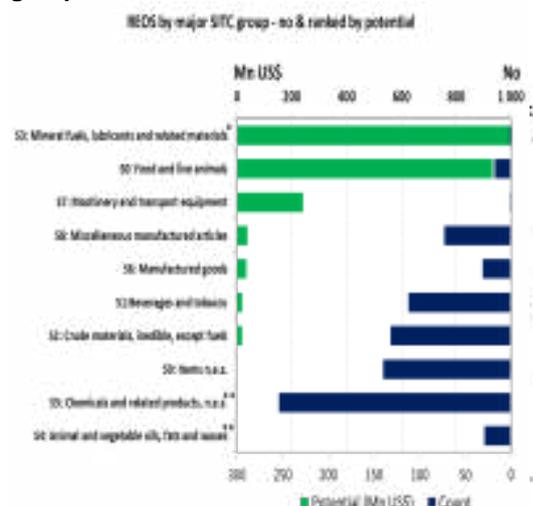
<sup>29</sup> S33: Petroleum, petroleum products and related materials containing sub groups of S3330: Crude petroleum and S33512: Paraffin wax, microcrystalline petroleum wax, slack wax, ozokerite, lignite wax, peat wax, other mineral waxes, & similar products obtained by synthesis/by other processes, whether/not coloured.

<sup>30</sup> "Rwanda continues its exploration for oil" in Kenya Engineer, 27 MAY 2016 [accessed July 11 2017] available at <http://www.kenyaengineer.co.ke/2016-05-27-10-44-22/powertrains/item/3504-rwanda-continues-its-exploration-for-oil>.

<sup>31</sup> S97: Gold, non-monetary (excluding gold ores and concentrates) and sub group S97101: Gold (including gold plated with platinum), non-monetary, unwrought/in semi-manufactured forms,/in powder form.

### 5.3.2. Outcomes – summary for Africa

Figure 27: African REOs by major SITC group



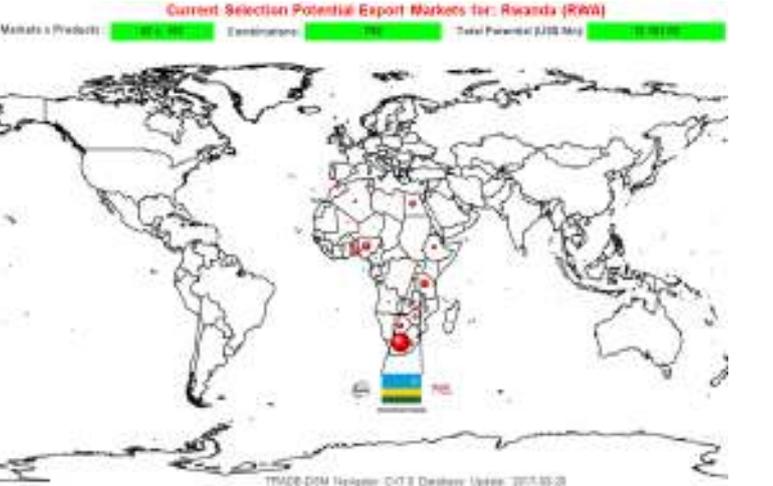
Source: Authors, TRADE-DSM Navigator

In total only 42 markets in Africa remain from an initial 62 possible options (including islands). Figure 28 provides a geographic view of these markets, as well as the overall potential associated with the 167 HS 6-digit level country-product lines (with RCA>1) that remain at filter 4. Total potential associated with these product-market lines are around US\$ 12 billion.

The classification for these opportunities are provided in Table 8. Notably 93 percent of both the number of opportunities are in the first column (1) and 99.8 percent of the potential value. These are opportunities that Rwanda does export and can supply to such markets, but currently is not exporting to such potential markets. Around 52 percent of the potential is associated with markets classified as REO<sub>1,2</sub> meaning markets that exhibits import demand for these product lines that are not necessarily large, both are growing in the short and long term.

South African potential in value terms dominates the region, hence the results excluding South Africa is provided in the next section.

Figure 28: Overview of Africa distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

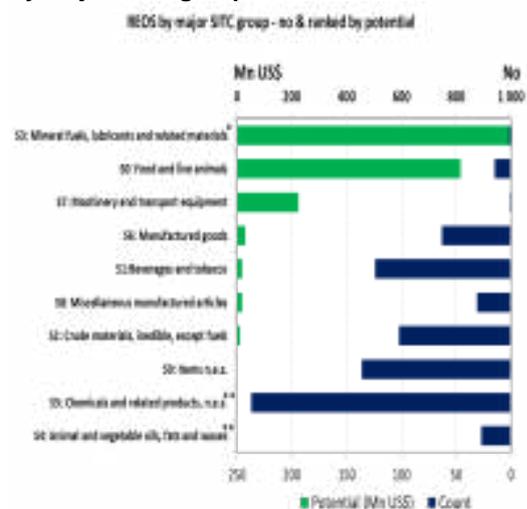
Table 8: REO Map outcomes for Africa opportunities for Rwanda

Product-country or target market (s) import demand size and growth characteristics	Map of Realistic Export Opportunities (REO) By type (Number and % of Total Number) (Potential Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
		Intermediate				Grand Total
		Small: 1 (0.00%<15%)	Small: 2 (5.00%<15%)	Large: 3 (15.00%<25%)	Large: 4 (25.00%)	
Large: 1	2 (0.88%) Mn US\$ 190.5 (1.57%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	1 (0.10%) Mn US\$ 0.0 (0.00%)	3 (1.01%) Mn US\$ 190.5 (1.57%)	
Growing: 2 (short & long term)	107 (88.26%) Mn US\$ 6,419.0 (52.79%)	11 (1.39%) Mn US\$ 8.2 (0.01%)	11 (1.39%) Mn US\$ 2.4 (0.02%)	25 (3.16%) Mn US\$ 4.5 (0.04%)	154 (94.18%) Mn US\$ 6,434.1 (52.82%)	
Large & Growing: 3 (only short term)	4 (0.51%) Mn US\$ 22.1 (0.18%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	4 (0.51%) Mn US\$ 22.1 (0.18%)	
Large & Growing: 4 (only long term)	11 (1.39%) Mn US\$ 376.0 (3.04%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	1 (0.12%) Mn US\$ 14.2 (0.12%)	3 (3.79%) Mn US\$ 0.0 (0.00%)	15 (1.88%) Mn US\$ 384.1 (3.16%)	
Large & Growing: 5 (both short & long term)	17 (2.11%) Mn US\$ 5,128.3 (42.12%)	1 (0.14%) Mn US\$ 0.3 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	1 (0.12%) Mn US\$ 0.2 (0.00%)	19 (2.40%) Mn US\$ 5,128.8 (42.18%)	
<b>Grand Total</b>	<b>738 (93.18%) Mn US\$ 12,130.9 (99.76%)</b>	<b>12 (1.52%) Mn US\$ 8.6 (0.07%)</b>	<b>12 (1.52%) Mn US\$ 16.5 (0.14%)</b>	<b>30 (3.79%) Mn US\$ 4.6 (0.04%)</b>	<b>792 (100.00%) Mn US\$ 12,160.6 (100.00%)</b>	

Source: Authors, TRADE-DSM Navigator

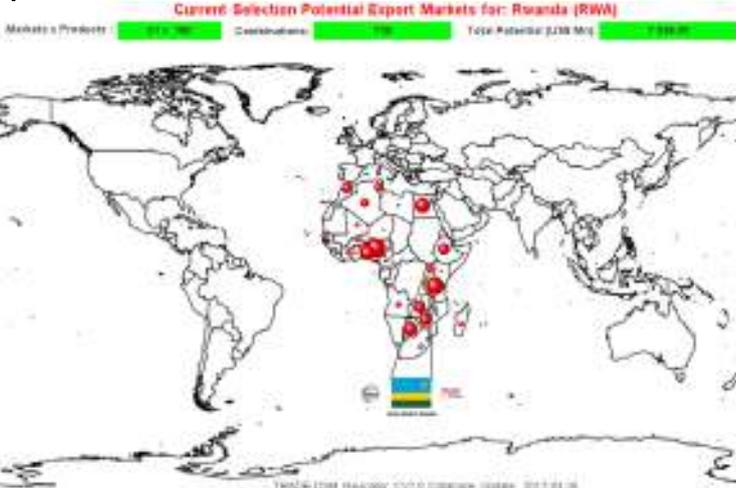
### 5.3.3. Outcomes – summary for Africa excluding South Africa

Figure 29: Africa (excl. South Africa) REOs by major SITC group



Source: Authors, TRADE-DSM Navigator

Figure 30: Overview of Africa (excl. South Africa) distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

Evident is that when South Africa is removed from the results set, more African countries exhibit similar potential import demand pools for 160 product lines (Figure 30). South Africa contributed to US\$ 5.1 billion (leaving US\$ 7 billion associated with the rest of Africa) of the overall potential for 54 products lines and should not be discarded as a potential destination for more exports from Rwanda. However, as mentioned in the global overview section, petroleum import demand also dominates the relative picture for South Africa and other African countries.

Evident from Figure 29 is that opportunities classified as Food and live animals (S0) and Machinery and transport equipment (S7) dominates potential if petroleum is ignored.

In terms of REO classifications, these opportunities are concentrated (90.5 percent of potential) in markets classified as REO<sub>1,2</sub> meaning markets that exhibits import demand for these product lines that are not necessarily large, both are growing in the short and long term.

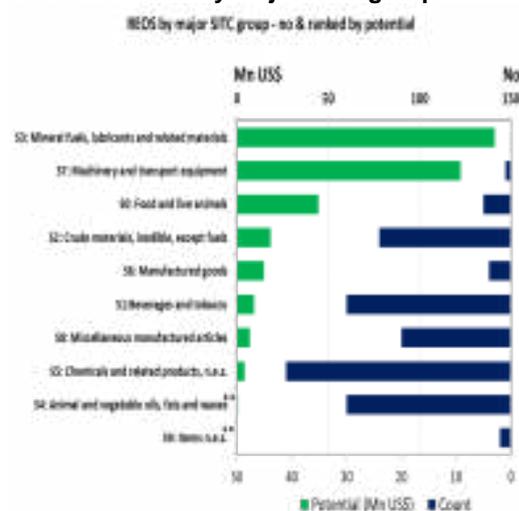
Table 9: REO Map outcomes for African (excl. South Africa) opportunities for Rwanda

Map of Realistic Export Opportunities (REO) by type [Number and % of Total Number] [Potential Value (Mn US\$) and % of Total Value]	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Intermediate				Grand Total
	Small: 1 0%<=s<5%	Small: 2 5%<=s<15%	Large: 3 15%<=s<25%	Large: 4 25%<=s	
<b>Large: 1</b>	5 (0.68%) Mn US\$ 119.1 (1.69%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	1 (0.14%) Mn US\$ 0.0 (0.00%)	<b>6</b> <b>(0.81%)</b> <b>Mn US\$</b> <b>119.1</b> <b>(1.69%)</b>
<b>Growing: 2 (short &amp; long term):</b>	654 (88.62%) Mn US\$ 6 369.6 (90.49%)	11 (1.49%) Mn US\$ 8.2 (0.12%)	11 (1.49%) Mn US\$ 2.4 (0.03%)	25 (3.39%) Mn US\$ 4.3 (0.06%)	<b>701</b> <b>(94.99%)</b> <b>Mn US\$</b> <b>6 384.5</b> <b>(90.70%)</b>
<b>Large &amp; Growing: 3 (only short term):</b>	2 (0.27%) Mn US\$ 2.6 (0.04%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	<b>2</b> <b>(0.27%)</b> <b>Mn US\$</b> <b>2.6</b> <b>(0.04%)</b>
<b>Large &amp; Growing: 4 (only long term):</b>	11 (1.49%) Mn US\$ 370.0 (5.26%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	1 (0.14%) Mn US\$ 14.2 (0.20%)	3 (0.41%) Mn US\$ 0.0 (0.00%)	<b>15</b> <b>(2.03%)</b> <b>Mn US\$</b> <b>384.1</b> <b>(5.46%)</b>
<b>Large &amp; Growing: 5 (both short &amp; long term):</b>	12 (1.63%) Mn US\$ 147.9 (2.10%)	1 (0.14%) Mn US\$ 0.3 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	1 (0.14%) Mn US\$ 0.2 (0.00%)	<b>14</b> <b>(1.90%)</b> <b>Mn US\$</b> <b>148.5</b> <b>(2.11%)</b>
<b>Grand Total</b>	<b>684</b> <b>(92.68%)</b> <b>Mn US\$</b> <b>7 009.2</b> <b>(99.58%)</b>	<b>12</b> <b>(1.63%)</b> <b>Mn US\$</b> <b>8.6</b> <b>(0.12%)</b>	<b>12</b> <b>(1.63%)</b> <b>Mn US\$</b> <b>16.5</b> <b>(0.24%)</b>	<b>30</b> <b>(4.07%)</b> <b>Mn US\$</b> <b>4.6</b> <b>(0.06%)</b>	<b>738</b> <b>(100.00%)</b> <b>Mn US\$</b> <b>7 038.9</b> <b>(100.00%)</b>

Source: Authors, TRADE-DSM Navigator

### 5.3.4. Outcomes – summary for Caribbean, Central and South America

Figure 31: Caribbean, Central and South American REOs by major SITC group



Source: Authors, TRADE-DSM Navigator

Figure 32: Overview of Caribbean, Central and South America distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

Evident from Figure 32 it is evident that no opportunities for the Central American region pass the DSM filters. In total 104 product lines and 14 destination markets remain in the result set with a potential of US\$ 387 million. In terms of product lines, opportunities classified as Machinery and transport equipment (S7), Food and live animals (S0) dominates in potential value terms, while Crude materials, inedible, except fuels (S2) poses less demand, but more diversity in terms of number of opportunities (product lines and market combinations). Again, in terms of REO classifications, these opportunities are concentrated (88.7 percent of potential) in markets classified as REO<sub>1,2</sub> meaning markets that exhibits import demand for these product lines that are not necessarily large, both are growing in the short and long term. Interestingly Paraguay's potential is slightly higher than that of Brazil, followed by Chile and Argentina. The focus of this study is not on detail on a country level. However, the information per target market was processed and can be analysed in detail in future reports.

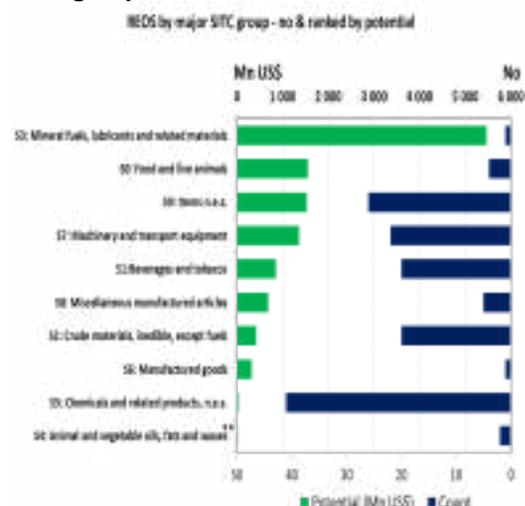
Table 10: REO Map outcomes for Central and South American opportunities for Rwanda

Map of Realistic Export Opportunities (REO) By type (Number and % of Total Number) (Products/Export (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0% to 5%)	Intermediate		Large: 4 (25 to 40%)	Grand Total
		Small: 2 (5% to 15%)	Large: 3 (15% to 25%)		
Large: 1	1 (1.90%) Mn US\$ 70.5 (18.17%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	4 (1.90%) Mn US\$ 20.5 (5.31%)
Growing: 2 (short & long term)	190 (93.14%) Mn US\$ 343.1 (88.68%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	190 (93.14%) Mn US\$ 343.1 (88.68%)
Large & Growing: 3 (only short term)	2 (0.98%) Mn US\$ 2.6 (0.67%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	2 (0.98%) Mn US\$ 2.6 (0.67%)
Large & Growing: 4 (only long term)	2 (0.98%) Mn US\$ 2.7 (0.69%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	2 (0.98%) Mn US\$ 2.7 (0.69%)
Large & Growing: 5 (both short & long term)	5 (2.49%) Mn US\$ 13.0 (3.36%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	5 (2.49%) Mn US\$ 13.0 (3.36%)
Grand Total	204 (100.00%) Mn US\$ 386.9 (100.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	204 (100.00%) Mn US\$ 386.9 (100.00%)

Source: Authors, TRADE-DSM Navigator

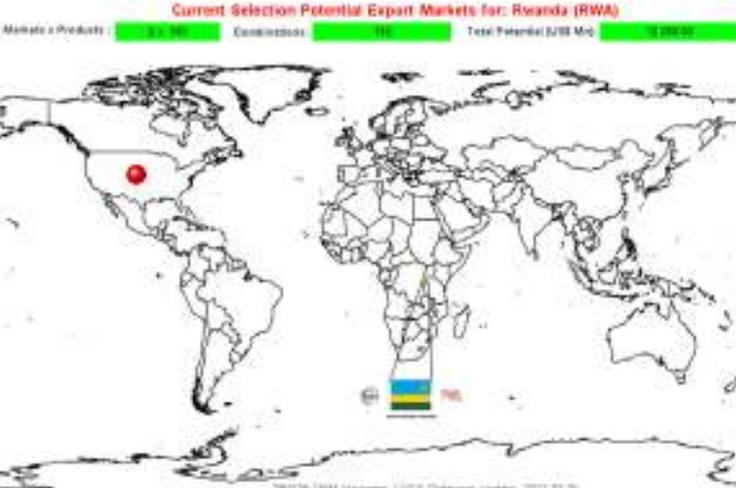
### 5.3.5. Outcomes – summary for Northern America

Figure 33: Northern American REOs by major SITC group



Source: Authors, TRADE-DSM Navigator

Figure 34: Overview of Northern America distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

The United States as a single market exhibits the largest overall potential. The other areas included is Turks and Caicos Islands (with only 2 opportunities namely HS210320: Tomato ketchup & other tomato sauces and HS220300: Beer made from malt) and Canada (which exhibits no potential opportunities that pass all the filters). In terms of regional potential North America (mainly the USA) is fourth in terms of value at US\$ 12.2 billion (see Figure 24 in the global overview section). However, it must be kept in mind that this is a single country that exhibits demand for 140 product lines, of which at the HS 6-digit level 82 of these opportunities identified conform to the AGOA agreement and therefore qualifies for duty-free access into the USA market. One of the major products dominating the USA opportunities is that of gold, which will be excluded in the rest of the analysis. Since the USA is a large market, most of these opportunities are classified as REO<sub>1,5</sub> meaning for these lines the demand is relatively large and growing both in the short and long term.

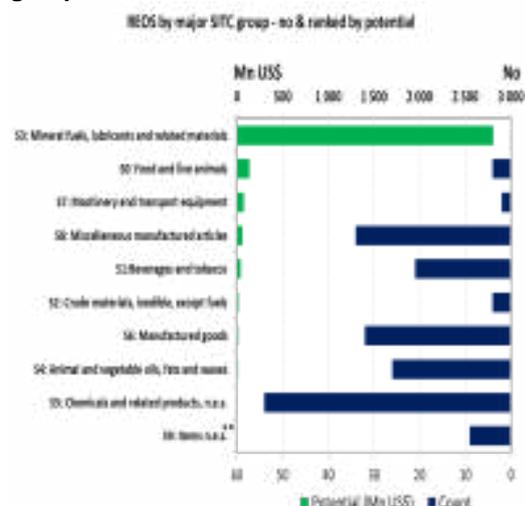
Table 11: REO Map outcomes for Northern American opportunities for Rwanda

Product-country or target market (s) import demand size and growth characteristics	Map of Realistic Export Opportunities (REO) By type (Number and % of Total Number) (Products Factor (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
		Small: 1 (0% to 5%)	Intermediate		Large: 4 (25 to 40%)	Grand Total
			Small: 2 (5% to 15%)	Large: 3 (15% to 25%)		
Large: 1	16 (11.27%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	16 (11.27%)	
	Mn US\$ 1 150.1	0.0	0.0	0.0	1 150.1	
	(15.92%)	(0.00%)	(0.00%)	(0.00%)	(15.92%)	
	16 (11.27%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	16 (11.27%)	
	Mn US\$ 36.6	0.0	0.0	0.0	36.6	
(0.30%)	(0.00%)	(0.00%)	(0.00%)	(0.30%)		
Large & Growing: (only short term): 3	5 (3.27%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	5 (3.27%)	
	Mn US\$ 48.0	0.0	0.0	0.0	48.0	
	(0.39%)	(0.00%)	(0.00%)	(0.00%)	(0.39%)	
Large & Growing: (only long term): 4	15 (10.00%)	1 (0.70%)	0 (0.00%)	0 (0.00%)	16 (11.27%)	
	Mn US\$ 379.8	0.3	0.0	0.0	379.9	
	(3.10%)	(0.00%)	(0.00%)	(0.00%)	(3.10%)	
Large & Growing: (both short & long term): 5	87 (61.77%)	0 (0.00%)	1 (0.70%)	0 (0.00%)	88 (61.97%)	
	Mn US\$ 9 827.0	0.0	7.4	0.0	9 834.4	
	(80.01%)	(0.00%)	(0.06%)	(0.00%)	(80.07%)	
Grand Total	140 (98.99%)	1 (0.70%)	1 (0.70%)	0 (0.00%)	142 (100.00%)	
	Mn US\$ 12 249.2	0.3	7.4	0.0	12 256.9	
	(99.91%)	(0.00%)	(0.06%)	(0.00%)	(100.00%)	

Source: Authors, TRADE-DSM Navigator

### 5.3.6. Outcomes – summary for Oceania

Figure 35: Oceania REOs by major SITC group



Source: Authors, TRADE-DSM Navigator

Figure 36: Overview of Oceania distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

In terms of Oceania the economies of Australia and New Zealand dominate as expected. The rest of the island economies are relatively small and in transport logistics terms expensive to reach. In total there are 199 product lines with a potential of US\$ 3.1 billion – but the value as in all cases in this section is heavily skewed by petroleum and gold. Opportunities in this region are mainly in the SITC groups of Food and live animals (S0), Machinery and transport equipment (S7) and Miscellaneous manufactured articles (S8). The fact that while the relative value of opportunities are relatively low, the number is higher due to there are 7 other (over and above Australia and New Zealand) major island economies demanding a variety of products, albeit in small value terms. Papua New Guinea and a New Caledonia being the largest after Australia and New Zealand in terms of identified potential. The bulk of opportunities are associated with REO<sub>1,2</sub> meaning that these are small but growing demand pockets.

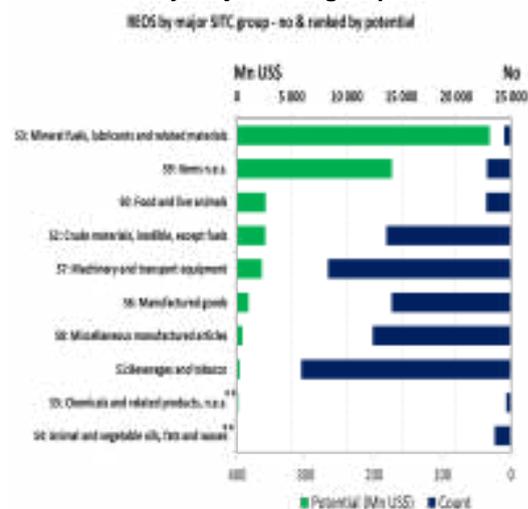
Table 12: REO Map outcomes for Oceania opportunities for Rwanda

Map of Realistic Export Opportunities (REO) by type [Number and % of Total Number] [Potential Value (Mn US\$) and % of Total Value]	Relative Market Share (s) of home market (exporter country) into target market(s)					Grand Total
	Intermediate				Grand Total	
	Small: 1 0%<=s<5%	Small: 2 5%<=s<15%	Large: 3 15%<=s<25%	Large: 4 25%<=s		
<b>Large: 1</b>	6 (3.23%) Mn US\$ 34.8 (1.10%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	6 (3.23%) Mn US\$ 34.8 (1.10%)	
<b>Growing: (short &amp; long term): 2</b>	166 (89.25%) Mn US\$ 2 991.0 (94.81%)	(0.00%) Mn US\$ 0.0 (0.00%)	1 (0.54%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	167 (89.78%) Mn US\$ 2 991.0 (94.81%)	
<b>Large &amp; Growing: (only short term): 3</b>	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	
<b>Large &amp; Growing: (only long term): 4</b>	4 (2.15%) Mn US\$ 23.6 (0.75%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	4 (2.15%) Mn US\$ 23.6 (0.75%)	
<b>Large &amp; Growing: (both short &amp; long term): 5</b>	9 (4.84%) Mn US\$ 105.4 (3.34%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	9 (4.84%) Mn US\$ 105.4 (3.34%)	
<b>Grand Total</b>	185 (99.46%) Mn US\$ 3 154.7 (100.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	1 (0.54%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	186 (100.00%) Mn US\$ 3 154.8 (100.00%)	

Source: Authors, TRADE-DSM Navigator

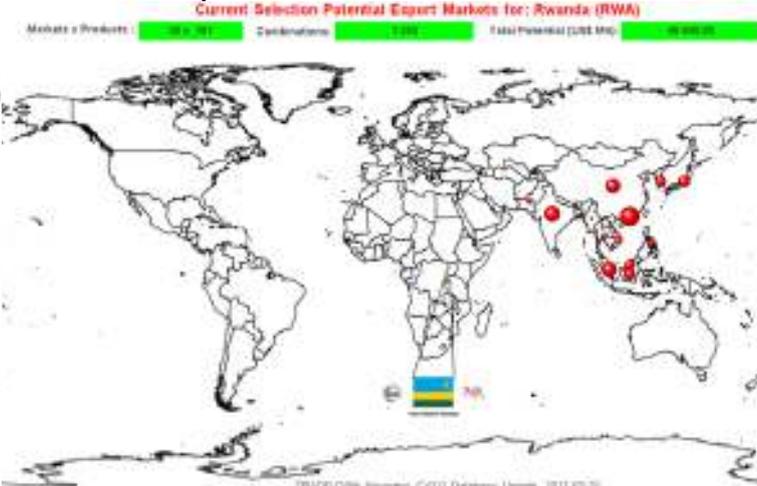
### 5.3.7. Outcomes – summary for Central, East & Southern (South-east) Asia

Figure 37: Central, East and South-East Asian REOs by major SITC group



Source: Authors, TRADE-DSM Navigator

Figure 38: Overview of Central, East and South-East Asia distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

Overall the Central, East and Southern Asian areas has the highest potential in number of country-line combinations as well as in value at US\$ 46.6 billion (see Figure 24 under global overview) with 30 potential markets and 181 product lines.

However, within the group the sub region of Eastern Asia (including markets such as Hong Kong, India, Japan, China, Korea etc.) contains the most opportunities (744) valued at US\$ 29.8 billion. South East Asia (Singapore, Indonesia, Malaysia, Vietnam, Thailand etc.) follows East Asia in terms of both number (488) and value at US\$ 16.8 billion.

Opportunities in this region are mainly in the SITC groups of Miscellaneous manufactured articles (S8), Food and live animals (S0), Crude materials, inedible, except fuels (S2) and Machinery and transport equipment (S7). The opportunities are much more diversely spread across REO classifications in the first column (from REO<sub>1,1</sub> with 27 percent of potential value to REO<sub>1,5</sub> with 25 percent of value) than any of the other regions.

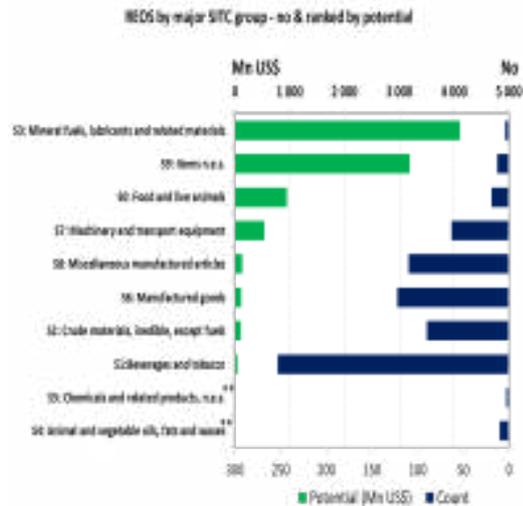
Table 13: REO Map outcomes for Central, East and South-East Asian opportunities for Rwanda

Map of Realistic Export Opportunities (REO) By type (Number and % of Total Number) (Products/Export (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0% to 5%)	Intermediate		Large: 4 (25 to %)	Grand Total
		Small: 2 (5% to 15%)	Large: 3 (15% to 25%)		
<b>Large: 1</b>	12 (7.80%) Mn US\$ 17,465.7 (26.27%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	12 (7.80%) Mn US\$ 17,465.7 (26.27%)
<b>Growing: 2 (short &amp; long term)</b>	171 (66.05%) Mn US\$ 8,445.0 (18.11%)	4 (0.24%) Mn US\$ 0.2 (0.00%)	2 (0.16%) Mn US\$ 0.2 (0.00%)	4 (0.22%) Mn US\$ 0.5 (0.00%)	180 (66.77%) Mn US\$ 8,445.7 (18.11%)
<b>Large &amp; Growing: 3 (only short term)</b>	25 (2.01%) Mn US\$ 4,227.0 (9.07%)	2 (0.16%) Mn US\$ 41.0 (0.09%)	1 (0.08%) Mn US\$ 6.5 (0.01%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	28 (2.25%) Mn US\$ 4,275.4 (9.17%)
<b>Large &amp; Growing: 4 (only long term)</b>	67 (5.18%) Mn US\$ 9,876.6 (21.18%)	1 (0.08%) Mn US\$ 5.0 (0.01%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	68 (5.47%) Mn US\$ 9,881.6 (21.18%)
<b>Large &amp; Growing: 5 (both short &amp; long term)</b>	213 (17.14%) Mn US\$ 11,483.2 (24.62%)	2 (0.16%) Mn US\$ 64.2 (0.14%)	3 (0.24%) Mn US\$ 18.7 (0.04%)	2 (0.16%) Mn US\$ 4.0 (0.01%)	220 (17.20%) Mn US\$ 11,570.2 (24.81%)
<b>Grand Total</b>	1,223 (98.39%) Mn US\$ 46,498.5 (99.70%)	6 (0.64%) Mn US\$ 110.9 (0.24%)	6 (0.48%) Mn US\$ 25.8 (0.06%)	6 (0.48%) Mn US\$ 4.3 (0.01%)	1,241 (100.00%) Mn US\$ 46,639.7 (100.00%)

Source: Authors, TRADE-DSM Navigator

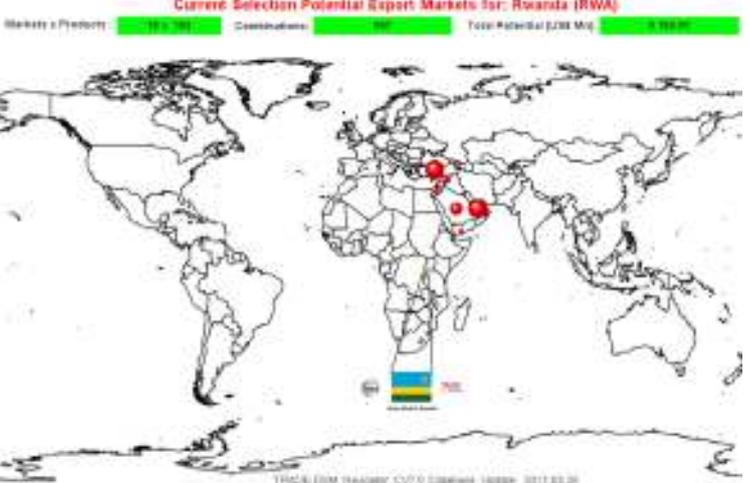
### 5.3.8. Outcomes – summary for Western Asia (Middle East)

Figure 39: Western Asia (Middle East) REOs by major SITC group



Source: Authors, TRADE-DSM Navigator

Figure 40: Overview of Western Asia (Middle East) distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

Overall the geographic area of Western Asia (comprising most “middle eastern” countries) is ranked as the 5<sup>th</sup> highest region in terms of potential value with around US\$ 687 million (see Figure 24 under global overview) with 18 markets and 163 product lines.

Ignoring petroleum (S3) and gold (S9), opportunities in this region are mainly in the SITC groups of Food and live animals (S0) and Machinery and transport equipment (S7). Interestingly, while not that large in potential value terms, Beverages and tobacco (S1) shows the most potential in terms of number of product lines.

The opportunities are focused in mainly REO<sub>1,2</sub> (growing import demand in both short and long term, but in relative terms not such large markets as some others such as the e.g. the USA and Northern and Western Europe) with around 63 percent in potential terms concentrated in this REO class.

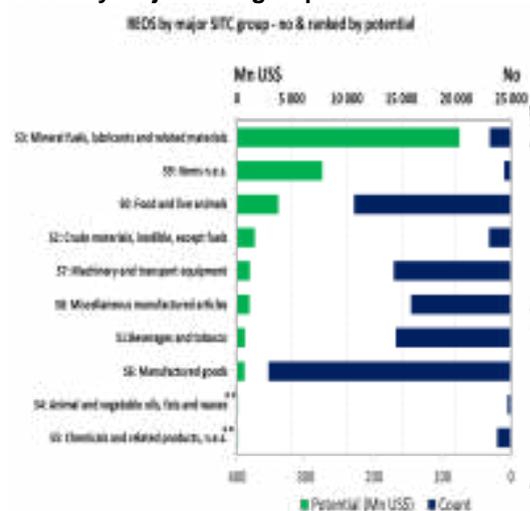
Table 14: REO Map outcomes for Western Asia (Middle East) opportunities for Rwanda

Map of Realistic Export Opportunities (REO) By type (Number and % of Total Number) (Products/Export (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0% to 5%)	Intermediate		Large: 4 (25 to 50%)	Grand Total
		Small: 2 (5% to 15%)	Large: 3 (15% to 25%)		
Large: 1	11 (2.04%) Mn US\$ 960.7 (13.45%)	1 (0.15%) Mn US\$ 7.8 (0.03%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	12 (2.19%) Mn US\$ 968.1 (13.48%)
Growing: (short & long term): 2	7 (17.19%) Mn US\$ 5,280.1 (62.88%)	2 (0.29%) Mn US\$ 7.3 (0.02%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	9 (87.48%) Mn US\$ 5,287.3 (62.91%)
Large & Growing: (only short term): 3	4 (0.58%) Mn US\$ 41.4 (0.47%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	4 (0.58%) Mn US\$ 41.4 (0.45%)
Large & Growing: (only long term): 4	17 (2.47%) Mn US\$ 1,774.3 (19.03%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	17 (2.47%) Mn US\$ 1,774.3 (19.03%)
Large & Growing: (both short & long term): 5	50 (7.30%) Mn US\$ 530.9 (6.09%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	50 (7.30%) Mn US\$ 530.9 (6.09%)
Grand Total	84 (99.56%) Mn US\$ 9,187.7 (99.61%)	3 (0.44%) Mn US\$ 5.1 (0.05%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	87 (100.00%) Mn US\$ 9,192.8 (100.00%)

Source: Authors, TRADE-DSM Navigator

### 5.3.9. Outcomes – summary for Northern & Western Europe

Figure 41: Northern and Western European REOs by major SITC group



Source: Authors, TRADE-DSM Navigator

Figure 42: Overview of Northern and Western Europe distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

The geographic areas of Northern and Western Europe combined (comprising 17 countries) is second in terms of potential value at US\$ 37.4 billion after the combined Central, East and Southern Asian markets.

Again ignoring petroleum (S3) and gold (S9), opportunities in this region are mainly in the SITC groups of Food and live animals (S0) and Crude materials, inedible, except fuels (S2). Interestingly, while not that large in potential value terms, Manufactured goods (S6) shows the most potential in terms of number of product lines.

A reflection of the general size of markets contained in these geographic areas, the opportunities are focused in mainly REO<sub>1,5</sub> (large import demand and growing in both short and long term), with around 63 percent in potential terms concentrated in this REO class. However, it must also be kept in mind that intra-european trade influences these outcomes and will be competition for products coming into these markets.

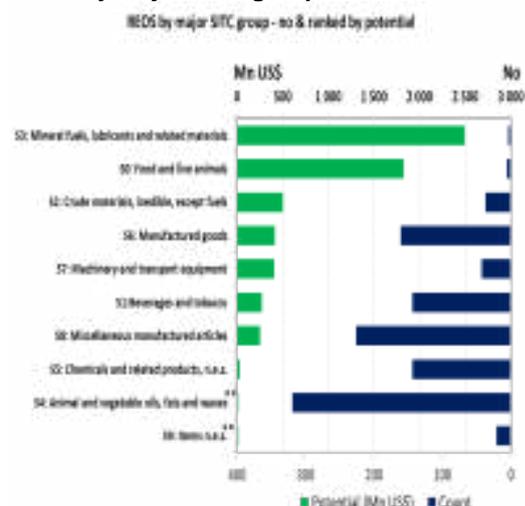
Table 15: REO Map outcomes for Northern and Western European opportunities for Rwanda

Map of Realistic Export Opportunities (REO) By type (Number and % of Total Number) (Potential Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0% to 5%)	Intermediate		Large: 4 (25 to %)	Grand Total
		Small: 2 (5% to 15%)	Large: 3 (15% to 25%)		
Product-country or target market (s) import demand size and growth characteristics	Large: 1	10 (16.72%) Mn US\$ 4 020.9 (10.76%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	10 (16.72%) Mn US\$ 4 020.9 (10.76%)
	Growing: 2 (short & long term)	170 (52.32%) Mn US\$ 4 550.0 (12.38%)	7 (0.17%) Mn US\$ 0.0 (0.00%)	6 (0.51%) Mn US\$ 0.4 (0.00%)	183 (55.00%) Mn US\$ 4 552.2 (12.38%)
	Large & Growing: 3 (only short term)	66 (19.6%) Mn US\$ 3 260.8 (8.71%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	66 (19.6%) Mn US\$ 3 260.8 (8.71%)
	Large & Growing: 4 (only long term)	63 (19.40%) Mn US\$ 1 624.1 (4.35%)	1 (0.03%) Mn US\$ 1.4 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	64 (19.43%) Mn US\$ 1 625.6 (4.35%)
	Large & Growing: 5 (both short & long term)	241 (70.67%) Mn US\$ 23 898.1 (63.97%)	1 (0.03%) Mn US\$ 2.0 (0.00%)	1 (0.03%) Mn US\$ 0.0 (0.00%)	243 (70.84%) Mn US\$ 23 898.1 (63.97%)
Grand Total	1 155 (99.00%) Mn US\$ 37 357.8 (99.99%)	4 (0.34%) Mn US\$ 4.0 (0.01%)	7 (0.00%) Mn US\$ 0.0 (0.00%)	1 166 (100.00%) Mn US\$ 37 357.8 (100.00%)	

Source: Authors, TRADE-DSM Navigator

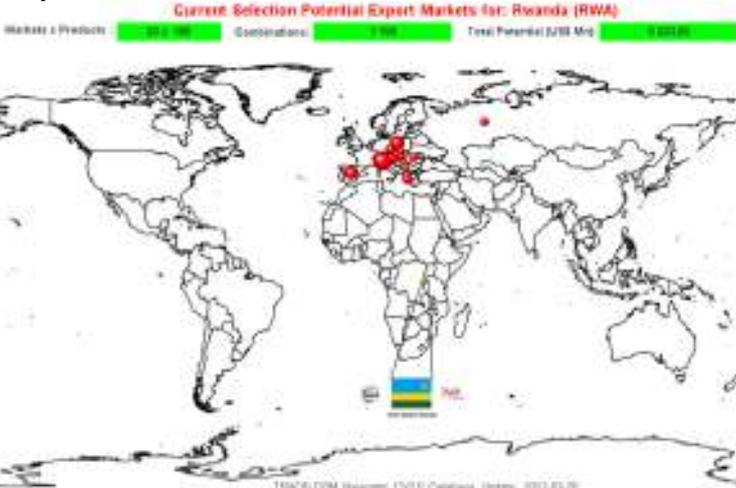
### 5.3.10. Outcomes – summary for Southern & Eastern Europe

Figure 43: Southern and Eastern European REOs by major SITC group



Source: Authors, TRADE-DSM Navigator

Figure 44: Overview of Southern and Eastern Europe distribution of potential associated with REOs for Rwanda



Source: Authors, TRADE-DSM Navigator

Southern and Eastern Europe combined comprises 23 countries associated with potential value of US\$ 6.2 billion. In terms of markets within the regions Italy, Spain, Poland, the Russian Federation and Czech Republic represents the majority of potential in value terms (around 84 percent of the value), but only 36 percent of the number of product lines.

Excluding petroleum (S3) and gold (S9), opportunities in this region are mainly in the SITC groups of Food and live animals (S0), Crude materials, inedible, except fuels (S2) and Manufactured goods (S6). Interestingly, while not that large in potential value terms, Animal and vegetable oils, fats and waxes (S4) shows the most potential in terms of number of product lines.

A reflection of the general size of markets contained in these geographic areas being on the smaller side the opportunities are focused in mainly REO<sub>1,2</sub> (growing in both short and long term but with the exception of the above mentioned countries, not large markets), with around 57 percent in potential terms concentrated in this REO class.

Table 16: REO Map outcomes for Southern and Eastern European opportunities for Rwanda

Map of Realistic Export Opportunities (REO) By type (Number and % of Total Number) (Divide by Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 0% to 5%	Intermediate		Large: 4 25 to %	Grand Total
		Small: 2 5% to 15%	Large: 3 15% to 25%		
Large: 1	17 (5.61%) Mn US\$ 668.0 (11.29%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	17 (5.61%) Mn US\$ 668.0 (11.29%)
Growing: (short & long term): 2	108 (81.27%) Mn US\$ 3,546.7 (57.01%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	1 (0.08%) Mn US\$ 0.0 (0.00%)	109 (81.36%) Mn US\$ 3,546.7 (57.02%)
Large & Growing: (only short term): 3	11 (1.00%) Mn US\$ 47.4 (0.76%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	11 (1.00%) Mn US\$ 47.4 (0.76%)
Large & Growing: (only long term): 4	52 (2.90%) Mn US\$ 568.0 (9.08%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	52 (2.90%) Mn US\$ 568.0 (9.08%)
Large & Growing: (both short & long term): 5	101 (4.14%) Mn US\$ 1,205.0 (19.38%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	101 (4.14%) Mn US\$ 1,205.0 (19.38%)
Grand Total	1104 (99.91%) Mn US\$ 6,223.7 (100.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	0 (0.00%) Mn US\$ 0.0 (0.00%)	1 (0.09%) Mn US\$ 0.0 (0.00%)	1105 (100.00%) Mn US\$ 6,223.7 (100.00%)

Source: Authors, TRADE-DSM Navigator

#### **5.4. Specific focus on neighbouring markets**

The following countries are either bordering on Rwanda or are of specific regional interest due to relatively close proximity to Rwanda. Direct neighbours are the Burundi, the DRC, Tanzania and Uganda. The Congo (Brazzaville), Kenya, Somalia and South Sudan are not directly bordering Rwanda but of regional interest.

For each of these countries brief context is provided as well as a view on total trade and major trading partners over the period 2010 to 2015. The outcomes from the DSM methodology as applied and obtained for these 8 countries are then provided in an overview and tabular format, followed by a short illustrative overview of the 5 major opportunities at the HS6-digit product line detail for each country.

The purpose of this section is not to be exhaustive nor authoritative, but rather illustrative of how the outcomes from the DSM approach can be applied for decision making. While an advantage is that the outcomes are provided at the HS6-digit product line detail, at the same time this can pose a challenge since data quality and frequency of reporting at this level can be problematic for lesser developed countries. Hence the emphasis on illustrative rather than authoritative outcomes in this section, as to really sensibly and responsibly inform strategic decisions each of the detail opportunities still would require more detailed investigation and evaluation (see e.g. the mining equipment example for the Congo and rice for the DRC).

However, the advantage of this approach demonstrated in this section is that it does allow for decision making and planning support at a detailed level but in a pragmatic fashion, while also informing more macro-level decisions as illustrated in the preceding section.

### 5.4.1. Congo (Brazzaville) (C178)

The Congo is removed by one country (the Democratic Republic of the Congo) from Rwanda. Overall the Congo covers an area of 342 000 square kilometres and size wise is ranked as number 64 in the world.

The economy consists of mainly a mixture of subsistence farming and hunting, an industrial sector based largely on oil and support services, and government spending. In terms of GDP the economy is estimated at US\$ 9 billion (2015) and the country's estimated population in 2015 was 4.6 million persons (United Nations, 2016). The Congo's economy is relatively open in terms of imports to GDP at 64 percent (2015), but around 47 percent of the population live below the national poverty line (WFP, 2017b).

Based on the data as compiled by CEPII the Congo (Brazzaville) on average exported around US\$ 4 billion to US\$ 10 billion over the period 2010 to 2015, with 2014 being an exceptional year.

In terms of imports it is evident from Figure 46 that merchandise imports have increased steadily over the period 2010 to 2015, while the trade balance have deteriorated. The top 10 trading partners (excluding Rwanda) supplies in excess of 60 percent of the Congo's imports.

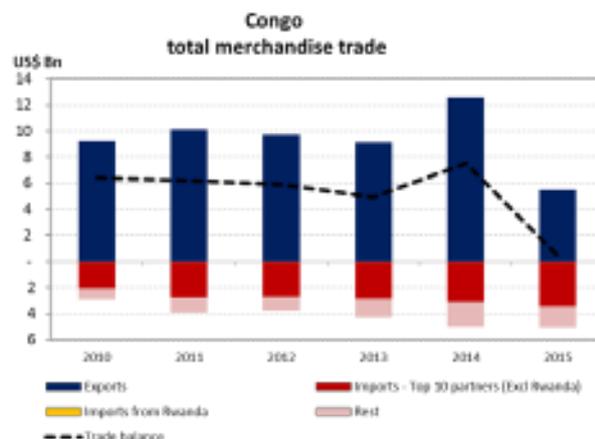
Over the period China is the leading source of imports, followed by France, Italy, Belgium and the United States of America. Evident from Figure 47 is that Rwanda does not feature as a major supplier of imports to the Congo, on time-weighted basis over the period 2011 to 2015 only supplying US\$ 130 000.00 worth of imports to the Congo. However, there are products that Rwanda is able to successfully export which the Congo does import from other suppliers.

Figure 45: Map of the Congo



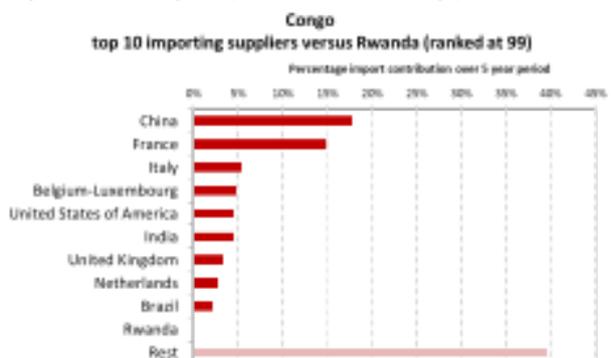
Source: The World Factbook (CIA)

Figure 46: Congo overall merchandise trade



Source: Authors, BACI data

Figure 47: Congo top overall importing partners



Source: Authors, BACI data

All the opportunities (14) identified for Rwanda into the Congo are classified as REO<sub>1,2</sub> (growing in both short and long term, but overall not large opportunities). The overall potential is calculated at around US\$ 12 million only. The spread of these opportunities that the Congo does import and that the DSM methodology highlights as potential realistic export opportunities from Rwanda into the Congo are depicted in Figure 48. More detail on each of these is provided in Table 18.

The largest opportunities seem to be in mining equipment, beer, processed vegetables with a focus on tomatoes, fresh eggs and artificial jewellery.

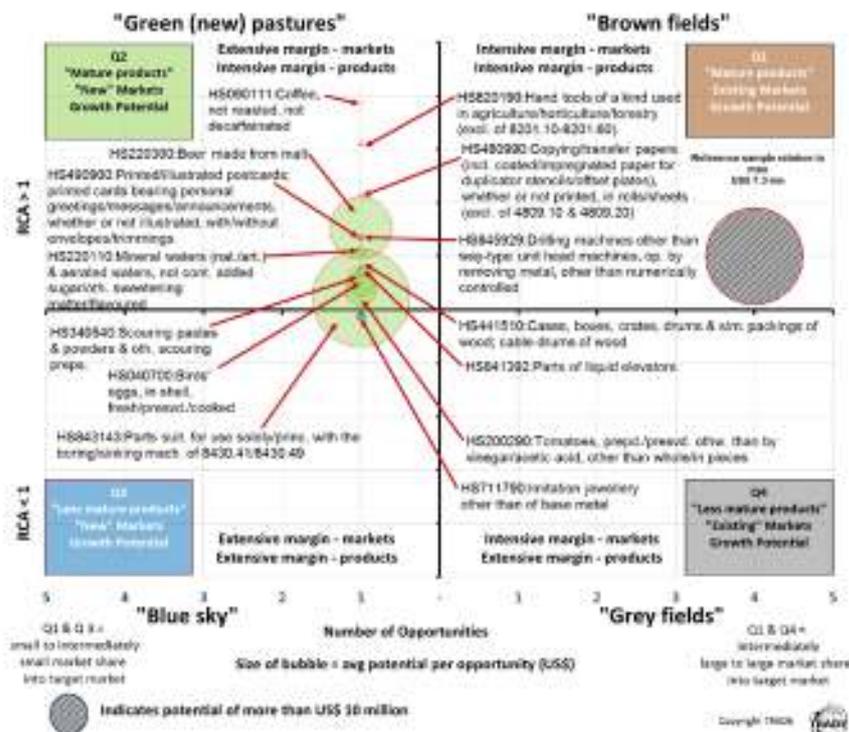
**Table 17: REO Map outcomes for Congo opportunities for Rwanda**

Product-country or target market (s) import demand size and growth characteristics	Map of Realistic Export Opportunities (REO) by type (Number and % of Total Number) (Potential value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
		Small: 1 (0%<=20%)	Intermediate		Large: 4 (50%<=100%)	Grand Total
			Small: 2 (20%<=50%)	Large: 3 (20%<=50%)		
Large: 1	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	
Growing: 2 (short & long term):	14 (100.00%) Mn US\$ 12.0 (100.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	14 (100.00%) Mn US\$ 12.0 (100.00%)	
Large & Growing: 3 (only short term):	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	
Large & Growing: 4 (only long term):	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	
Large & Growing: 5 (both short & long term):	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	
Grand Total	14 (100.00%) Mn US\$ 12.0 (100.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	14 (100.00%) Mn US\$ 12.0 (100.00%)	

Source: Authors, TRADE-DSM Navigator

The nature of the Congo's economy (due to petroleum production) in terms of difference from other regional neighbours reflects in the nature of demand and opportunities identified in Figure 48. Only 5 of the 14 opportunities relates to food products, the rest more towards manufactured products. However, while the country's human development rating is high by regional standards, it masks unequal wealth distribution and high poverty rates (WFP, 2017b).

**Figure 48: Rwanda REO opportunities for Congo Brazzaville (excluding petroleum and gold)**



Source: Authors, TRADE-DSM

**Table 18: Identified REOs (14) for Rwanda into the Congo (ranked descending by potential)**

Item	Product	REO type	RCA	[A] Realistic Export Potential to Target Market(s) '000 US\$	[B] Total Exports from Rwanda to Target Market(s) '000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s) Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) '000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) '000 US\$	[G] Target Market(s) Total Imports '000 US\$
		<b>14</b>	<b>-</b>	<b>11 976.63</b>	<b>2.46</b>	<b>0.0%</b>	<b>71 859.78</b>	<b>15 624.47</b>	<b>87 486.71</b>
1	HS843143 : Parts suit. for use solely/princ. with buckets, shovels, grabs & grips - Parts suit. for use solely/princ. with the boring/sinking mach. of 8430.41/8430.49	REO1,2	1.28	7 332.42	0.00	0.0%	43 994.52	15 089.73	59 084.25
2	HS220300 : Beer made from malt	REO1,2	5.82	2 975.22	2.46	0.0%	17 851.32	310.11	18 163.90
3	HS200290 : Tomatoes, prepd./presvd. othw. than by vinegar/acetic acid, other than whole/in pieces	REO1,2	1.53	772.74	0.00	0.0%	4 636.42	10.29	4 646.71
4	HS040700 : Birds' eggs, in shell, fresh/presvd./cooked	REO1,2	1.83	618.33	0.00	0.0%	3 709.97	111.90	3 821.87
5	HS711790 : Cuff-links & studs of base metal, whether or not plated with precious metal - Imitation jewellery other than of base metal	REO1,2	0.87	62.21	0.00	0.0%	373.29	12.82	386.11
6	HS220110 : Mineral waters (nat./art.) & aerated waters, not cont. added sugar/oth. sweetening matter/flavoured	REO1,2	3.48	56.96	0.00	0.0%	341.74	0.68	342.42
7	HS841392 : Centrifugal pumps (excl. of 8413.11-8413.40) - Parts of liquid elevators	REO1,2	2.31	45.82	0.00	0.0%	274.91	16.77	291.69
8	HS340540 : Polishes & creams, scouring pastes & powders & sim. preps. (excl. waxes of ... - Scouring pastes & powders & oth. scouring preps.	REO1,2	2.14	33.88	0.00	0.0%	203.29	0.30	203.58
9	HS845929 : Boring machines n.e.s. in 84.59, op. by removing metal - Drilling machines other than way-type unit head machines, op. by removing metal, other than numerically controlled	REO1,2	4.72	32.26	0.00	0.0%	193.57	47.26	240.83
10	HS820190 : Axes, bill hooks & sim. hewing tools - Hand tools of a kind used in agriculture/horticulture/forestry (excl. of 8201.10- 8201.60)	REO1,2	35.21	11.73	0.00	0.0%	70.40	7.16	77.56
11	HS441510 : Cases, boxes, crates, drums & sim. packings of wood; cable-drums of wood	REO1,2	2.53	11.18	0.00	0.0%	67.11	10.09	77.20
12	HS490900 : Printed/illustrated postcards; printed cards bearing personal greetings/messages/announcements, whether or not illustrated, with/without envelopes/trimmings	REO1,2	4.70	10.78	0.00	0.0%	64.68	4.56	69.23
13	HS480990 : Copying/transfer papers (incl. coated/impregnated paper for duplicator stencils/offset plates), whether or not printed, in rolls/sheets (excl. of 4809.10 & 4809.20)	REO1,2	11.69	9.14	0.00	0.0%	54.86	2.72	57.58
14	HS090111 : Coffee husks & skins; coffee substitutes cont. coffee in any proportion - Coffee, not roasted, not decaffeinated	REO1,2	85.83	3.95	0.00	0.0%	23.71	0.07	23.78

Source: Authors, TRADE-DSM

While there are 14 HS6-digit product lines in total that the methodology identifies, the top 5 only are discussed in more detail in this section of the report.

### 5.4.1.1. Parts of self-propelled drilling equipment (REO<sub>1,2</sub>)

The largest realistic export opportunity identified for Rwanda into the Congo is that of **HS843143: Parts suitable for use solely/principally with buckets, shovels, grabs & grips - Parts suitable for use solely/principally with the boring/sinking machinery. of 8430.41/8430.49.**

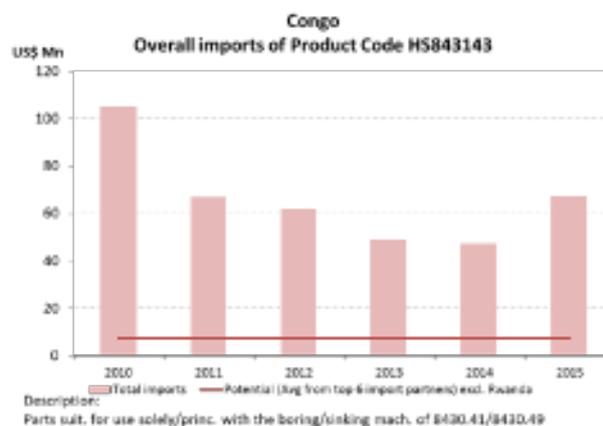
The product is produced in the Manufacture of machinery for mining, quarrying and construction sector (S3574) and of medium skill- and technology intensity. Rwanda has an RCA of 1.28 for this product and potential estimated at US\$ 7.3 million (based on the calculation as explained in the appendix in section 9.1.6). However, the characteristics of this product indicate that this may be a re-export and would require more detailed research before any investment decisions are taken.

Figure 49 provides the imports of the Congo of this product over the period 2010 to 2015, as well as the realistic potential estimate.

Figure 50 depicts the export of this product from Rwanda to the top destinations – under which the Congo does not feature. At the same time top suppliers to the Congo are depicted, again Rwanda not being one of these.

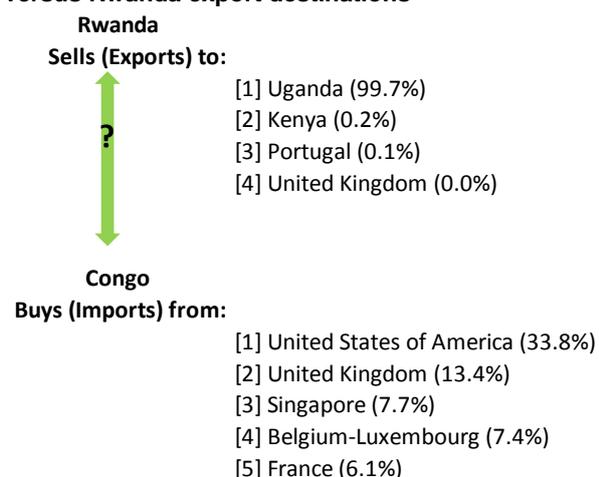
The main export destination from Rwanda is Uganda, while the main import origins for the Congo are the United States of America, the United Kingdom, Singapore, Belgium and France.

Figure 49: Congo REO for HS843143



Source: Authors, TRADE-DSM

Figure 50: Congo REO HS843143 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.1.2. Beer (REO<sub>1,2</sub>)

The second largest realistic export opportunity identified for Rwanda into the Congo is that of **HS220300: Beer made from malt**.

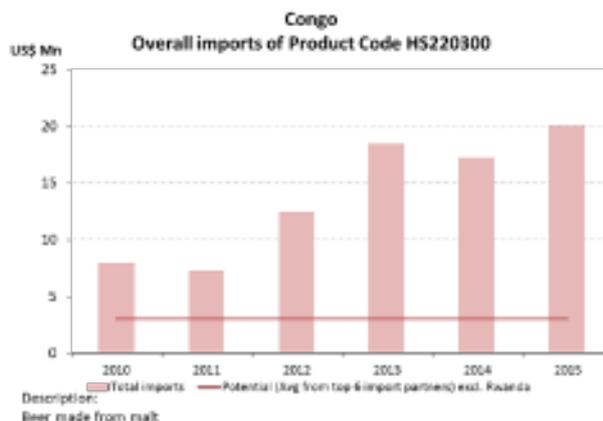
The product is produced in Manufacture of beer and other malt liquors and malt sector (S3052) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 5.82 for this product and potential estimated at US\$ 2.9 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 51 provides the imports of the Congo of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into the Congo exhibits a steady growth over the period.

Figure 52 depicts the export of this product from Rwanda to the top destinations with the Congo appearing at number 5 but an insignificant 0.1 percent. At the same time top suppliers to the Congo are depicted and Rwanda is not included as one of these.

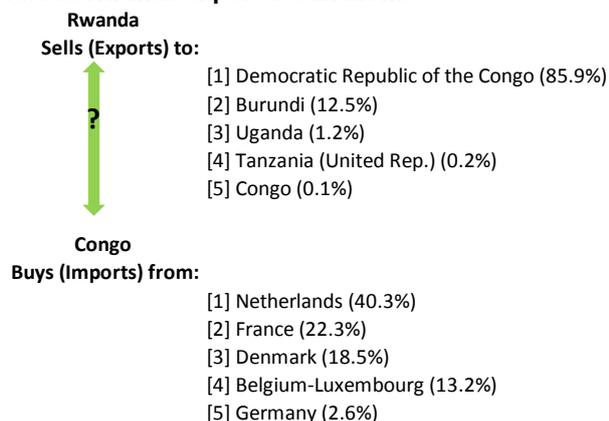
The main export destination from Rwanda is the DRC, while the main import origins for the Congo are the Netherlands, France, Denmark and Belgium.

**Figure 51: Congo REO for HS220300**



Source: Authors, TRADE-DSM

**Figure 52: Congo REO HS220300 import origins versus Rwanda export destinations**



Source: Authors, TRADE-DSM

### 5.4.1.3. Processed tomatoes (REO<sub>1,2</sub>)

The third largest realistic export opportunity identified for Rwanda into the Congo is that of **HS200290: Tomatoes, prepd./presvd. othw. than by vinegar/acetic acid, other than whole/in pieces.**

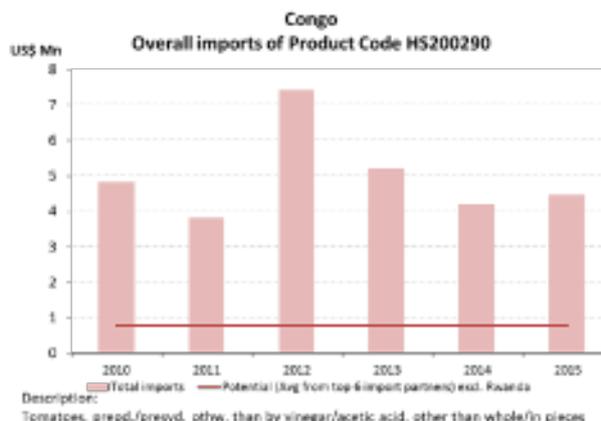
The product is produced in Processing and preserving of fruit and vegetables sector (S3013) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 1.53 for this product and potential estimated at US\$ 773 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 53 provides the imports of the Congo of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into the Congo exhibits a flat pattern over the period of around US\$ 4 million.

Figure 54 depicts the export of this product from Rwanda to the top destinations with the Congo not appearing. At the same time top suppliers to the Congo are depicted and Rwanda is not included as one of these.

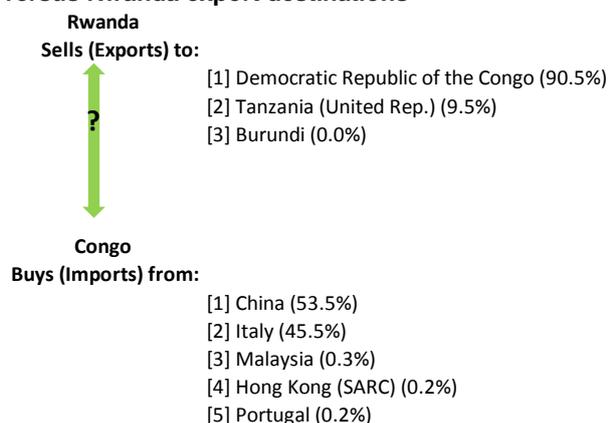
The main export destination from Rwanda is the DRC followed by Tanzania, while the main import origins for the Congo are the China and Italy.

Figure 53: Congo REO for HS200290



Source: Authors, TRADE-DSM

Figure 54: Congo REO HS200290 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

#### 5.4.1.4. Eggs (REO<sub>1,2</sub>)

The third largest realistic export opportunity identified for Rwanda into the Congo is that of **HS040700: Birds' eggs, in shell, fresh/presvd./cooked.**

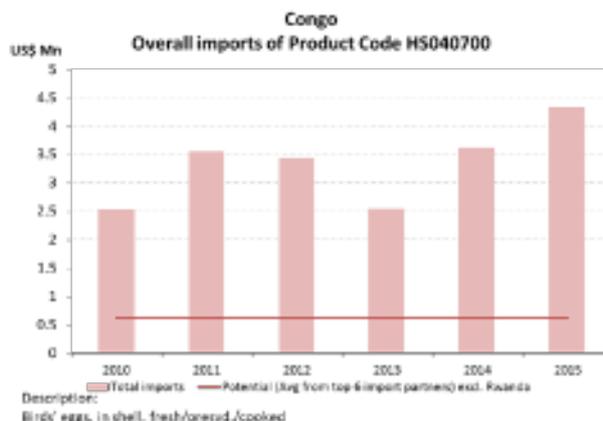
The product is produced in the sector group of Growing of crops; market gardening; horticulture' farming of animals' growing of crops combined with farming of animals (\$1110,1120,1130) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 1.83 for this product and potential estimated at US\$ 773 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 55 provides the imports of the Congo of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into the Congo exhibits an increasing pattern over the period of around US\$ 3.5 million.

Figure 56 depicts the export of this product from Rwanda to the top destinations with the Congo not appear. At the same time top suppliers to the Congo are depicted and Rwanda is not included as one of these.

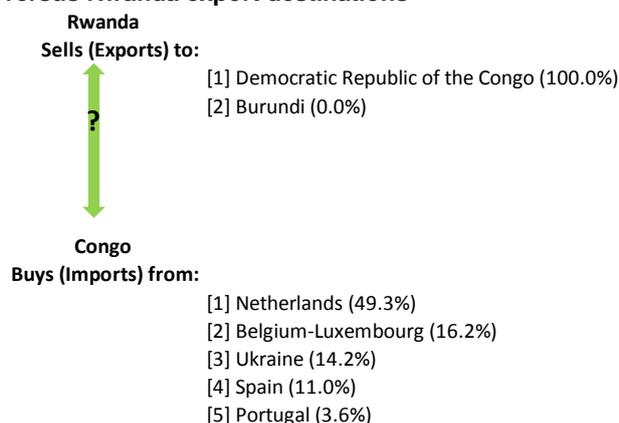
The main export destination from Rwanda is the DRC (Burundi appears to have zero due to rounding), while the main import origins for the Congo are the Netherlands, Belgium and the Ukraine.

Figure 55: Congo REO for HS040700



Source: Authors, TRADE-DSM

Figure 56: Congo REO HS040700 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.1.5. Artificial jewellery (REO<sub>1,2</sub>)

The third largest realistic export opportunity identified for Rwanda into the Congo is that of **HS711790: Imitation jewellery other than of base metal**.

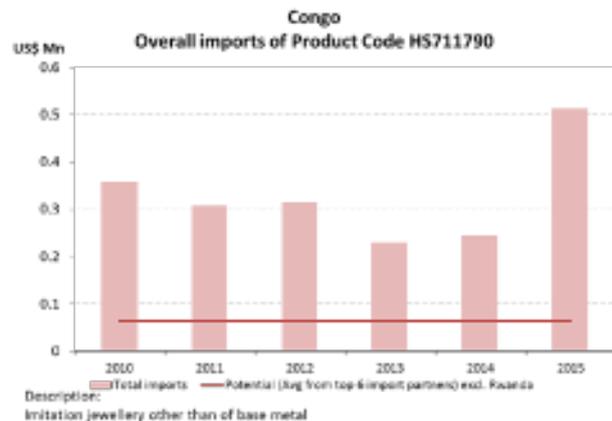
The product is produced in the sector Manufacture of jewellery and related articles (S3921) and classified as resource-intensive manufactures. Rwanda has an RCA of 0.87 for this product and potential estimated at US\$ 62 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 57 provides the imports of the Congo of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into the Congo exhibits a sharp increase in 2015.

Figure 58 depicts the export of this product from Rwanda to the top destinations with the Congo not appear. At the same time top suppliers to the Congo are depicted and Rwanda is not included as one of these.

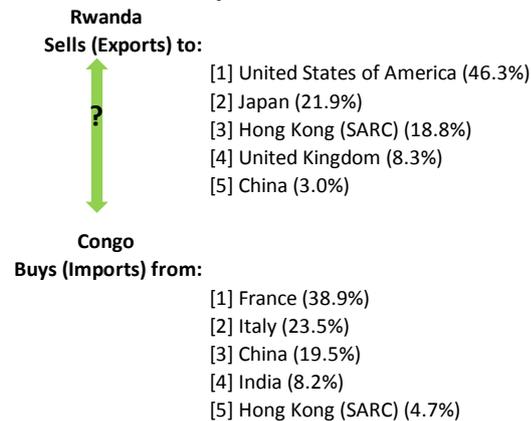
The main export destination from Rwanda is the United States of America, Japan, Hong Kong and the United Kingdom, while the main import origins for the Congo are the France, Italy, China and India.

**Figure 57: Congo REO for HS711790**



Source: Authors, TRADE-DSM

**Figure 58: Congo REO HS711790 import origins versus Rwanda export destinations**



Source: Authors, TRADE-DSM

## 5.4.2. Democratic Republic of the Congo (C180)

The Democratic Republic of the Congo (DRC) borders Rwanda from the west and is significantly larger than Rwanda. Overall the DRC covers an area of 2 344 858 square kilometres and size wise is ranked as number 11 in the world. Much economic activity still occurs in the informal sector and is not reflected in GDP data. The economy is mainly dependent on mining and exports of commodities. In terms of GDP the economy is estimated at US\$ 23 billion (2015) and the country's estimated population in 2015 was 77.3 million persons (United Nations, 2016). The DRC's economy is relatively open in terms of imports to GDP at 35.8 percent (2015). Around 64 percent of the population live below the national poverty line (WFP, 2017c).

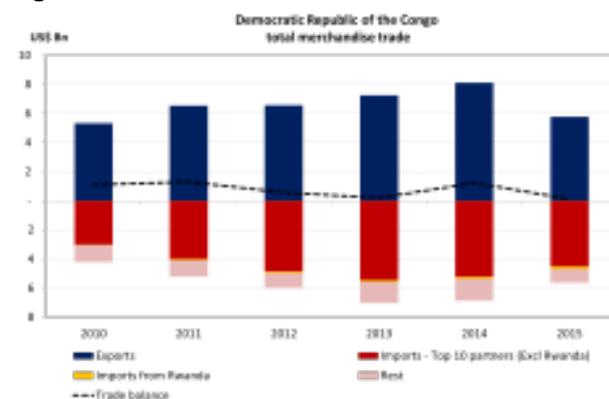
Figure 59: Map of the DRC



Source: The World Factbook (CIA)

Based on the data as compiled by CEPII the DRC on average exported around US\$ 4 billion to US\$ 8 billion over the period 2010 to 2015, with 2015 showing a sharp decline. In terms of imports it is evident from Figure 60 that merchandise imports have increased steadily over the period 2010 to 2013 then started to decline. The top 10 trading partners (excluding Rwanda) supplies in excess of 67.2 percent of the DRC's imports.

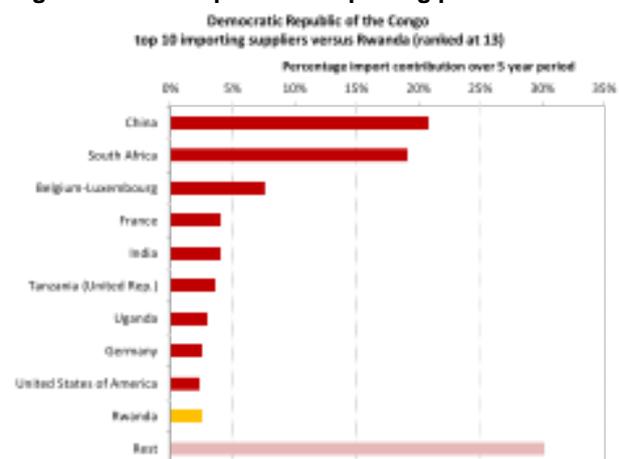
Figure 60: DRC overall merchandise trade



Source: Authors, BACI data

Over the period China is the leading source of imports, followed by South Africa, Belgium, France, India and Tanzania. Evident from Figure 61 is that Rwanda supplies around 2.5 percent of imports to the DRC. On time-weighted basis over the period 2011 to 2015 Rwanda supplied US\$ 159.6 million worth of imports to the DRC. There are 27 opportunities identified for Rwanda into the DRC. Most (25 of 27) are classified as growing in both short and long term, but overall not large opportunities (REO<sub>2,n</sub> – so row 2).

Figure 61: DRC top overall importing partners



Source: Authors, BACI data

Two where Rwanda already is a major supplier (REO<sub>4,1</sub> - HS811259: Thallium & arts. thereof, n.e.s. in 81.12) and (REO<sub>4,5</sub> - HS110220: Maize (corn) flour) are also indicated. The overall potential is calculated at around US\$ 7.1 million only.

There are 20 of these products that Rwanda supplies to the DRC in Quadrant 1 (intensive margin) while 5 products are located in Quadrant 2 (extensive margin for markets, intensive margins for the products) as depicted in Figure 62. Then one in Q3 and one in Q4. More detail on each of these is provided in Table 20.

The largest opportunities seem to be in beer, rice, containers (for specialised transport), processed vegetables with a focus on tomato ketchup and maize (corn) flour.

The nature of the DRC's economy in terms of food insecurity and resource challenges reflect in the nature of demand and opportunities identified in

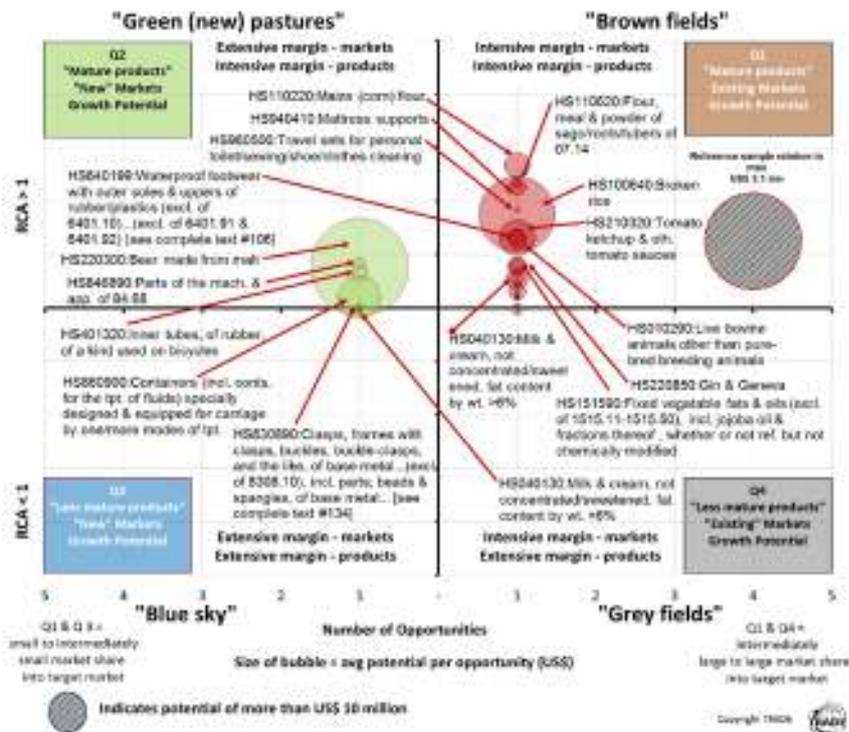
Figure 62. The majority of products relate to food or basic housing items (such as mattresses) but also to mineral resource related activities (waterproof footwear, clasps and buckles, containers and machinery parts).

Table 19: REO Map outcomes for DRC opportunities for Rwanda

Map of Realistic Export Opportunities (REO) by type (Number and % of Total Number) (Potential Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0%<=MS<=5%)	Intermediate		Large: 4 (50%<=MS<=100%)	Grand Total
		Small: 2 (5%<MS<=20%)	Large: 3 (20%<MS<=50%)		
Large: 1	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	1 (3.70%) Mn US\$ 0.0 (0.00%)	1 (3.70%) Mn US\$ 0.0 (0.00%)
Growing: 2 (short & long term):	4 (14.81%) Mn US\$ 0.6 (8.81%)	2 (7.41%) Mn US\$ 3.1 (44.02%)	8 (29.63%) Mn US\$ 2.3 (32.26%)	11 (40.74%) Mn US\$ 0.9 (12.03%)	25 (92.59%) Mn US\$ 6.9 (97.10%)
Large & Growing: 3 (only short term):	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Large & Growing: 4 (only long term):	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Large & Growing: 5 (both short & long term):	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	1 (3.70%) Mn US\$ 0.2 (2.90%)	1 (3.70%) Mn US\$ 0.2 (2.90%)
Grand Total	4 (14.81%) Mn US\$ 0.6 (8.81%)	2 (7.41%) Mn US\$ 3.1 (44.02%)	8 (29.63%) Mn US\$ 2.3 (32.26%)	13 (48.15%) Mn US\$ 1.1 (14.91%)	27 (100.00%) Mn US\$ 7.1 (100.00%)

Source: Authors, TRADE-DSM Navigator

Figure 62: Rwanda REO opportunities for DRC (excluding petroleum and gold)



Source: Authors, TRADE-DSM

**Table 20: Identified REOs (27) for Rwanda into the Congo (ranked descending by potential)**

Item	Product	REO type	RCA	[A] Realistic Export Potential to Target Market(s) '000 US\$	[B] Total Exports from Rwanda to Target Market(s) '000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s) Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) '000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) '000 US\$	[G] Target Market(s) Total Imports '000 US\$
		<b>27</b>	-	<b>7 131.12</b>	<b>33 439.33</b>	<b>43.2%</b>	<b>42 697.42</b>	<b>1 319.49</b>	<b>77 456.24</b>
1	HS220300 : Beer made from malt	REO2,2	5.82	3 060.58	2 897.39	13.3%	18 363.47	530.70	21 791.56
2	HS100640 : Broken rice	REO3,2	56.29	1 843.20	5 079.77	31.4%	11 059.19	12.99	16 151.96
3	HS860900 : Containers (incl. conts. for the tpt. of fluids) specially designed & equipped for carriage by one/more modes of tpt.	REO1,2	1.55	575.13	0.00	0.0%	3 450.80	497.97	3 948.77
4	HS210320 : Mustard flour & meal & prepd. mustard - Tomato ketchup & oth. tomato sauces	REO4,2	20.86	408.53	1 368.09	35.6%	2 451.17	23.60	3 842.85
5	HS110220 : Cereal flour other than of wheat, meslin, rye, maize (corn), rice - Maize (corn) flour	REO4,5	465.02	206.47	8 067.36	86.7%	1 238.82	3.20	9 309.38
6	HS220110 : Mineral waters (nat./art.) & aerated waters, not cont. added sugar/oth. sweetening matter/flavoured	REO3,2	3.48	149.12	387.00	29.3%	894.73	38.63	1 320.37
7	HS220850 : Gin & Geneva	REO3,2	6.10	106.59	266.62	28.0%	639.55	47.52	953.69
8	HS010290 : Live bovine animals other than pure-bred breeding animals	REO4,2	19.61	102.88	6 692.57	91.5%	617.29	2.74	7 312.59
9	HS940410 : Mattress supports	REO4,2	181.94	101.76	5 710.24	90.0%	610.54	20.55	6 341.32
10	HS040210 : Milk & cream, concentrated (excl. in powder), sweetened - Milk in powder/granules/oth. solid form, fat content by wt. not >1.5%	REO4,2	2.03	93.70	663.97	51.8%	562.17	55.03	1 281.17
11	HS640199 : Waterproof footwear with outer soles & uppers of rubber/plastics (excl. of 6401.10)...(excl. of 6401.91 & 6401.92)	REO3,2	21.18	91.99	267.23	32.2%	551.94	12.01	831.18
12	HS151590 : Fixed vegetable fats & oils (excl. of 1515.11-1515.50), incl. jojoba oil & fractions thereof, whether or not ref. but not chemically modified	REO4,2	5.87	90.55	313.93	35.4%	543.30	28.71	885.93
13	HS401320 : Inner tubes, of rubber, of a kind used on bicycles	REO2,2	4.55	78.60	68.33	12.7%	471.58	0.04	539.95
14	HS040130 : Milk & cream, not concentrated/sweetened, fat content by wt. >6%	REO3,2	3.55	45.24	87.52	24.3%	271.46	0.49	359.47
15	HS846890 : Gas-operated mach. & app. for soldering/brazing/welding, other than hand-held ... - Parts of the mach. & app. of 84.68	REO1,2	6.78	41.17	0.00	0.0%	247.04	24.74	271.78
16	HS040291 : Milk & cream, concentrated (excl. in powder), unsweetened	REO3,2	0.91	40.50	64.21	20.5%	243.02	6.60	313.83
17	HS110620 : Flour, meal & powder of sago/roots/tubers of 07.14	REO4,2	209.60	28.56	816.33	87.7%	114.26	0.00	930.59
18	HS960329 :	REO3,2	1.05	15.24	37.04	28.6%	91.42	1.09	129.55

	Shaving brushes, hair brushes, nail brushes, eyelash brushes & oth. toilet brushes for use on the person, incl. such brushes constituting parts of appls.								
<b>19</b>	HS640420 : Footwear with outer soles of leather/composition leather & uppers of textile mats.	REO4,2	1.80	10.96	51.03	43.7%	65.76	0.03	116.83
<b>20</b>	HS960500 : Travel sets for personal toilet/sewing/shoe/clothes cleaning	REO3,2	68.70	8.78	15.05	19.0%	52.66	11.37	79.07
<b>21</b>	HS251612 : Granite, merely cut, by sawing/othw., into blocks/slabs of a rect. (incl. square) shape	REO4,2	2.83	7.80	43.94	58.5%	31.20	0.00	75.15
<b>22</b>	HS830890 : Clasps, frames with clasps, buckles, buckle-clasps, and the like, of base metal...(excl. of 8308.10), incl. parts; beads & spangles, of base metal... [see complete text #134]	REO1,2	1.14	6.44	0.00	0.0%	38.63	1.48	40.12
<b>23</b>	HS330190 : Essential oils of bergamot - Extracted oleoresins; concs. of essential oils in fats/fixed oils/waxes/the like, obt. by enfleurage/maceration	REO1,2	0.89	5.52	0.19	0.6%	33.10	0.00	33.29
<b>24</b>	HS210220 : Inactive yeasts; oth. single-cell micro-organisms, dead (excl. vaccines of 30.02)	REO4,2	1.66	5.09	49.18	65.9%	25.44	0.00	74.62
<b>25</b>	HS190520 : Gingerbread and the like	REO4,2	1.57	4.76	20.36	51.7%	19.04	0.00	39.40
<b>26</b>	HS520849 : Plain weave cotton fabric, >=85%, not more than 100 g/m2, unbleached - Woven fabrics of cotton (excl. of 5208.41-5208.43), cont. 85%/more by wt. of cotton, of yarns of diff. colours, weighing not >200g/m2	REO4,2	2.30	1.97	54.44	84.7%	9.86	0.00	64.29
<b>27</b>	HS811259 : Thallium & arts. thereof , n.e.s. in 81.12	REO4,1	$\frac{1}{577.64}$	0.00	417.54	100.0%	0.00	0.00	417.54

Source: Authors, TRADE-DSM

While there are 27 HS6-digit product lines in total that the methodology identifies, the top 5 only are discussed in more detail in this section of this report.

### 5.4.2.1. Beer (REO<sub>2,2</sub>)

The largest realistic export opportunity identified for Rwanda into the DRC is that of **HS220300: Beer made from malt**.

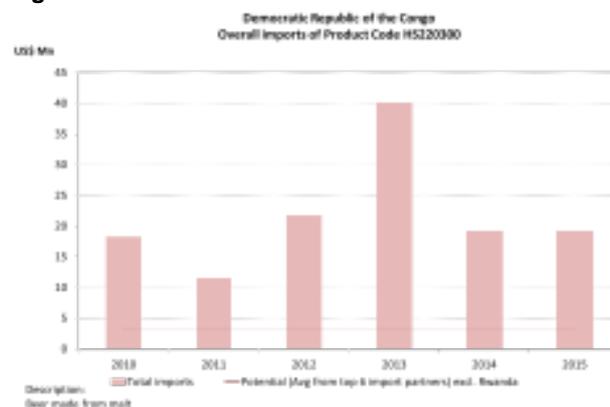
The product is produced in Manufacture of beer and other malt liquors and malt sector (S3052) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 5.82 for this product and potential estimated at US\$ 3.1 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 63 provides the imports of the DRC of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into the DRC had an exceptional year in 2013, with imports flat in 2014 and 2015.

Figure 64 depicts the export of this product from Rwanda to the top destinations with the DRC appearing at the top. At the same time top suppliers to the DRC are depicted and Rwanda is not included as it supplies less than 15 percent of the DRC's imports and is therefore still classified as a "green pastures" market for Rwanda.

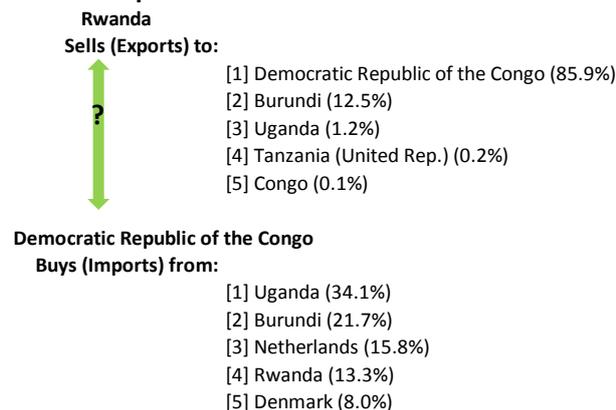
The main export destination from Rwanda is the DRC, while the main import origins for the DRC are the Uganda, Burundi, Netherlands, Rwanda and Denmark.

**Figure 63: DRC REO for HS220300**



Source: Authors, TRADE-DSM

**Figure 64: DRC REO HS220300 import origins versus Rwanda export destinations**



Source: Authors, TRADE-DSM

### 5.4.2.2. Rice (REO<sub>3,2</sub>)

The second largest realistic export opportunity identified for Rwanda into the DRC is that of **HS100640: Broken rice**.

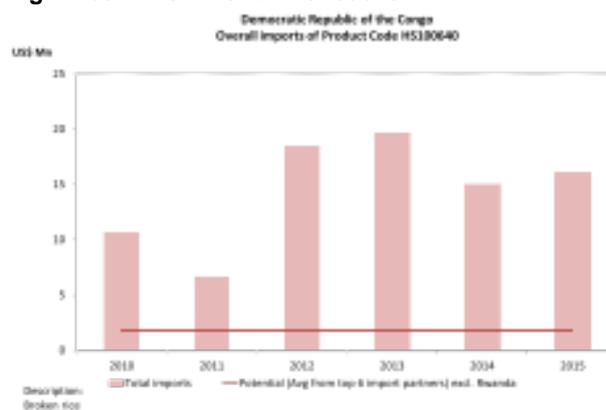
The product is produced in the Manufacture of grain mill products sector (S3031) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 56.29 for this product and potential estimated at US\$ 1.8 million (based on the calculation as explained in the appendix in section 9.1.6). Rwanda does have local production capacity for this product (see <http://ricepedia.org/rwanda>) and broken rice as a by-product started to be exported since around 2012.

Figure 65 provides the imports of the DRC of this product over the period 2010 to 2015 (around US\$ 15 million per annum), as well as the realistic potential estimate.

Figure 66 depicts the export of this product from Rwanda to the top destinations. The DRC features as number 1 (expected for a product-market line classified in Quadrant 1) followed by Uganda and Kenya. At the same time top suppliers to the DRC are depicted, with Rwanda the number 2 supplier after Uganda.

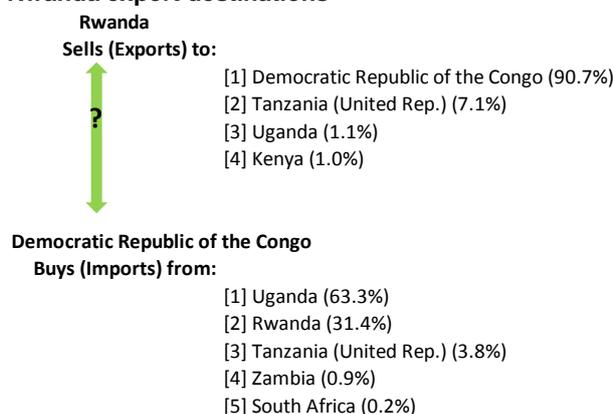
The main import origins for the DRC are Uganda, Rwanda, Tanzania and South Africa at the margin.

**Figure 65: DRC REO for HS100640**



Source: Authors, TRADE-DSM

**Figure 66: DRC REO HS100640 import origins versus Rwanda export destinations**



Source: Authors, TRADE-DSM

### 5.4.2.3. Containers (REO<sub>1,2</sub>)

The third largest realistic export opportunity identified for Rwanda into the DRC is that of **HS860900: Containers (incl. conts. for the tpt. of fluids) specially designed & equipped for carriage by one/more modes of tpt.**

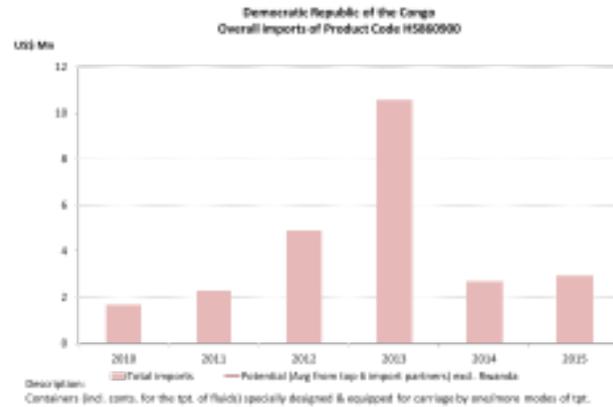
The product is produced in Manufacture of railway and tramway locomotives and rolling stock sector (S3850) and classified as of low skill- and technology intensity. Rwanda has an RCA of 1.55 for this product and potential estimated at US\$ 575 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 67 provides the imports of the DRC of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into the DRC exhibits peaked in 2013, then stabilised around US\$ 2.5 million 2014 and 2015.

Figure 68 depicts the export of this product from Rwanda to the top destinations with the DRC not appearing. At the same time top suppliers to the DRC are depicted and Rwanda is not included as one of these.

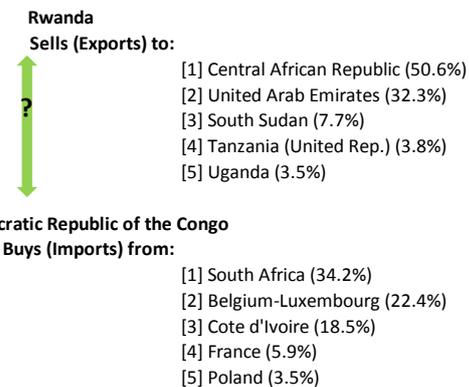
The main export destination from Rwanda is the Central African Republic followed by the United Arab Emirates, while the main import origins for the DRC are the South Africa, Belgium and the Ivory Coast.

Figure 67: DRC REO for HS860900



Source: Authors, TRADE-DSM

Figure 68: DRC REO HS860900 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

#### 5.4.2.4. Tomato sauces (REO<sub>4,2</sub>)

The fourth largest realistic export opportunity identified for Rwanda into the DRC is that of **HS210320: Tomato ketchup & other tomato sauces**.

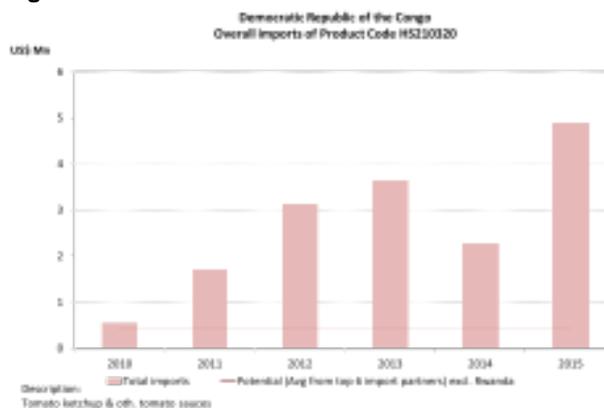
The product is produced in the sector group of Manufacture of other food products n.e.c (S3049) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 20.86 for this product and potential estimated at US\$ 408 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 69 provides the imports of the DRC of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into the DRC exhibits an increasing pattern over the period of around US\$ 3 to 5 million.

Figure 70 depicts the export of this product from Rwanda to the top destinations with the DRC at the top. At the same time top suppliers to the DRC are depicted and Rwanda is second.

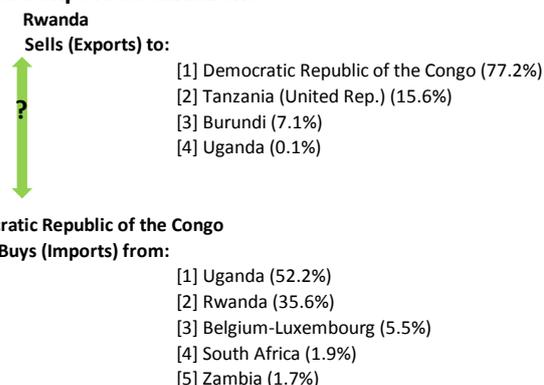
The main export destination from Rwanda after the DRC is Tanzania and Burundi, while the main import origins for the DRC are Uganda, Rwanda, Belgium and South Africa.

**Figure 69: DRC REO for HS210320**



Source: Authors, TRADE-DSM

**Figure 70: DRC REO HS210320 import origins versus Rwanda export destinations**



Source: Authors, TRADE-DSM

### 5.4.2.5. Maize (corn) flour (REO<sub>4,5</sub>)

The fifth largest realistic export opportunity identified for Rwanda into the Congo is that of **HS110220: Maize (corn) flour**.

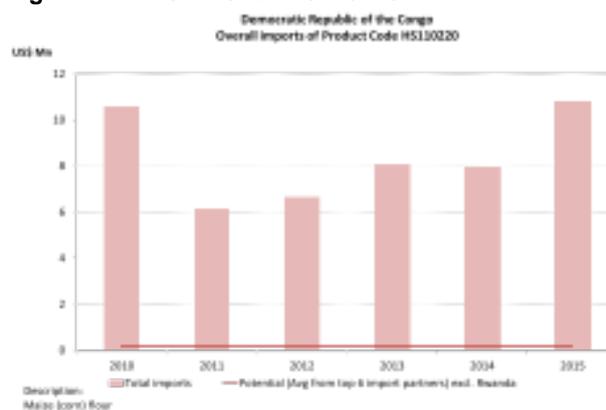
The product is produced in the Manufacture of grain mill products sector (S3031) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 465.0 for this product and potential estimated at US\$ 206 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 71 provides the imports of the DRC of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into the DRC exhibits a continued increase since 2011.

Figure 58 depicts the export of this product from Rwanda to the top destinations with the DRC at the top. At the same time top suppliers to the DRC are depicted and Rwanda is first.

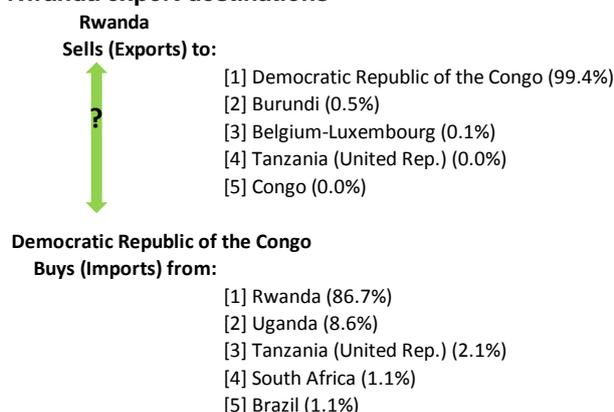
The main export destination from Rwanda after the DRC is Burundi (but very small values), while the main import origins for the DRC are Rwanda and Uganda.

**Figure 71: DRC REO for HS110220**



Source: Authors, TRADE-DSM

**Figure 72: DRC REO HS110220 import origins versus Rwanda export destinations**



Source: Authors, TRADE-DSM

### 5.4.3. Burundi (C108)

Burundi directly borders Rwanda from the south and is slightly larger than Rwanda. Overall Burundi covers an area of 27 830 square kilometres and size wise is ranked as number 147 in the world. The economy is also landlocked with agriculture accounting for more than 40 percent of the economy and employing around 90 percent of the population. In terms of GDP the economy is estimated at US\$ 2 billion (2015) and the country's estimated population in 2015 was 11.2 million persons (United Nations, 2016). Burundi's economy is very open in terms of imports to GDP at 74.9 percent (2015). Burundi is resource-poor, low-income and has a food deficit while being densely populated (WFP, 2017a). Foreign aid represented 48% of Burundi's national income in 2015, one of the highest percentages in Sub-Saharan Africa, but decreased to 33.5% in 2016.

Based on the data as compiled by CEPII Burundi on average exported around US\$ 0.1 billion to US\$ 0.3 billion over the period 2010 to 2015, with a sharp decline from 2014 to 2015. In terms of imports it is evident from Figure 74 that merchandise imports have increased steadily over the period 2010 to 2013 then started to decline.

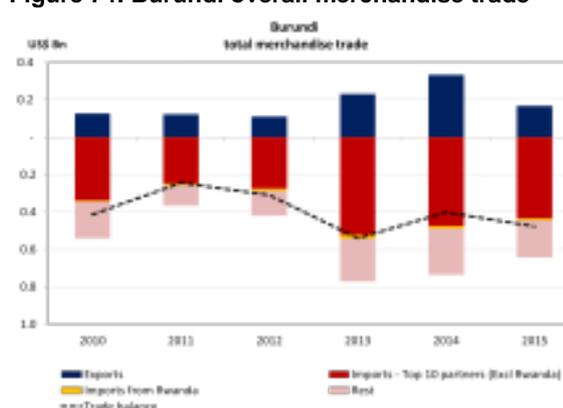
The top 10 trading partners (excluding Rwanda) supplies in excess of 58.4 percent of Burundi's imports. Over the period China is the leading source of imports, followed by India, Tanzania, Saudi Arabia, Uganda, Kenya and the Netherlands and France. Evident from Figure 75 is that Rwanda only supplies around 2.0 percent of imports to Burundi. On time-weighted basis over the period 2011 to 2015 Rwanda only supplied US\$ 13.3 million worth of imports to Burundi.

Figure 73: Map of Burundi



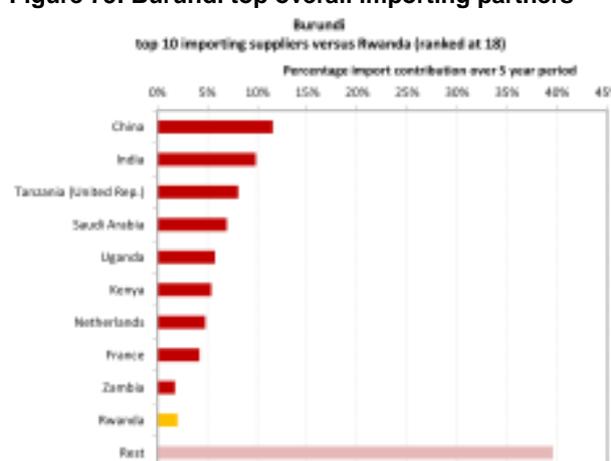
Source: The World Factbook (CIA)

Figure 74: Burundi overall merchandise trade



Source: Authors, BACI data

Figure 75: Burundi top overall importing partners



Source: Authors, BACI data

There are a total of 13 (if Petroleum (HS271000) is excluded) opportunities identified for Rwanda into Burundi. All are classified as growing in both short and long term, but overall not large opportunities (REO<sub>n,2</sub> – so row 2). The overall potential is calculated at around US\$ 0.7 million (including petroleum US\$ 16.8 million).

There are 8 of these products that Rwanda supplies to Burundi in Quadrant 1 (intensive margin) while 4 products are located in Quadrant 2 (extensive margin for markets, intensive margins for the products) and one in Q3 as depicted in Figure 76. More detail on each of these is provided in Table 22.

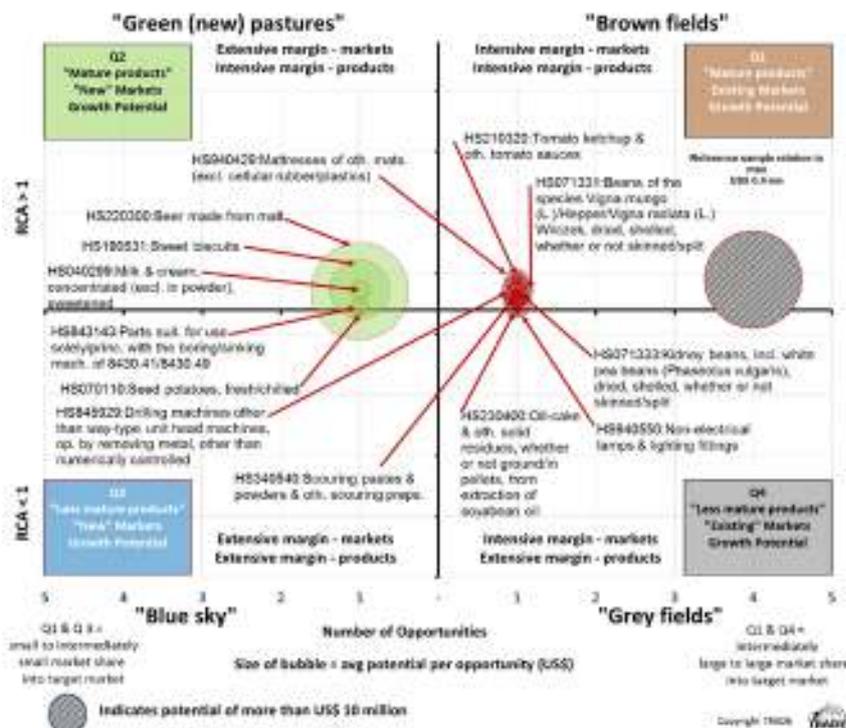
The largest opportunities seem to be in beer, biscuits, sweetened milk, beans and non-electrical lamps. The nature of Burundi's economy in terms of food insecurity and resource challenges reflect in the nature of demand and opportunities identified in Figure 76. The majority of products relate to food or basic housing items (such as mattresses and non-electrical lights).

Table 21: REO Map outcomes for Burundi opportunities for Rwanda

Map of Realistic Export Opportunities (REO) by type (Number and % of Total Number) (Potential Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0% to 5%)	Intermediate		Large: 4 (50% to 100%)	Grand Total
		Small: 2 (5% to 25%)	Large: 3 (25% to 50%)		
Large: 1	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}
Growing: 2 (short & long term):	2 {15.38%} Mn US\$ 0.1 {22.50%}	2 {15.38%} Mn US\$ 0.4 {58.41%}	{0.00%} Mn US\$ 0.0 {0.00%}	9 {69.23%} Mn US\$ 0.1 {19.09%}	13 {100.00%} Mn US\$ 0.7 {100.00%}
Large & Growing: 3 (only short term):	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}
Large & Growing: 4 (only long term):	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}
Large & Growing: 5 (both short & long term):	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}
Grand Total	2 {15.38%} Mn US\$ 0.1 {22.50%}	2 {15.38%} Mn US\$ 0.4 {58.41%}	{0.00%} Mn US\$ 0.0 {0.00%}	9 {69.23%} Mn US\$ 0.1 {19.09%}	13 {100.00%} Mn US\$ 0.7 {100.00%}

Source: Authors, TRADE-DSM Navigator

Figure 76: Rwanda REO opportunities for Burundi (excluding petroleum and gold)



Source: Authors, TRADE-DSM

**Table 22: Identified REOs (13) for Rwanda into Burundi (ranked descending by potential)**

Item	Product	REO type	RCA	[A] Realistic Export Potential to Target Market(s) '000 US\$	[B] Total Exports from Rwanda to Target Market(s) '000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s) Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) '000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) '000 US\$	[G] Target Market(s) Total Imports '000 US\$
		<b>13</b>	-	<b>652.95</b>	<b>1 373.88</b>	<b>27.0%</b>	<b>3 658.14</b>	<b>56.46</b>	<b>5 088.47</b>
1	HS220300 : Beer made from malt	REO2,2	5.82	366.82	421.14	16.0%	2 200.89	9.99	2 632.03
2	HS190531 : Bread, pastry, cakes, biscuits & oth. bakers' wares n.e.s. in Ch.19, - Sweet biscuits	REO1,2	6.73	136.04	0.90	0.1%	816.23	11.51	828.64
3	HS071331 : Beans (Vigna spp., Phaseolus spp. (excl. of 0713.31-0713.33)), dried, shell ... - Beans of the species Vigna mungo (L.)/Hepper/Vigna radiata (L.) Wilczek, dried, shelled, whether or not skinned/split	REO4,2	5.77	37.33	156.53	80.7%	37.33	0.00	193.85
4	HS940550 : Chandeliers & oth. elec. ceiling/wall lighting fittings (excl. those of a k ... - Non- electrical lamps & lighting fittings	REO4,2	1.78	27.79	109.82	39.0%	166.75	4.80	281.37
5	HS940429 : Mattresses of oth. mats. (excl. cellular rubber/plastics)	REO4,2	14.98	21.60	201.27	56.5%	129.63	25.46	356.36
6	HS845929 : Boring machines n.e.s. in 84.59, op. by removing metal - Drilling machines other than way-type unit head machines, op. by removing metal, other than numerically controlled	REO4,2	4.72	21.08	84.08	44.4%	105.40	0.00	189.48
7	HS040299 : Milk & cream, concentrated (excl. in powder), sweetened	REO2,2	6.73	14.57	21.64	19.7%	87.41	0.65	109.70
8	HS843143 : Parts suit. for use solely/princ. with buckets, shovels, grabs & grips - Parts suit. for use solely/princ. with the boring/sinking mach. of 8430.41/8430.49	REO1,2	1.28	10.88	0.00	0.0%	65.31	2.75	68.06
9	HS340540 : Polishes & creams, scouring pastes & powders & sim. preps. (excl. waxes of ... - scouring pastes & powders & oth. scouring preps.	REO4,2	2.14	8.26	37.36	69.4%	16.51	0.00	53.87
10	HS210320 : Tomato ketchup & oth. tomato sauces	REO4,2	20.86	3.84	126.68	83.9%	23.03	1.30	151.02
11	HS071333 : Beans (Vigna spp., Phaseolus spp. (excl. of 0713.31-0713.33)), dried, shell ... - Kidney beans, incl. white pea beans (Phaseolus vulgaris), dried, shelled, whether or not skinned/split	REO4,2	4.16	2.45	177.97	96.0%	7.35	0.00	185.32
12	HS230400 : Oil-cake & oth. solid residues, whether or not ground/in pellets, from extraction of soyabean oil	REO4,2	1.05	2.29	3.53	60.7%	2.29	0.00	5.83
13	HS070110 : Potatoes other than seed potatoes, fresh/chilled - Seed potatoes, fresh/chilled	REO4,2	0.93	0.00	32.94	100.0%	0.00	0.00	32.94

Source: Authors, TRADE-DSM

While there are 13 HS6-digit product lines in total that the methodology identifies, the top 5 only are discussed in more detail in this section of the report.

### 5.4.3.1. Beer (REO<sub>2,2</sub>)

The largest realistic export opportunity identified for Rwanda into Burundi is that of **HS220300: Beer made from malt**.

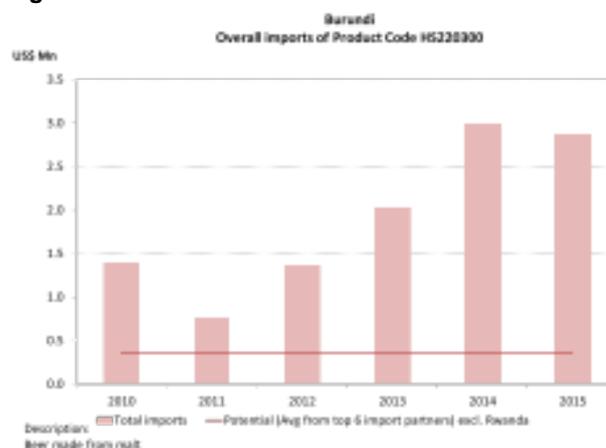
The product is produced in Manufacture of beer and other malt liquors and malt sector (S3052) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 5.82 for this product and potential estimated at US\$ 367 thousand (based on the calculation as explained in the appendix in section 9.1.6).

Figure 77 provides the imports of Burundi of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Burundi showed steady growth in imports flat from 2011 and 2014, with a slight dip in 2015.

Figure 78 depicts the export of this product from Rwanda to the top destinations with Burundi appearing second from the top. At the same time top suppliers to Burundi are depicted and Rwanda is second as it supplies just more than 16 percent of Burundi's imports. Burundi is still classified as a "green pastures" market for Rwanda as there is a lot of demand scope for intensified sales focused on gaining market share relative to the Netherlands.

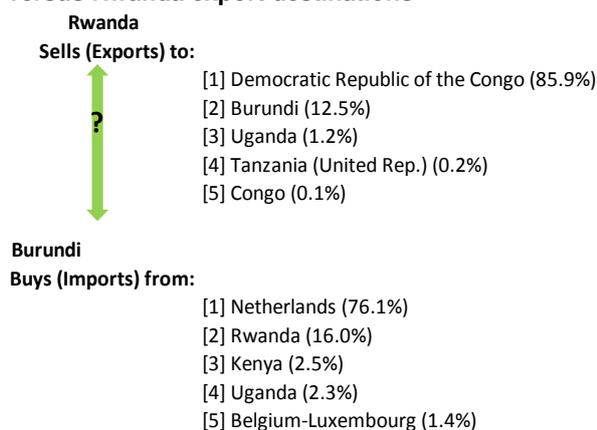
The main export destination from Rwanda is the DRC (at 86 percent), while the main import origins for Burundi therefore are the Netherlands, Rwanda, Kenya, Uganda and Belgium.

**Figure 77: Burundi REO for HS220300**



Source: Authors, TRADE-DSM

**Figure 78: Burundi REO HS220300 import origins versus Rwanda export destinations**



Source: Authors, TRADE-DSM

### 5.4.3.2. Biscuits (REO<sub>1,2</sub>)

The second largest realistic export opportunity identified for Rwanda into Burundi is that of **HS190531: Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty cachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products: Sweet biscuits; waffles and wafers - Sweet biscuits.**

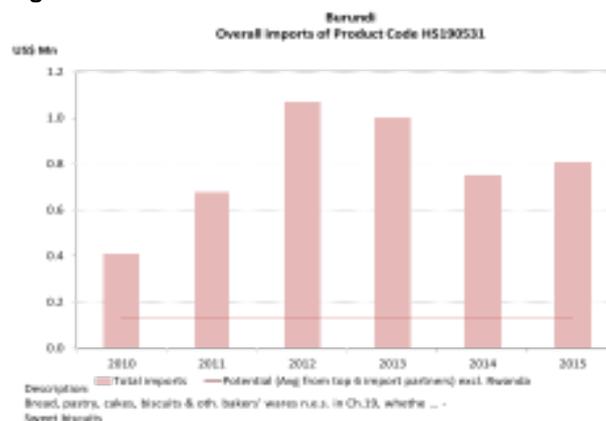
The product is produced in the Manufacture of bakery products, fresh, frozen or dry sector (S3041) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 6.73 for this product and potential estimated at US\$ 136 thousand (based on the calculation as explained in the appendix in section 9.1.6).

Figure 79 provides the imports of Burundi of this product over the period 2010 to 2015 (around US\$ 700-800 thousand per annum), as well as the realistic potential estimate.

Figure 80 depicts the export of this product from Rwanda to the top destinations (the DRC at 94 percent of Rwanda's exports). Burundi represents a negligible 0.04 percent of exports from Rwanda. At the same time top suppliers to Burundi are depicted, with Rwanda not featuring under the top 5 (Rwanda is actually placed at number 10 with 0.1 percent of Burundi's imports for this product).

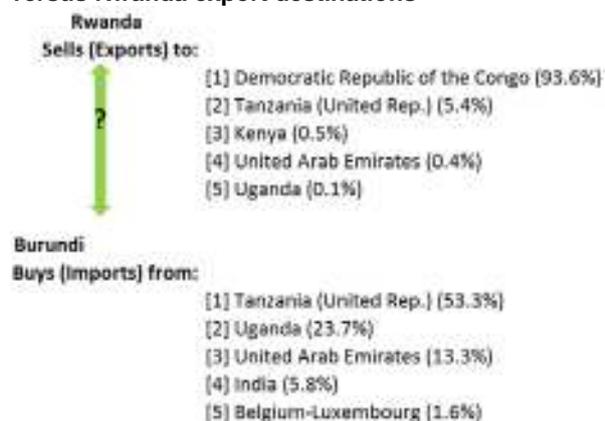
The main import origins for Burundi are Tanzania, Uganda, the United Arab Emirates, India and Belgium.

Figure 79: Burundi REO for HS190531



Source: Authors, TRADE-DSM

Figure 80: Burundi REO HS190531 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.3.3. Beans (REO<sub>4,2</sub>)

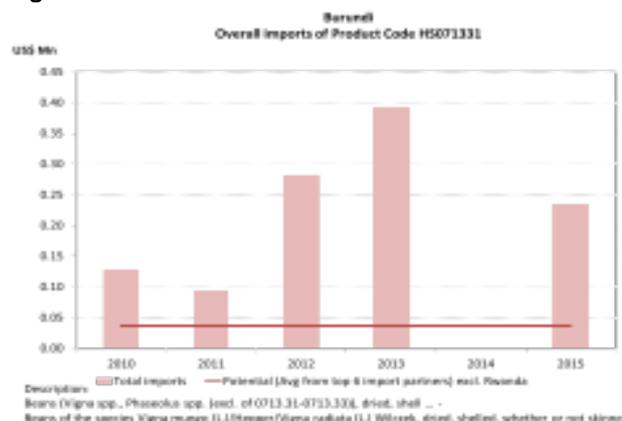
The fourth largest realistic export opportunity identified for Rwanda into Burundi is that of **HS071331: Dried leguminous vegetables, shelled, whether or not skinned or split: Beans of the species *Vigna mungo* (L.) Hepper or *Vigna radiata* (L.) Wilczek.**

The product is produced in the sector group of Processing and preserving of fruit and vegetables (S3013) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 5.78 for this product and potential estimated at US\$ 37 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 81 provides the imports for Burundi of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Burundi exhibited an increasing pattern over the period 2011 to 2013, then dropped to nearly zero, recovering to around US\$ 220 000 by 2015.

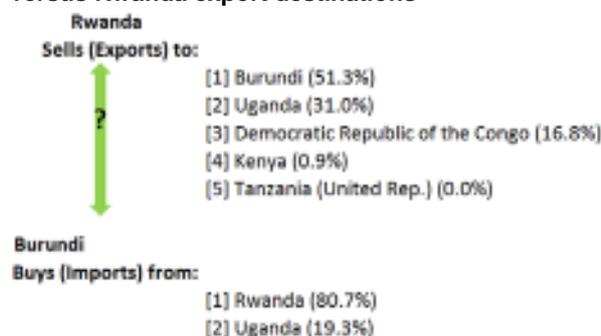
Figure 82 depicts the export of this product from Rwanda to the top destinations with Burundi at the top. At the same time top suppliers to Burundi are depicted and Rwanda is first at around 80 percent of Burundi's import demand with the rest coming from Uganda.

Figure 81: Burundi REO for HS071331



Source: Authors, TRADE-DSM

Figure 82: Burundi REO HS071331 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

#### 5.4.3.4. Non-electrical lamps (REO<sub>4,2</sub>)

The fifth largest realistic export opportunity identified for Rwanda into Burundi is that of **HS940550: Lamps and lighting fittings including searchlights and spotlights and parts thereof, not elsewhere specified or included; illuminated signs, illuminated name-plates and the like, having a permanently fixed light source, and parts thereof not elsewhere specified or included:- Non-electrical lamps & lighting fittings.**

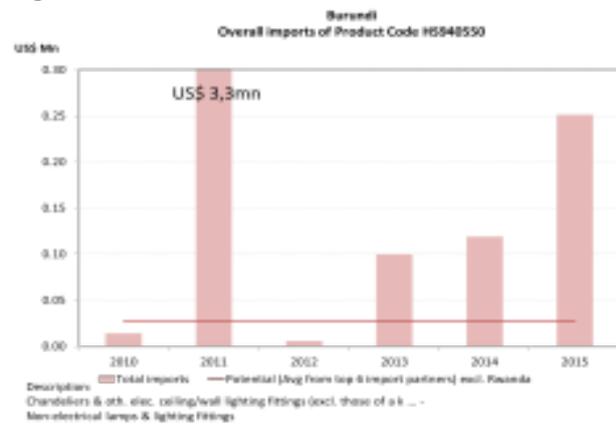
The product is produced in the Manufacture of electric lamps and lighting equipment sector (S3650) and classified as relatively low skill and technology intensive. Rwanda has an RCA of 1.78 for this product and potential estimated at US\$ 28 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 83 provides the imports of Burundi of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Burundi exhibits a continued increase since 2013 (in 2011 an abnormally high US\$ 3.3 million was recorded).

Figure 84 depicts the export of this product from Rwanda to the top destinations with Burundi at the top (99.4 percent). At the same time top suppliers to Burundi are depicted and Rwanda is the largest (at 39 percent), followed by the United States.

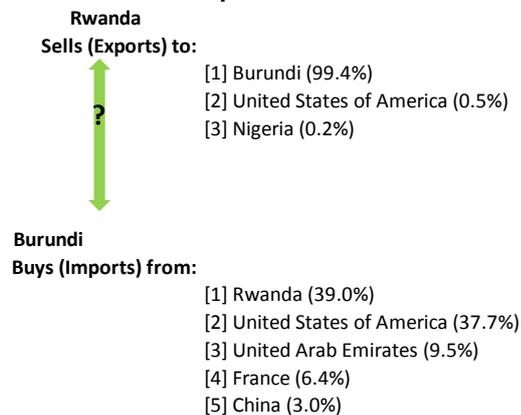
Burundi further also sources from the United Arab Emirates, France and China.

Figure 83: Burundi REO for HS940550



Source: Authors, TRADE-DSM

Figure 84: Burundi REO HS940550 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.3.5. Sweetened milk (REO<sub>4,2</sub>)

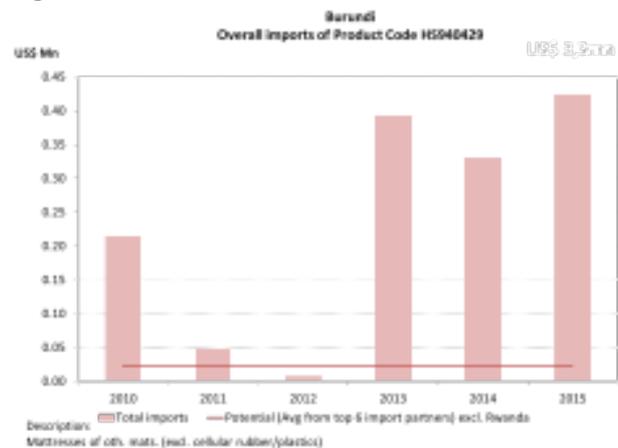
The third largest realistic export opportunity identified for Rwanda into Burundi is that of **HS940429: Mattresses of oth. mats. (excl. cellular rubber/plastics)**.

The product is produced in Manufacture of furniture sector (S3910) and classified as resources (natural) intensive manufactures. Rwanda has an RCA of 14.98 for this product and potential estimated at US\$ 21 600 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 85 provides the imports into Burundi of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Burundi is small but has increased in recent years to around US\$ 423 thousand.

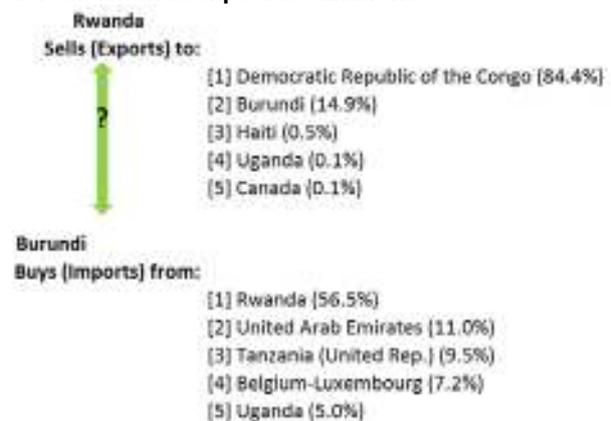
Figure 86 depicts the export of this product from Rwanda to the top destinations with Burundi the second largest market after the DRC. At the same time top suppliers to Burundi are depicted and Rwanda is the main supplier to Burundi, followed by the United Arab Emirates, Tanzania, Belgium and Uganda.

Figure 85: Burundi REO for HS940429



Source: Authors, TRADE-DSM

Figure 86: Burundi REO HS940429 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

#### 5.4.4. Tanzania (C834)

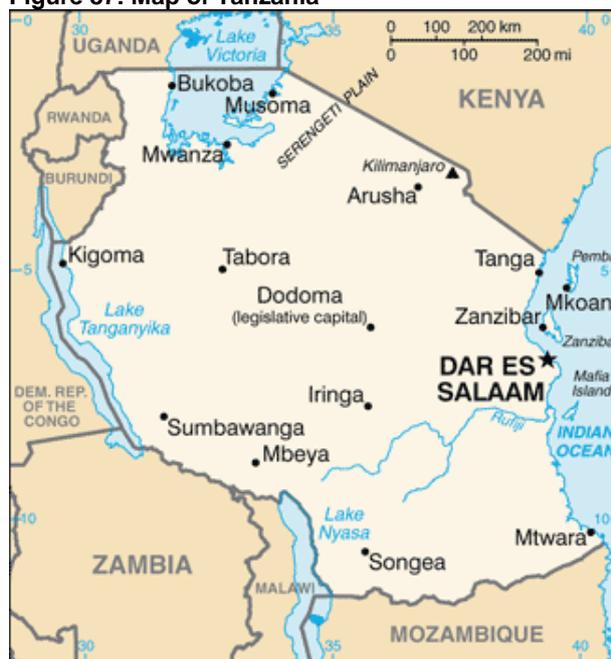
Tanzania directly borders Rwanda from the east and is significantly larger than Rwanda. Overall Tanzania covers an area of 947 300 square kilometres and size wise is ranked as number 31 in the world. In terms of GDP the economy is estimated at US\$ 34 billion (2015) and the country's estimated population in 2015 was 52.0 million persons (United Nations, 2016). Tanzania's economy is slightly open in terms of imports to GDP at 34.2 percent (2015). Tanzania is one of the world's poorest economies in terms of per capita income, but has achieved high growth rates based on its vast natural resource wealth and tourism. GDP growth in 2009-16 averaged 6-7% per year.

The economy depends on agriculture, which accounts for more than one-quarter of GDP, provides 85% of exports, and employs about 65% of the work force. Tanzania has been hosting refugees from the Congo and Burundi since the 1970s (WFP, 2017d). The port in Dar es Salaam is a key component of import and export logistics in the region.

Based on the data as compiled by CEPII Burundi on average exported around US\$ 4.4 billion to US\$ 6.6 billion over the period 2010 to 2015, with a marked decline from 2013 to 2015.

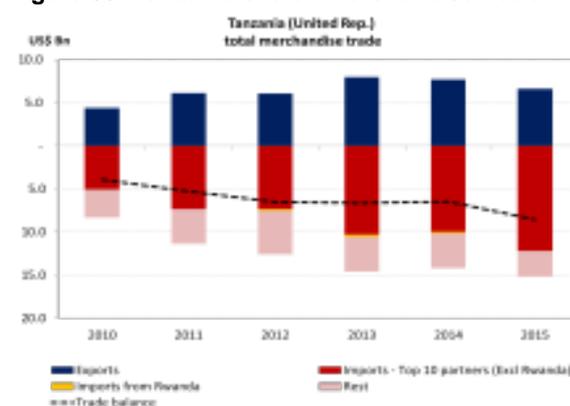
In terms of imports it is evident from Figure 88 that merchandise imports have increased steadily over the period 2010 to 2015. The top 10 trading partners (excluding Rwanda) supplies in excess of 62.4 percent of Tanzania's imports. Over the period Saudi Arabia is the leading source of imports, followed by China, the United Arab Emirates, South Africa Switzerland and Japan. Evident from Figure 89 is that Rwanda only supplies around 0.6 percent of Tanzania's imports. On time-weighted basis over the period 2011 to 2015 Rwanda only supplied US\$ 89.14 million worth of imports to Tanzania.

Figure 87: Map of Tanzania



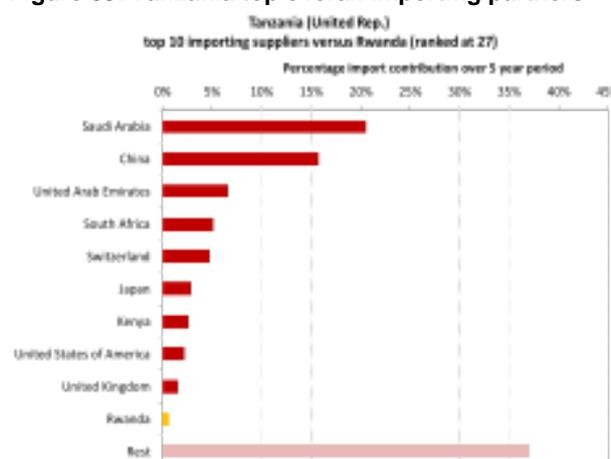
Source: The World Factbook (CIA)

Figure 88: Tanzania overall merchandise trade



Source: Authors, BACI data

Figure 89: Tanzania top overall importing partners



Source: Authors, BACI data

There are a total of 31 (if Petroleum (HS271000) is excluded) opportunities identified for Rwanda into Tanzania. Most (27) are classified as growing in both short and long term, but overall not large opportunities (REO<sub>n,2</sub> – so row 2). The overall potential is calculated at around US\$ 10.1 million (including petroleum it is US\$ 869.9 million).

There are 6 of these products that Rwanda supplies to Tanzania in Quadrant 1 (intensive margin) while 24 products are located in Quadrant 2 (extensive margin for markets, intensive margins for the products) and one in Q3 as depicted in Figure 90. More detail on each of these is provided in Table 24.

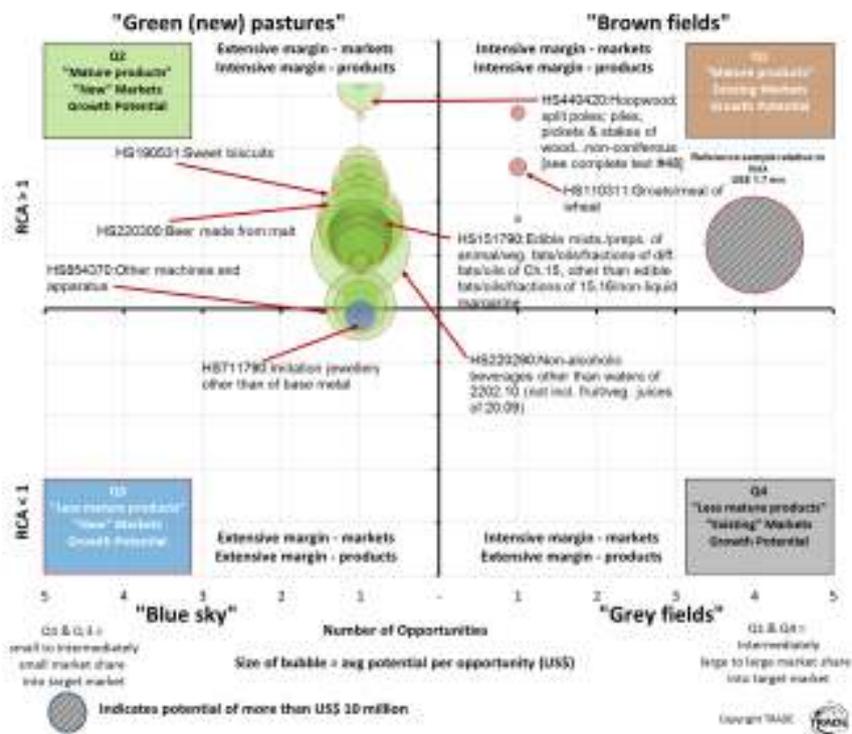
The largest opportunities seem to be in non-alcoholic beverages, biscuits, beer, electrical machines, apparatus and parts and accessories and margarine.

Table 23: REO Map outcomes for Tanzania opportunities for Rwanda

Map of Realistic Export Opportunities (REO) by type (Number and % of Total Number) (Potential Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0% to 25%)	Intermediate		Large: 4 (75% to 100%)	Grand Total
		Small: 2 (26% to 50%)	Large: 3 (51% to 75%)		
Large: 1	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Growing: 2 (short & long term):	24 (77.42%) Mn US\$ 9.7 (95.54%)	(0.00%) Mn US\$ 0.0 (0.00%)	(3.23%) Mn US\$ 0.3 (0.37%)	(6.45%) Mn US\$ 0.1 (0.61%)	(87.10%) Mn US\$ 9.8 (95.52%)
Large & Growing: 3 (only short term):	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Large & Growing: 4 (only long term):	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(9.68%) Mn US\$ 0.0 (0.03%)	(9.68%) Mn US\$ 0.0 (0.03%)
Large & Growing: 5 (both short & long term):	(0.00%) Mn US\$ 0.0 (0.00%)	(3.23%) Mn US\$ 0.3 (3.45%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(3.23%) Mn US\$ 0.3 (3.45%)
Grand Total	24 (77.42%) Mn US\$ 9.7 (95.54%)	1 (3.23%) Mn US\$ 0.3 (3.45%)	1 (3.23%) Mn US\$ 0.0 (0.37%)	5 (16.13%) Mn US\$ 0.1 (0.64%)	31 (100.00%) Mn US\$ 10.1 (100.00%)

Source: Authors, TRADE-DSM Navigator

Figure 90: Rwanda REO opportunities for Tanzania (excluding petroleum and gold)



Source: Authors, TRADE-DSM

**Table 24: Identified REOs (31) for Rwanda into Tanzania (ranked descending by potential)**

Item	Product	REO type	RCA	[A] Realistic Export Potential to Target Market(s) '000 US\$	[B] Total Exports from Rwanda to Target Market(s) '000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s) Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) '000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) '000 US\$	[G] Target Market(s) Total Imports '000 US\$
		<b>32</b>	-	<b>869 927.76</b>	<b>76 525.86</b>	<b>1.3%</b>	<b>5 219 377.25</b>	<b>384 564.89</b>	<b>5 680 467.99</b>
1	HS220290 : Non-alcoholic beverages other than waters of 2202.10 (not incl. fruit/veg. juices of 20.09)	REO1,2	3.70	1 724.73	61.62	0.5%	10 348.36	2 083.35	12 493.33
2	HS190531 : Bread, pastry, cakes, biscuits & oth. bakers' wares n.e.s. in Ch.19, - Sweet biscuits	REO1,2	6.73	1 330.29	125.96	1.5%	7 981.72	569.69	8 677.37
3	HS220300 : Beer made from malt	REO1,2	5.82	1 260.93	7.01	0.1%	7 565.57	188.40	7 760.97
4	HS854370 : Machines & app. for electroplating/electrolysis/electrophoresis - Other machines and apparatus	REO1,2	1.08	886.74	0.00	0.0%	5 320.45	910.27	6 230.71
5	HS151790 : Edible mixts./preps. of animal/veg. fats/oils/fractions of diff. fats/oils of Ch.15, other than edible fats/oils/fractions of 15.16/non-liquid margarine	REO1,2	4.98	775.59	1.54	0.0%	4 653.55	71.67	4 726.77
6	HS840710 : Spark-ignition recip./rotary int. comb. piston engines for aircraft	REO1,2	14.96	559.64	0.00	0.0%	3 357.83	817.13	4 174.96
7	HS843049 : Boring/sinking mach. (excl. of 8430.10-8430.40), other than self-propelled	REO1,2	12.74	508.03	5.46	0.1%	3 048.18	1 028.28	4 081.92
8	HS230400 : Oil-cake & oth. solid residues, whether or not ground/in pellets, from extraction of soyabean oil	REO1,2	1.05	495.04	30.98	1.0%	2 970.23	2.08	3 003.28
9	HS870520 : Concrete-mixer lorries - Mobile drilling derricks	REO1,2	4.34	490.92	0.00	0.0%	2 945.52	400.60	3 346.13
10	HS071310 : Beans (Vigna spp., Phaseolus spp. (excl. of 0713.31-0713.33 - Peas (Pisum sativum), dried, shelled, whether or not skinned/split	REO1,2	3.63	440.51	0.00	0.0%	2 643.08	61.55	2 704.63
11	HS440420 : Hoopwood; split poles; piles, pickets & stakes of wood...non-coniferous	REO2,5	114.97	349.39	507.45	19.5%	2 096.31	0.88	2 604.64
12	HS121190 : Ginseng roots - Plants & parts of plants, incl. seeds & fruits, of a kind used primarily in perfumery/pharmacy/for insecticidal/ fungicidal/ sim. purps., n.e.s. in Ch.12, fresh/dried, whether or not cut/crushed/powdered	REO1,2	21.43	287.79	4.55	0.3%	1 726.77	41.23	1 772.55
13	HS842612 : Lifting mach. n.e.s. in 84.26 - Mobile lifting frames on tyres & straddle carriers	REO1,2	1.20	198.78	0.00	0.0%	1 192.65	82.58	1 275.24
14	HS711790 : Cuff-links & studs of base metal, whether or not plated with precious metal ... - Imitation jewellery other than of base metal	REO1,2	0.87	157.02	0.00	0.0%	942.09	41.19	983.28
15	HS631090 : Used/new rags, scrap twine, cordage, rope & cables & worn out arts. of twin ... - Used/new rags, scrap twine, cordage, rope & cables & worn out arts. of twine/cordage/rope/cables, of textile mats. (excl. sorted)	REO1,2	1.09	151.81	0.00	0.0%	910.84	44.27	955.12
16	HS845310 :	REO1,2	4.36	75.42	0.00	0.0%	452.53	37.25	489.78

	Machinery (excl. sewing machines) for making/repairing arts. of hides/skins ... - Machinery for preparing/tanning/working hides/skins/leather								
17	HS940429 : Mattress supports - Mattresses of oth. mats. (excl. cellular rubber/plastics)	REO1,2	14.98	74.84	0.10	0.0%	449.02	134.23	583.35
18	HS841940 : Distilling/rectifying plant, whether or not electrically heated	REO1,2	2.71	61.97	0.00	0.0%	371.84	36.30	408.14
19	HS392510 : Builders' ware of plastics, n.e.s. (excl. of 3925.10-3925.30) - Reservoirs, tanks, vats & sim. conts., of a cap. >300 l, of plastics	REO1,2	2.92	60.53	0.00	0.0%	363.19	252.84	616.04
20	HS110311 : Groats/meal of cereals other than wheat & maize (corn) - Groats/meal of wheat	REO4,2	21.19	53.52	374.42	70.0%	160.56	0.00	534.99
21	HS720429 : Waste & scrap of alloy steel other than stainless steel	REO1,2	3.17	44.08	4.63	1.5%	264.51	44.44	313.58
22	HS960500 : Travel sets for personal toilet/sewing/shoe/clothes cleaning	REO3,2	68.70	37.87	109.42	26.8%	227.21	72.08	408.71
23	HS090190 : Coffee husks & skins; coffee substitutes cont. coffee in any proportion	REO1,2	133.00	30.08	2.19	1.1%	180.45	24.30	206.94
24	HS040299 : Milk & cream, concentrated (excl. in powder), sweetened	REO1,2	6.73	21.00	0.00	0.0%	126.01	40.79	166.80
25	HS110290 : Cereal flour other than of wheat, meslin, rye, maize (corn), rice	REO1,2	19.78	19.49	3.50	2.8%	116.93	2.33	122.75
26	HS481720 : Letter cards, plain postcards & correspondence cards, of paper/paperboard	REO1,2	64.20	11.34	0.00	0.0%	68.02	3.43	71.45
27	HS261000 : Chromium ores & concs.	REO4,2	6.87	8.22	278.68	89.4%	32.89	0.00	311.57
28	HS711711 : Cuff-links & studs of base metal, whether or not plated with precious metal	REO1,2	2.08	3.01	0.00	0.0%	18.04	0.70	18.74
29	HS261100 : Tungsten ores & concs.	REO4,4	$\frac{2}{889.66}$	2.13	8 926.55	100.0%	2.13	0.00	8 928.68
30	HS261590 : Niobium/tantalum/vanadium ores & concs.	REO4,4	$\frac{12}{708.17}$	0.55	32 610.89	100.0%	1.66	0.00	32 612.55
31	HS260900 : Tin ores & concs.	REO4,4	$\frac{3}{659.21}$	0.00	21 629.75	100.0%	0.00	0.00	21 629.75

Source: Authors, TRADE-DSM

While there are 31 HS6-digit product lines in total that the methodology identifies, the top 5 only are discussed in more detail in this section of the report.

#### 5.4.4.1. Non-alcoholic beverages (REO<sub>1,2</sub>)

The largest realistic export opportunity identified for Rwanda into Tanzania is that of **HS220290: Non-alcoholic beverages other than waters of 2202.10 (not incl. fruit/veg. juices of 20.09)**.

The product is produced in Manufacture of soft drinks; production of mineral waters sector (S3053) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 3.7 for this product and potential for Tanzania estimated at US\$ 1.7 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 91 provides the imports of Burundi of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that while the imports of this product into Tanzania declined somewhat in 2013 and 2014 it recovered in 2015 to around US\$ 13 million.

Figure 92 depicts the export of this product from Rwanda to the top destinations with Tanzania appearing second from the top at 4.2 percent only. At the same time top suppliers to Tanzania are depicted and Rwanda does not appear on the list. Major suppliers to Tanzania are Austria, Germany, Netherlands, South Africa and Kenya.

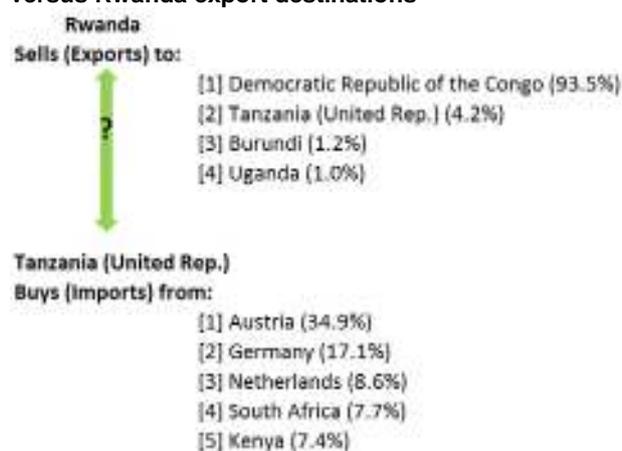
Tanzania therefore is classified as a “green pastures” market for Rwanda as there is a lot of demand scope for intensified sales focused on gaining market share relative to these supplying countries.

Figure 91: Tanzania REO for HS220290



Source: Authors, TRADE-DSM

Figure 92: Tanzania REO HS220290 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.4.2. Biscuits (REO<sub>1,2</sub>)

The second largest realistic export opportunity identified for Rwanda into Tanzania is that of **HS190531: Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty cachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products: Sweet biscuits; waffles and wafers - Sweet biscuits.**

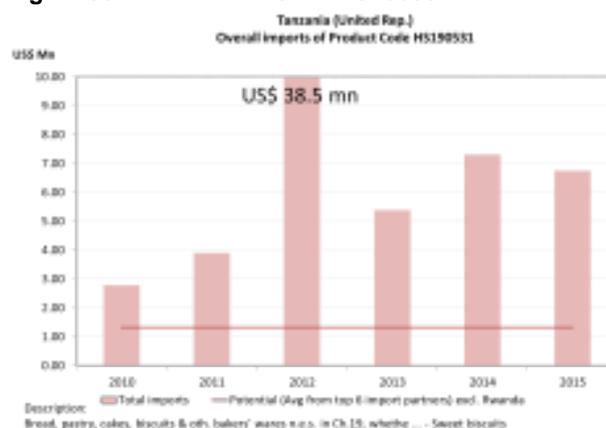
The product is produced in the Manufacture of bakery products, fresh, frozen or dry sector (S3041) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 6.73 for this product and potential estimated at US\$ 1.3 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 93 provides the imports of Tanzania of this product over the period 2010 to 2015. 2012 exhibited an outlier in terms of US\$ 38.5 million's worth of imports, with more regular levels around US\$ 7 to 8 million by 2015.

Figure 94 depicts the export of this product from Rwanda to the top destinations (Tanzania is second at 5.4 percent of Rwanda's exports). At the same time top suppliers to Tanzania are depicted, with Rwanda not featuring under the top 5 (Rwanda is actually placed at number 8 with 1.5 percent of Tanzania's imports for this product).

The main import origins for Tanzania are India, Zambia, the United Arab Emirates, South Africa and Oman.

Figure 93: Tanzania REO for HS190531



Source: Authors, TRADE-DSM

Figure 94: Tanzania REO HS190531 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.4.3. Beer (REO<sub>1,2</sub>)

The third largest realistic export opportunity identified for Rwanda into Tanzania is that of **HS220300: Beer made from malt**.

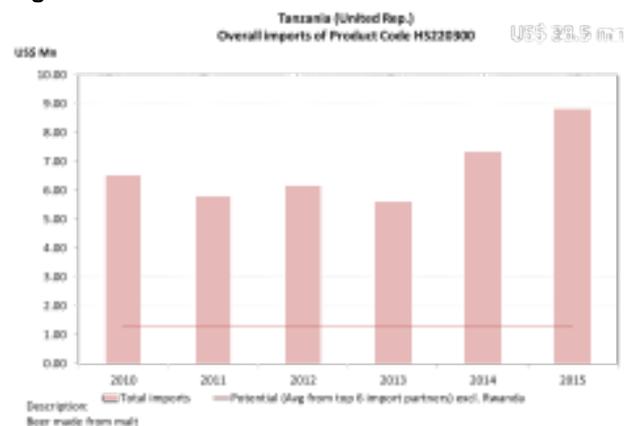
The product is produced in Manufacture of beer and other malt liquors and malt sector (S3052) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 5.82 for this product and Tanzania potential estimated at US\$ 1.2 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 95 provides the imports of Tanzania of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Tanzania exhibits a continued increase since 2013 to around US\$ 9 million by 2015.

Figure 96 depicts the export of this product from Rwanda to the top destinations with Tanzania does not feature. At the same time top suppliers to Tanzania are depicted and Rwanda also do not feature as a major supplier.

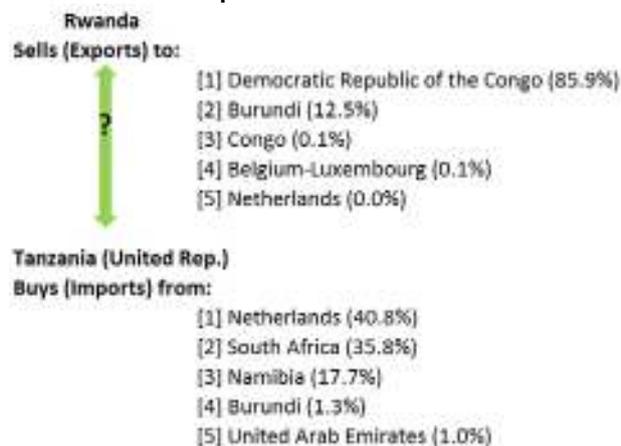
Tanzania mainly sources from The Netherlands, South Africa and Namibia.

**Figure 95: Tanzania REO for HS220300**



Source: Authors, TRADE-DSM

**Figure 96: Tanzania REO HS220300 import origins versus Rwanda export destinations**



Source: Authors, TRADE-DSM

#### 5.4.4.4. Electrical machines, apparatus and parts and accessories (REO<sub>1,2</sub>)

The fourth largest realistic export opportunity identified for Rwanda into Tanzania is that of **HS854370: Electrical machines and apparatus, having individual functions, not specified or included**<sup>32</sup>.

The product is produced in Manufacture of other electrical equipment not elsewhere classified sector (S3660) and classified as medium skill and technology intensity. Rwanda has an RCA of 1.08 for this product and potential estimated at US\$ 886 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 97 provides the imports into Tanzania of this product over the period 2010 to 2015, as well as the realistic potential estimate. Imports drastically increased in 2015 up to nearly US\$ 10 million from around US\$ 2 million before.

Figure 98 depicts the export of this product from Rwanda to the top destinations with Tanzania not appearing on the list. At the same time top suppliers to Tanzania are depicted as Korea, China, South Africa, United Kingdom and the United States of America.

While this product group may be far removed from the current capabilities of Rwanda it may be possible to get involved in assembly of electrical and electronic components with the right drive and partners. In line with Hausmann (2015) recommendations for higher technology, higher value to weight ratio products destined for air transport.

Figure 97: Tanzania REO for HS854370



Source: Authors, TRADE-DSM

Figure 98: Tanzania REO HS854370 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

<sup>32</sup> Including physical vapor deposition apparatus; electric synchros and transducers; flight data recorders; defrosters and demisters with electric resistors for aircraft; articles designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks; microwave amplifiers; for electrical nerve stimulation; electrical machines with translation or dictionary functions; flat panel displays other than for articles of heading 8528, except for subheadings 8528.52 or 8528.62; video game console controllers which use infrared transmissions to operate or access the various functions and capabilities of the console etc.).

#### 5.4.4.5. Margarine (based on artificial edible mixtures or preparations of animal or vegetable fats or oils) (REO<sub>1,2</sub>)

The fifth largest realistic export opportunity identified for Rwanda into Tanzania is that of **HS151790: Margarine; edible mixtures or preparations of animal or vegetable fats or oils or of fractions of different fats or oils of this chapter, other than edible fats or oils or their fractions of heading 1516**<sup>33</sup>.

The product is produced in the sector group of Manufacture of vegetable and animal oils and fats (S3014) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 4.98 for this product and potential estimated at US\$ 776 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 99 provides the imports for Tanzania of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Tanzania hovered around the US\$ 1 million mark over the period 2011 to 2014, then increased significantly to around US\$ 8 million by 2015.

Figure 100 depicts the export of this product from Rwanda to the top destinations with the Tanzania second but negligible (0.2 percent). At the same time top suppliers to Tanzania are depicted with Malaysia, Singapore, Kenya, Argentina and Indonesia being the main suppliers.

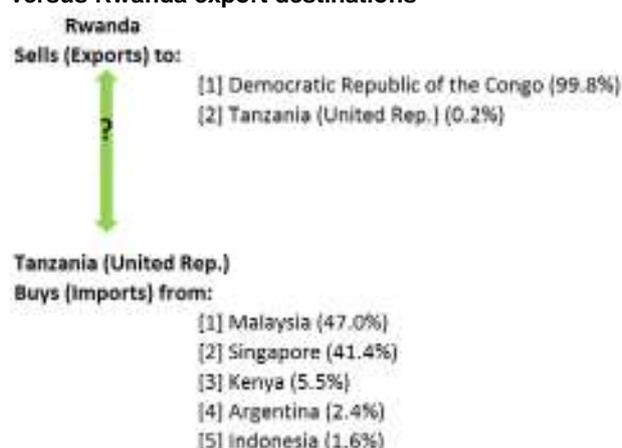
Tanzania has a large Muslim population (35.2 percent according to the CIA World Factbook). The major countries supplying these products into Tanzania are also associated with the Muslim religion and as such these products may have Halaal processes associated with them which potentially need to be considered (in Malaysia 61.3 percent, Singapore 14.3 percent and Indonesia 87.2 percent of population are Muslims (CIA, 2017)).

Figure 99: Tanzania REO for HS151790



Source: Authors, TRADE-DSM

Figure 100: Tanzania REO HS151790 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

<sup>33</sup> HS 1516 = Animal or vegetable fats and oils and their fractions, partly or wholly hydrogenated, inter-esterified, re-esterified or elaidinized, whether or not refined, but not further prepared – including animal fats and oils and their fractions; vegetable fats and oils and their fractions (rapeseed oil and other).

### 5.4.5. Uganda (C800)

Uganda directly borders Rwanda from the north and is significantly larger than Rwanda, but also landlocked. Overall Uganda covers an area of 241 038 square kilometres and size wise is ranked as number 81 in the world. In terms of GDP the economy is estimated at US\$ 21 billion (2015) and the country's estimated population in 2015 was 39.0 million persons (United Nations, 2016). Uganda's economy is slightly less open in terms of imports to GDP at 29.1 percent (2015). Uganda has substantial natural resources, including fertile soils, regular rainfall, small deposits of copper, gold, and other minerals, and recently discovered oil. Agriculture is the most important sector of the economy, employing more than one-third of the work force. Uganda's economy remains predominantly agricultural with a small industrial sector that is dependent on imported inputs like oil and equipment. Instability in South Sudan has led to a sharp increase in Sudanese refugees and is disrupting Uganda's main export market. Uganda hosts the largest refugee caseloads in Africa with 1.27 million refugees (WFP, 2017e).

Based on the data as compiled by CEPII Burundi on average exported around US\$ 1.8 billion to US\$ 2.3 billion over the period 2010 to 2015, with a levelling from 2012 to 2015.

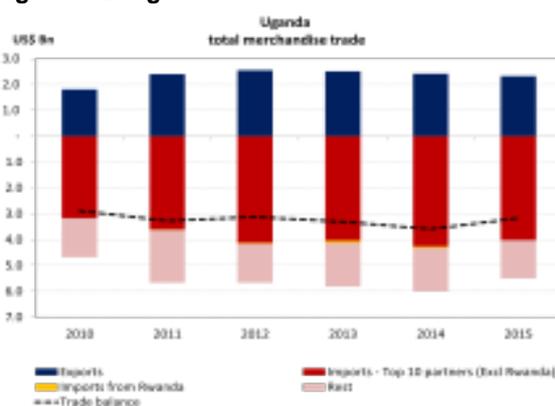
In terms of imports it is evident from Figure 102 that merchandise imports have increased steadily over the period 2010 to 2014, then started a slight decline. The top 10 trading partners (excluding Rwanda) supplies in excess of 61.8 percent of imports. Over the period India is the leading source of imports, followed by China, the United Arab Emirates, Japan, South Africa and Indonesia. Evident from Figure 103 is that Rwanda only supplies around 0.6 percent of Uganda's imports (on time-weighted basis valued at US\$ 34.55 million).

Figure 101: Map of Uganda



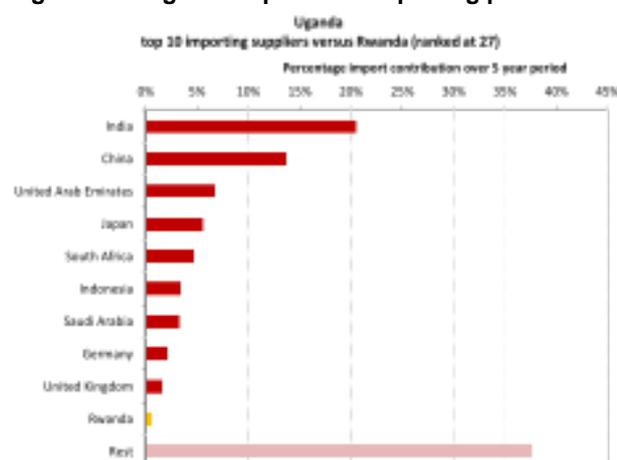
Source: The World Factbook (CIA)

Figure 102: Uganda overall merchandise trade



Source: Authors, BACI data

Figure 103: Uganda top overall importing partners



Source: Authors, BACI data

There are a total of 38 (if Petroleum related (HS27nnnn) products are excluded) opportunities identified for Rwanda into Uganda. All are classified as growing in both short and long term, but overall not large opportunities (REO<sub>n,2</sub> – so row 2). The overall potential is calculated at around US\$ 4.2 million (if petroleum related products are included US\$ 155.9 million).

There are 8 of these products that Rwanda supplies to Uganda in Quadrant 1 (intensive margin) while 25 products are located in Quadrant 2 (extensive margin for markets, intensive margins for the products) and 4 in Q3 with 1 in Q4 as depicted in Figure 104.

More detail on each of these is provided in Table 26.

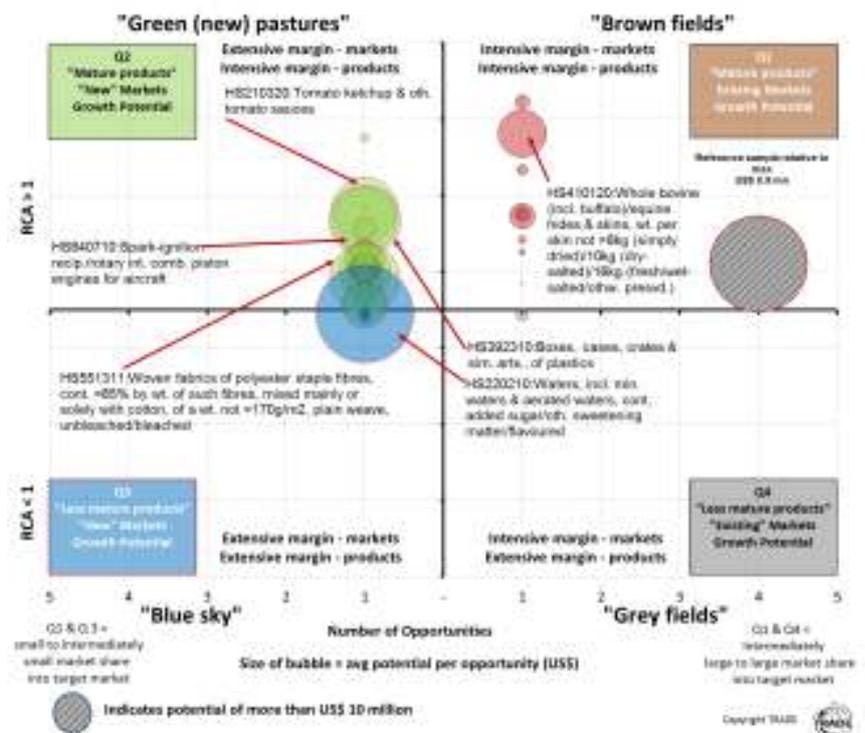
The largest opportunities seem to be in bottled waters, woven fabrics of polyester staple fibres, plastic boxes and crates, aircraft piston engines and tomato sauces.

**Table 25: REO Map outcomes for Uganda opportunities for Rwanda**

Map of Realistic Export Opportunities (REO) by type (Number and % of Total Number) (Potential Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0% - 25%)	Intermediate		Large: 4 (75% - 100%)	Grand Total
		Small: 2 (25% - 50%)	Large: 3 (50% - 75%)		
Large: 1	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Growing: 2 (short & long term)	(60.53%) Mn US\$ 2.9 (68.44%)	(15.79%) Mn US\$ 1.0 (23.49%)	(5.26%) Mn US\$ 0.1 (1.74%)	(18.42%) Mn US\$ 0.3 (6.35%)	(100.00%) Mn US\$ 4.2 (100.00%)
Large & Growing: 3 (only short term)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Large & Growing: 4 (only long term)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Large & Growing: 5 (both short & long term)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Grand Total	23 (60.53%) Mn US\$ 2.9 (68.44%)	6 (15.79%) Mn US\$ 1.0 (23.49%)	2 (5.26%) Mn US\$ 0.1 (1.74%)	7 (18.42%) Mn US\$ 0.3 (6.35%)	38 (100.00%) Mn US\$ 4.2 (100.00%)

Source: Authors, TRADE-DSM Navigator

**Figure 104: Rwanda REO opportunities for Uganda (excluding petroleum and gold)**



Source: Authors, TRADE-DSM

**Table 26: Identified REOs (38) for Rwanda into Uganda (ranked descending by potential)**

Item	Product	REO type	RCA	[A] Realistic Export Potential to Target Market(s) '000 US\$	[B] Total Exports from Rwanda to Target Market(s) '000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s) Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) '000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) '000 US\$	[G] Target Market(s) Total Imports '000 US\$
		<b>38</b>	<b>-</b>	<b>155 937.29</b>	<b>5 721.85</b>	<b>0.5%</b>	<b>935 570.48</b>	<b>99 160.58</b>	<b>1 040 452.90</b>
1	HS220210 : Waters, incl. min. waters & aerated waters, cont. added sugar/oth. sweetening matter/flavoured	REO1,2	0.88	880.21	1.17	0.0%	5 281.29	373.09	5 655.54
2	HS551311 : Woven fabrics of polyester staple fibres, cont. <85% by wt. of such fibres, mixed mainly or solely with cotton, of a wt. not >170g/m2, plain weave, unbleached/bleached	REO2,2	14.75	462.51	457.89	14.2%	2 775.04	0.12	3 233.05
3	HS392310 : Articles for the conveyance/packing of gds., of plastics (excl. of 3923.10- ... - Boxes, cases, crates & sim. arts., of plastics	REO1,2	2.65	439.54	9.99	0.4%	2 637.24	186.92	2 834.15
4	HS840710 : Spark-ignition recip./rotary int. comb. piston engines for aircraft	REO1,2	14.96	390.31	0.00	0.0%	2 341.84	108.68	2 450.51
5	HS210320 : Tomato ketchup & oth. tomato sauces	REO1,2	20.86	385.95	1.75	0.1%	2 315.67	138.73	2 456.15
6	HS720429 : Waste & scrap of alloy steel other than stainless steel	REO2,2	3.17	247.65	339.45	18.6%	1 485.92	2.65	1 828.02
7	HS410120 : Whole bovine (incl. buffalo)/equine hides & skins, wt. per skin not >8kg (simply dried)/10kg (dry-salted)/16kg (fresh/wet-salted/othw. presvd.)	REO4,2	205.51	210.63	3 051.10	70.7%	1 263.77	0.44	4 315.32
8	HS901420 : Direction finding compasses - Instruments & appls. for aeronautical/space navigation (excl. compasses)	REO1,2	1.14	182.93	0.00	0.0%	1 097.60	40.88	1 138.48
9	HS842612 : Mobile lifting frames on tyres & straddle carriers	REO1,2	1.20	160.17	41.26	3.6%	961.00	158.55	1 160.81
10	HS845310 : Machinery for preparing/tanning/working hides/skins/leather	REO2,2	4.36	149.99	60.27	6.1%	899.92	34.51	994.70
11	HS040210 : Milk in powder/granules/oth. solid form, fat content by wt. not >1.5%	REO1,2	2.03	104.04	0.44	0.1%	624.23	100.51	725.19
12	HS071310 : Peas (Pisum sativum), dried, shelled, whether or not skinned/split	REO2,2	3.63	99.66	111.10	15.6%	597.96	0.93	709.99
13	HS845929 : Boring machines n.e.s. in 84.59, op. by removing metal - Drilling machines other than way-type unit head machines, op. by removing metal, other than numerically controlled	REO1,2	4.72	86.36	0.76	0.1%	518.17	127.09	646.03
14	HS720430 : Waste & scrap of tinned iron/steel	REO3,2	16.95	59.07	144.63	28.8%	354.43	3.09	502.15
15	HS480990 : Carbon/sim. copying papers, whether or not printed, in rolls >36cm. side/sh - Copying/transfer papers (incl. coated/impregnated paper for duplicator stencils/offset plates), whether or not printed, in rolls/sheets (excl. of 4809.10 & 4809.20)	REO1,2	11.69	40.74	0.51	0.2%	244.41	45.50	290.43
16	HS950890 : Roundabouts, swings, shooting galleries & oth. fairground amusements; trave ... - Roundabouts, swings, shooting galleries & oth. fairground amusements;	REO1,2	4.23	32.03	0.00	0.0%	192.16	4.27	196.43

	travelling theatres									
17	HS040700 : Birds' eggs, in shell, fresh/presvd./cooked	REO1,2	1.83	30.40	0.00	0.0%	182.38	1.91	184.28	
18	HS392510 : Builders' ware of plastics, n.e.s. (excl. of 3925.10-3925.30) - Reservoirs, tanks, vats & sim. conts., of a cap. >300 l, of plastics	REO1,2	2.92	27.02	0.76	0.3%	162.14	67.85	230.74	
19	HS970300 : Original sculptures & statuary, in any mat.	REO1,2	1.31	22.54	0.41	0.3%	135.24	4.69	140.34	
20	HS800120 : Tin alloys, unwrought	REO4,2	17.86	18.43	397.35	84.4%	73.72	0.00	471.07	
21	HS200551 : Beans (Vigna spp., Phaseolus spp.), shelled, prepd./presvd. othw. than by vinegar/acetic acid, not frozen, other than prods. of 20.06	REO2,2	1.60	18.34	19.24	14.6%	110.05	2.49	131.78	
22	HS090240 : Tea, black (fermented) & partly fermented tea, whether or not flavoured, in immediate packings of a content >3kg	REO4,2	537.36	17.31	814.91	87.9%	103.88	8.66	927.45	
23	HS640420 : Footwear (excl. waterproof) with outer soles of rubber/plastics & uppers of - Footwear with outer soles of leather/composition leather & uppers of textile mats.	REO1,2	1.80	16.63	0.00	0.0%	99.79	12.43	112.22	
24	HS846890 : Gas-operated mach. & app. for soldering/brazing/welding, other than hand-he ... - Parts of the mach. & app. of 84.68	REO1,2	6.78	14.80	0.00	0.0%	88.79	9.27	98.06	
25	HS391590 : Waste, parings & scrap, of plastics n.e.s. in 39.15	REO3,2	0.85	13.98	32.42	26.2%	83.87	7.51	123.80	
26	HS841392 : Centrifugal pumps (excl. of 8413.11-8413.40) - Parts of liquid elevators	REO1,2	2.31	12.39	0.00	0.0%	74.35	10.53	84.87	
27	HS090121 : Coffee, roasted, not decaffeinated	REO1,2	0.80	10.77	0.08	0.1%	64.59	0.14	64.81	
28	HS330190 : Essential oils of bergamot - Extracted oleoresins; concs. of essential oils in fats/fixed oils/waxes/the like, obt. by enfleurage/maceration [see complete text #34]	REO1,2	0.89	10.47	0.00	0.0%	62.79	5.94	68.73	
29	HS220110 : Mineral waters (nat./art.) & aerated waters, not cont. added sugar/oth. sweetening matter/flavoured	REO1,2	3.48	10.33	0.63	1.0%	61.96	3.97	66.57	
30	HS960500 : Travel sets for personal toilet/sewing/shoe/clothes cleaning	REO4,2	68.70	9.65	64.25	49.7%	57.90	7.01	129.17	
31	HS940410 : Mattress supports	REO2,2	181.94	6.78	5.09	9.7%	40.66	7.00	52.75	
32	HS110610 : Flour, meal & powder of the dried leguminous vegetables of 07.13	REO4,2	8.35	5.72	28.39	45.3%	34.33	0.00	62.72	
33	HS850630 : Parts of the primary cells & primary batteries of 85.06 - Primary cells & primary batteries, mercuric oxide	REO1,2	1.23	4.63	0.00	0.0%	23.13	0.00	23.13	
34	HS121190 : Ginseng roots - Plants & parts of plants, incl. seeds & fruits, of a kind used primarily in perfumery/pharmacy/for insecticidal/fungicidal/sim. purps., n.e.s. in Ch.12, fresh/dried, whether or not cut/crushed/powdered	REO1,2	21.43	4.37	0.00	0.0%	26.21	1.57	27.78	
35	HS071331 : Beans (Vigna spp., Phaseolus spp. (excl. of 0713.31-0713.33)), dried, shell ... - Beans of the species Vigna mungo (L.)/Hepper/Vigna radiata (L.) Wilczek, dried, shelled, whether or not skinned/split	REO4,2	5.77	3.41	94.55	90.2%	10.23	0.00	104.78	

<b>36</b>	HS910390 : Clocks with watch movements (excl. of 91.04), other than electrically operated	RE01,2	0.98	2.36	0.00	0.0%	14.15	0.37	14.52
<b>37</b>	HS711711 : Cuff-links & studs of base metal, whether or not plated with precious metal	RE01,2	2.08	0.86	0.00	0.0%	4.29	0.00	4.29
<b>38</b>	HS520299 : Cotton waste other than yarn waste (incl. thread waste) & garnetted stock	RE04,2	2.20	0.35	31.12	95.7%	1.39	0.00	32.51

Source: Authors, TRADE-DSM

While there are 38 HS6-digit product lines in total that the methodology identifies, the top 5 only are discussed in more detail in this section of the report.

### 5.4.5.1. Bottled waters (REO<sub>1,2</sub>)

The largest realistic export opportunity identified for Rwanda into Uganda is that of **HS220210: Waters, incl. min. waters & aerated waters, cont. added sugar/oth. sweetening matter/flavoured.**

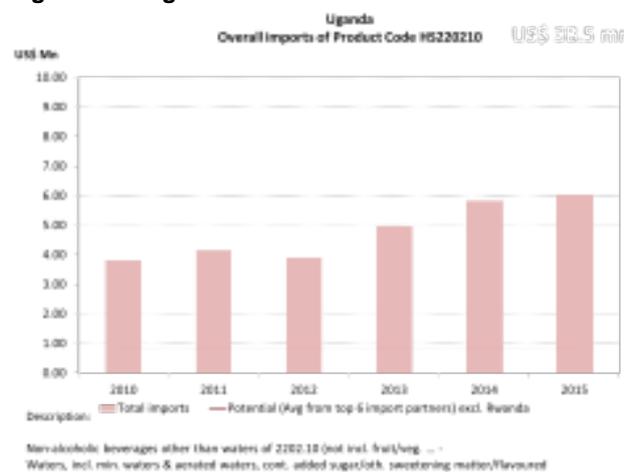
The product is produced in Manufacture of soft drinks; production of mineral waters sector (S3053) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 0.88 for this product and potential estimated at US\$ 880 thousand (based on the calculation as explained in the appendix in section 9.1.6).

Figure 105 provides the imports of Uganda of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Uganda showed steady growth in imports over the period ending at around US\$ 6 million in 2015.

Figure 106 depicts the export of this product from Rwanda to the top destinations with Uganda not appearing in the list. At the same time top suppliers to Uganda are depicted and the main suppliers are Austria, Kenya, Tanzania, Thailand and China.

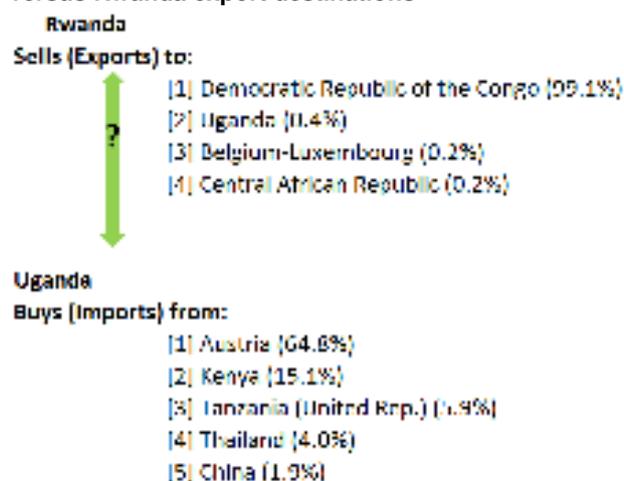
While Rwanda currently does not have an RCA of greater than 1 for this product, it is classified as a “blue sky” product with potential to become more mature since existing local productive capacity does exist and demonstrated export demand is available to tap into.

Figure 105: Uganda REO for HS220210



Source: Authors, TRADE-DSM

Figure 106: Uganda REO HS220210 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.5.2. Woven fabrics of polyester staple fibres (REO<sub>2,2</sub>)

The second largest realistic export opportunity identified for Rwanda into Uganda is that of **HS551311: Woven fabrics of polyester staple fibres, cont. <85% by wt. of such fibres, mixed mainly or solely with cotton, of a wt. not >170g/m<sup>2</sup>, plain weave, unbleached/bleached.**

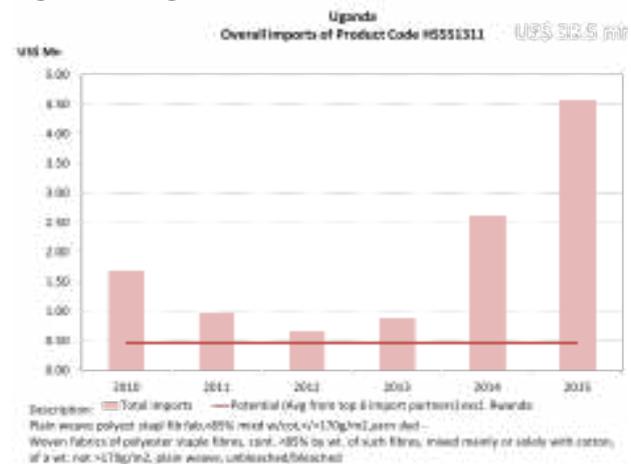
The product is produced in the Preparation and spinning of textile fibres; weaving of textiles sector (S3111) and classified as resource-intensive manufactures. Rwanda has an RCA of 14.75 for this product and potential estimated for Uganda at US\$ 462 thousand (based on the calculation as explained in the appendix in section 9.1.6).

Figure 107 provides the imports of Uganda of this product over the period 2010 to 2015. While declining around 2011 to 2013, strong growth in import demand is observed from 2014 and 2015 ending at around US\$ 4.5 million.

Figure 108 depicts the export of this product from Rwanda to the top destinations (Uganda taking up 100 percent of Rwanda's exports), while Rwanda is the second largest supplier after China into Uganda. Uganda also imports from India, Kenya and the United Arab Emirates.

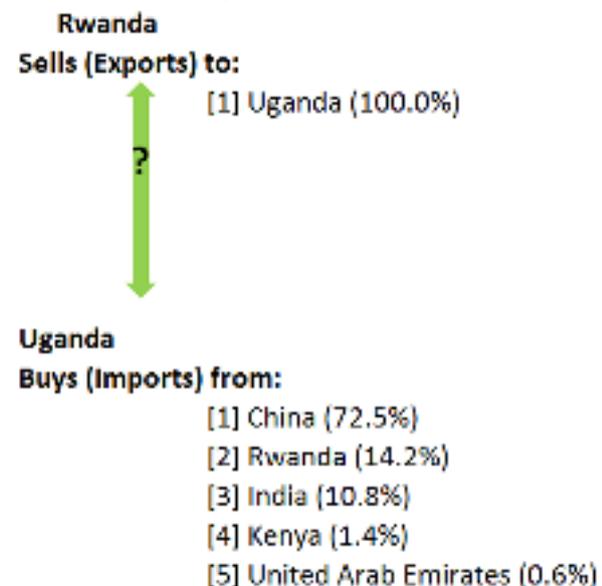
While Rwanda already supplies to Uganda, the opportunity exists to gain market share against China and India for this product into this specific market.

Figure 107: Uganda REO for HS551311



Source: Authors, TRADE-DSM

Figure 108: Uganda REO HS551311 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.5.3. Boxes, cases, crates & sim. arts., of plastics (REO<sub>1,2</sub>)

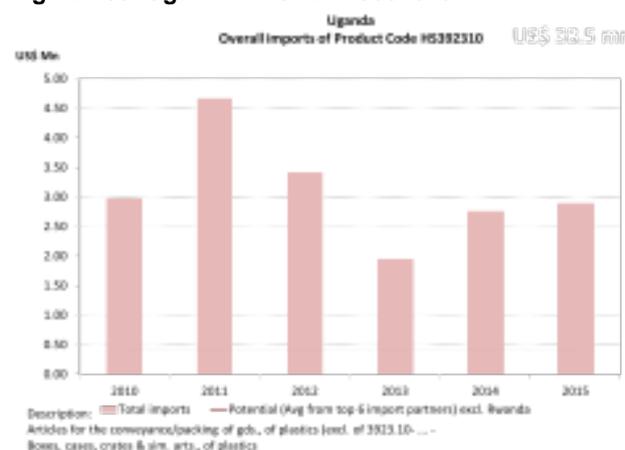
The third largest realistic export opportunity identified for Rwanda into Uganda is that of **HS392310: Boxes, cases, crates & sim. arts., of plastics**.

The product is produced in the Manufacture of plastic products sector (S3380) and classified as medium skill and technology intensive. Rwanda has an RCA of 2.65 for this product and potential estimated at US\$ 439 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 109 provides the imports of Uganda of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Uganda declined from 2011, but started recovering from 2013 onwards to around US\$ 3 million.

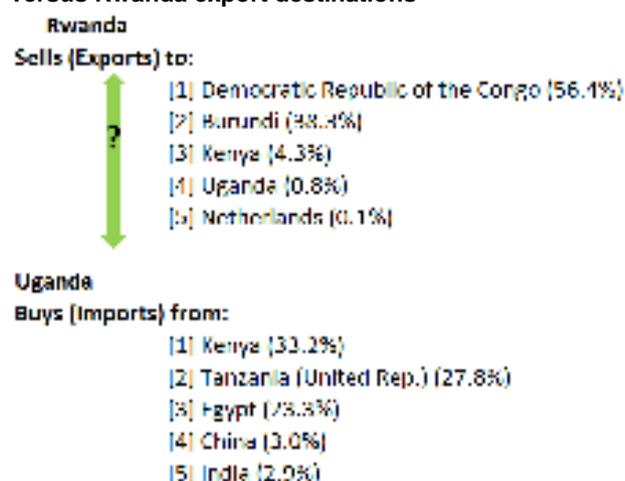
Figure 110 depicts the export of this product from Rwanda to the top destinations with Uganda in fourth place (0.8 percent). The major export destinations from Rwanda are the DRC (56.4 percent) and Burundi. At the same time top suppliers to Uganda are Kenya, Tanzania, Egypt, China and India.

Figure 109: Uganda REO for HS392310



Source: Authors, TRADE-DSM

Figure 110: Uganda REO HS392310 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

#### 5.4.5.4. Aircraft piston engines (REO<sub>1,2</sub>)

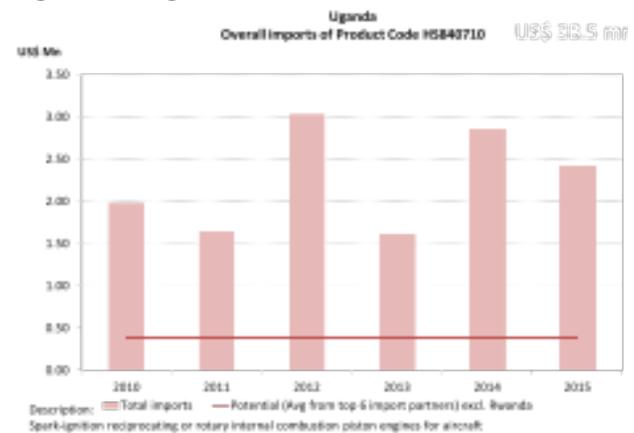
The fourth largest realistic export opportunity identified for Rwanda into Uganda is that of **HS840710: Spark-ignition reciprocating or rotary internal combustion piston engines for aircraft.**

The product is produced in the sector group of Manufacture of aircraft and spacecraft (S3860) and classified as medium skill- and technology intensive manufactures. Rwanda has an RCA of 14.95 for this product and potential estimated at US\$ 390 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 111 provides the imports into Burundi of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Uganda oscillates around the US\$ 2 million mark per annum.

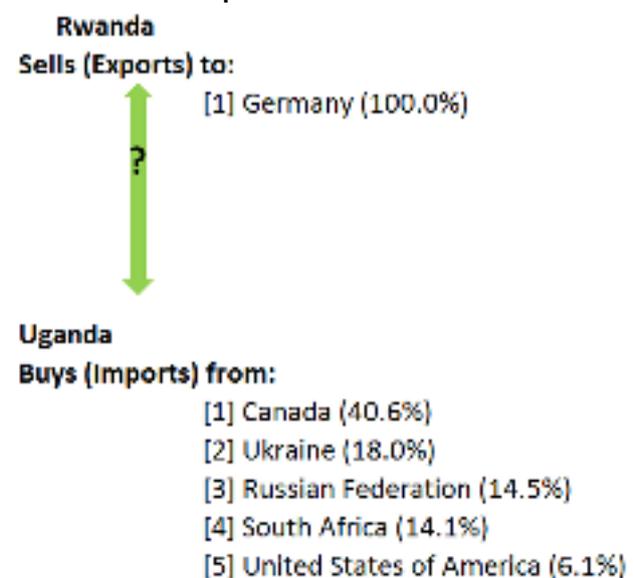
Figure 112 depicts the export of this product from Rwanda – only to Germany (supporting the observation that it may have to do with refurbishment of existing planes). At the same time top suppliers to Uganda are depicted and main sources are Canada, the Ukraine, Russia, South Africa and the United States of America.

Figure 111: Uganda REO for HS840710



Source: Authors, TRADE-DSM

Figure 112: Uganda REO HS840710 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

While this may seem a tree too far for Rwanda (in product space terminology) due to the fact that Rwanda may not currently specifically manufacture such engines, potential do exist to e.g. start with services around maintenance, refurbishment and even assembly for the region. This may make sense since East and Central African countries do make use of a lot of smaller planes due to challenges of infrastructure and distances in the region. The recent announcements<sup>34</sup> of e.g. Volkswagen (Germany) opening an assembly plant in Kigali, is an example that with the right investors and intent such a venture is totally plausible.

<sup>34</sup> See <http://www.engineeringnews.co.za/article/vwsa-md-takes-on-regional-responsibility-rwanda-to-open-vw-plant-2017-03-02> and <https://constructionreviewonline.com/2017/03/new-volkswagen-assembly-plant-to-be-constructed-in-rwanda/>

### 5.4.5.5. Tomato sauces (REO<sub>1,2</sub>)

The fifth largest realistic export opportunity identified for Rwanda into Uganda is that of **HS210320: Tomato ketchup & other tomato sauces**.

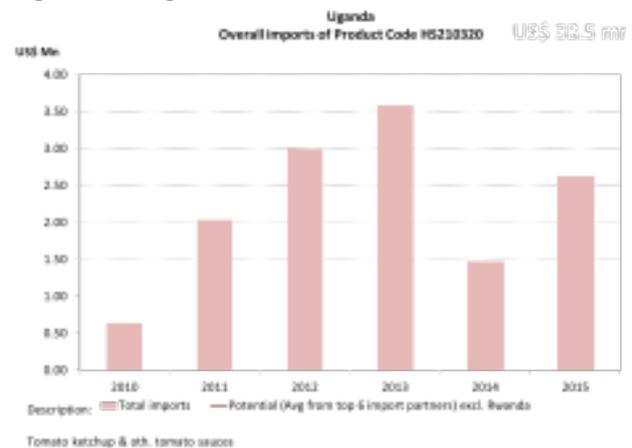
The product is produced in the sector group of Manufacture of other food products n.e.c (S3049) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 20.86 for this product and potential for Uganda estimated at US\$ 386 000 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 113 provides the imports for Burundi of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Uganda exhibited an increasing pattern over the period 2011 to 2013, then dropped to nearly zero, recovering to around US\$ 2.5 million by 2015.

Figure 114 depicts the export of this product from Rwanda to the top destinations with the Uganda at the bottom. At the same time top suppliers to Uganda are depicted and Rwanda does not appear on the list.

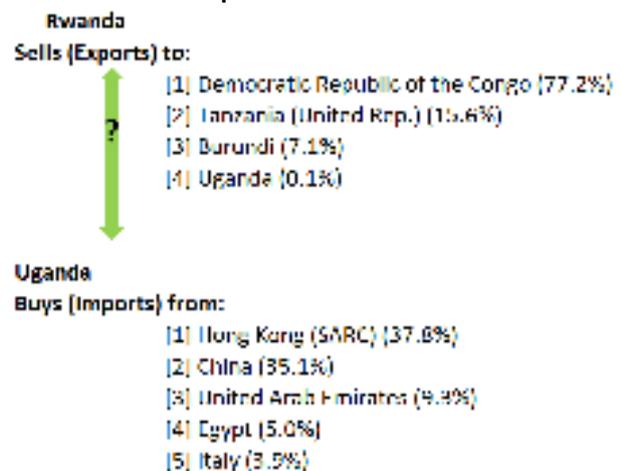
Uganda sources from the Hong Kong, China, the United Arab Emirates, Egypt and Italy.

Figure 113: Uganda REO for HS210320



Source: Authors, TRADE-DSM

Figure 114: Uganda REO HS210320 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.6. Kenya (C404)

Kenya does not border directly with Rwanda and is located to the east. The port at Mombasa is a key logistics point for the region and also for Rwanda. Overall Kenya covers an area of 580 367 square kilometres and size wise is ranked as number 49 in the world. In terms of GDP the economy is estimated at US\$ 36 billion (2015) and the country's estimated population in 2015 was 46.1 million persons (United Nations, 2016). Kenya's economy is relatively open in terms of imports to GDP at 39.8 percent (2015). Kenya is the economic, financial, and transport hub of East Africa. Kenya's real GDP growth has averaged over 5% for the last eight years. Agriculture remains the backbone of the Kenyan economy, contributing one-third of GDP. About 75% of Kenya's population work at least part-time in the agricultural sector. The country's highlands comprise one of the most successful farming areas in Africa, but 80 percent of Kenya is arid or semi-arid. Kenya also has to deal with refugees from South Sudan and Somalia (WFP, 2017f).

Based on the data as compiled by CEPII Burundi on average exported around US\$ 5 billion over the period 2010 to 2015, with a levelling from 2013 to 2015.

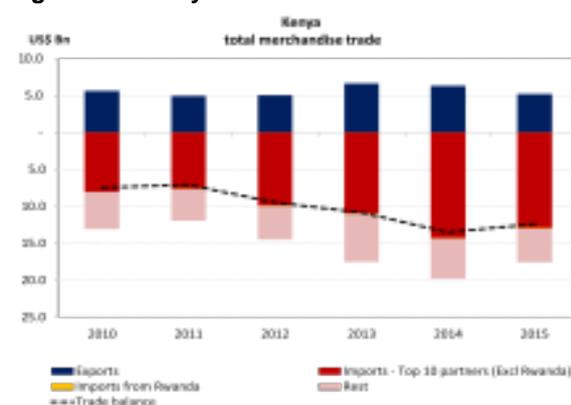
In terms of imports it is evident from Figure 116 that merchandise imports have increased steadily over the period 2010 to 2014, then started a slight decline. The top 10 trading partners (excluding Rwanda) supplies in excess of 66 percent of imports. Over the period China and India are the leading sources of imports, followed by South Africa, Tanzania, the United Kingdom, the United Arab Emirates, Germany and the United States. Evident from Figure 117 is that Rwanda only supplies around 0.4 percent of Kenya's imports (on time-weighted basis valued at US\$ 78.97 million).

Figure 115: Map of Kenya



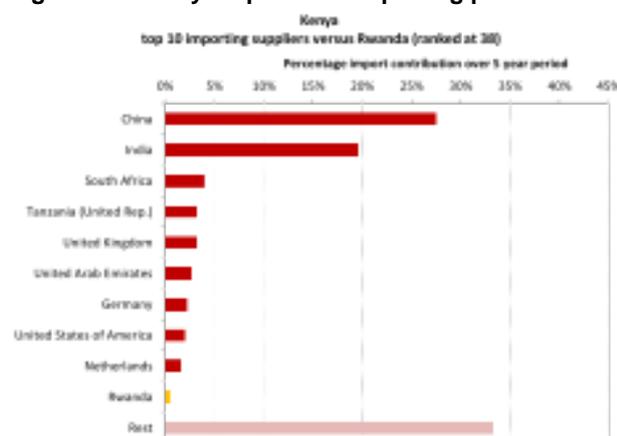
Source: The World Factbook (CIA)

Figure 116: Kenya overall merchandise trade



Source: Authors, BACI data

Figure 117: Kenya top overall importing partners



Source: Authors, BACI data

There are a total of 35 opportunities identified for Rwanda into Kenya. Most are classified as growing in both short and long term, but overall not large opportunities (REO<sub>n,2</sub> – so row 2). The overall potential is calculated at around US\$ 37.8 million.

There are 7 of these products that Rwanda supplies to Kenya in Quadrant 1 (intensive margin) while 26 products are located in Quadrant 2 (extensive margin for markets, intensive margins for the products) and 2 in Q3 as depicted in Figure 118. More detail on each of these is provided in Table 28.

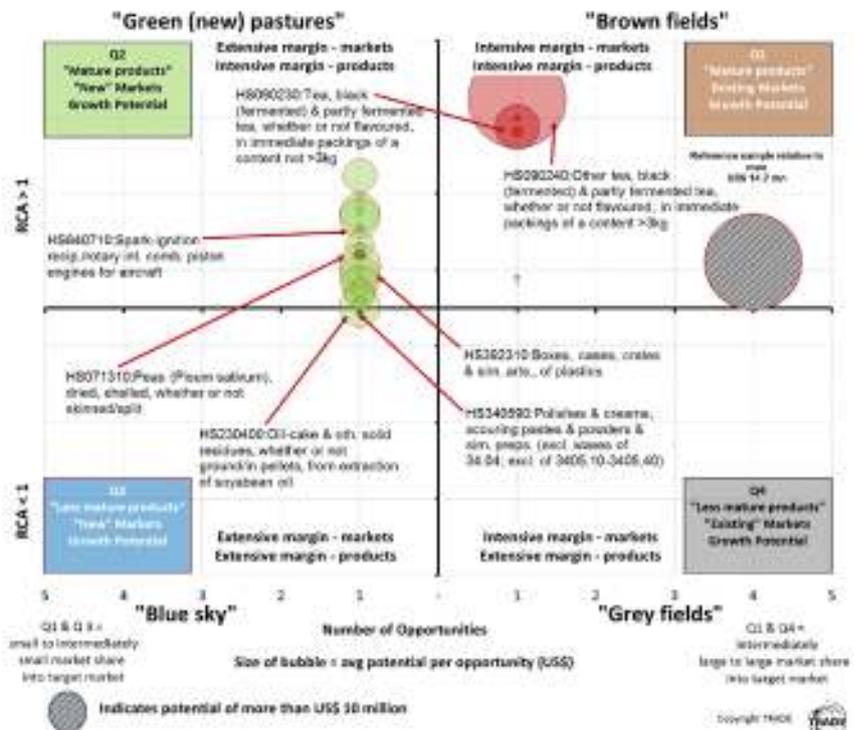
Table 27: REO Map outcomes for Kenya opportunities for Rwanda

Map of Realistic Export Opportunities (REO) by type (Number and % of Total Number) (Potential Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0.00-25%)	Intermediate		Large: 4 (75-100%)	Grand Total
		Small: 2 (25-50%)	Large: 3 (50-75%)		
Large: 1	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Growing: 2 (short & long term)	24 (68.57%) Mn US\$ 14.1 (37.30%)	5 (14.29%) Mn US\$ 4.1 (10.85%)	2 (5.71%) Mn US\$ 0.0 (0.00%)	4 (11.43%) Mn US\$ 3.2 (8.37%)	35 (94.29%) Mn US\$ 21.4 (56.60%)
Large & Growing: 3 (only short term)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Large & Growing: 4 (only long term)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	1 (2.86%) Mn US\$ 14.2 (37.41%)	(0.00%) Mn US\$ 0.0 (0.00%)	1 (2.86%) Mn US\$ 14.2 (37.41%)
Large & Growing: 5 (both short & long term)	1 (2.86%) Mn US\$ 2.3 (5.99%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	1 (2.86%) Mn US\$ 2.3 (5.99%)
Grand Total	25 (71.43%) Mn US\$ 16.4 (43.29%)	3 (8.57%) Mn US\$ 4.1 (10.85%)	3 (8.57%) Mn US\$ 14.2 (37.50%)	4 (11.43%) Mn US\$ 3.2 (8.37%)	35 (100.00%) Mn US\$ 37.8 (100.00%)

Source: Authors, TRADE-DSM Navigator

The largest opportunities seem to be in Other tea, black tea, peas, soybean oil cake and aircraft piston engines.

Figure 118: Rwanda REO opportunities for Kenya (excluding petroleum and gold)



Source: Authors, TRADE-DSM

**Table 28: Identified REOs (35) for Rwanda into Kenya (ranked descending by potential)**

Item	Product	REO type	RCA	[A] Realistic Export Potential to Target Market(s) '000 US\$	[B] Total Exports from Rwanda to Target Market(s) '000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s) Total Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) '000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) '000 US\$	[G] Target Market(s) Total Imports '000 US\$
		<b>35</b>	<b>-</b>	<b>37 834.50</b>	<b>59 098.05</b>	<b>20.8%</b>	<b>219 289.75</b>	<b>6 387.57</b>	<b>284 775.37</b>
1	HS090240 : Other tea, black (fermented) & partly fermented tea, whether or not flavoured, in immediate packings of a content >3kg	REO3,4	537.36	14 154.13	39 359.81	31.4%	84 924.75	873.24	125 157.81
2	HS090230 : Tea, black (fermented) & partly fermented tea, whether or not flavoured, in immediate packings of a content not >3kg	REO4,2	233.98	2 949.02	14 354.07	44.7%	17 694.13	64.98	32 113.18
3	HS071310 : Beans (Vigna spp., Phaseolus spp. (excl. of 0713.31-0713.33)), dried, shell ... - Peas (Pisum sativum), dried, shelled, whether or not skinned/split	REO1,2	3.63	2 634.22	0.00	0.0%	15 805.33	928.56	16 733.89
4	HS230400 : Oil-cake & oth. solid residues, whether or not ground/in pellets, from extraction of soyabean oil	REO2,2	1.05	2 403.19	1 075.54	6.9%	14 419.14	8.87	15 503.55
5	HS840710 : Spark-ignition reciprocating or rotary internal combustion piston engines for aircraft.	REO1,2	14.96	2 400.70	0.00	0.0%	14 404.18	1 535.90	15 940.08
6	HS392310 : Articles for the conveyance/packing of gds., of plastics (excl. of 3923.10- ... - Boxes, cases, crates & sim. arts., of plastics	REO1,2	2.65	2 311.05	54.63	0.4%	13 866.30	583.80	14 504.72
7	HS230210 : Bran, sharps & oth. residues, whether or not in the form of pellets, derived from the sifting/milling/oth. working of maize (corn)	REO1,5	17.70	2 264.57	308.62	2.7%	11 322.87	0.00	11 631.49
8	HS040210 : Milk & cream, concentrated (excl. in powder), sweetened - Milk in powder/granules/oth. solid form, fat content by wt. not >1.5%	REO1,2	2.03	2 051.73	0.00	0.0%	12 310.39	800.06	13 110.45
9	HS230230 : Bran, sharps & oth. residues, whether or not in the form of pellets, derived from the sifting/milling/oth. working of wheat	REO2,2	54.43	1 665.60	573.60	10.3%	4 996.79	0.00	5 570.39
10	HS200290 : Tomatoes, prepd./presvd. othw. than by vinegar/acetic acid, other than whole/in pieces	REO1,2	1.53	1 258.20	0.00	0.0%	7 549.20	19.71	7 568.91
11	HS190531 : Bread, pastry, cakes, biscuits & oth. bakers' wares n.e.s. in Ch.19, whethe ... - Sweet biscuits	REO1,2	6.73	1 163.38	12.19	0.2%	6 980.31	828.55	7 821.06
12	HS631090 : Used/new rags, scrap twine, cordage, rope & cables & worn out arts. of twine/cordage/rope/cables, of textile mats. (excl. sorted)	REO1,2	1.09	412.62	18.36	0.7%	2 475.71	39.41	2 533.48
13	HS040700 : Birds' eggs, in shell, fresh/presvd./cooked	REO1,2	1.83	389.41	0.00	0.0%	2 336.47	19.64	2 356.11
14	HS901420 : Direction finding compasses - Instruments & appls. for aeronautical/space navigation (excl. compasses)	REO1,2	1.14	236.86	0.00	0.0%	1 421.18	102.48	1 523.67
15	HS151790 : Edible mixts./preps. of animal/veg. fats/oils/fractions of diff. fats/oils of Ch.15, other than edible fats/oils/fractions of 15.16/non-liquid margarine	REO1,2	4.98	202.64	0.00	0.0%	1 215.83	18.32	1 234.15

16	HS410120 : Whole bovine (incl. buffalo)/equine hides & skins, wt. per skin not >8kg (simply dried)/10kg (dry-salted)/16kg (fresh/wet-salted/othw. presvd.)	REO4,2	205.51	148.07	1 161.47	72.3%	444.20	0.00	1 605.68
17	HS121190 : Ginseng roots - Plants & parts of plants, incl. seeds & fruits, of a kind used primarily in perfumery/pharmacy/for insecticidal/fungicidal/sim. purps., n.e.s. in Ch.12, fresh/dried, whether or not cut/crushed/powdered	REO1,2	21.43	144.46	0.00	0.0%	866.74	78.72	945.47
18	HS220850 : Gin & Geneva	REO1,2	6.10	131.75	0.00	0.0%	790.50	83.74	874.24
19	HS830890 : Clasps, frames with clasps, buckles, buckle-clasps, and the like, of base metal...(excl. of 8308.10), incl. parts; beads & spangles, of base metal... [see complete text #134]	REO1,2	1.14	131.67	0.00	0.0%	790.02	41.23	831.25
20	HS130219 : Agar-agar - Vegetable saps & extracts (excl. of 1302.11-1302.14)	REO1,2	29.27	111.32	0.00	0.0%	667.93	47.43	715.36
21	HS842220 : Dish washing machines of the h-hold. type - Machinery for cleaning/drying bottles/oth. conts.	REO1,2	4.91	98.53	0.00	0.0%	591.16	35.91	627.07
22	HS392510 : Builders' ware of plastics, n.e.s. (excl. of 3925.10-3925.30) - Reservoirs, tanks, vats & sim. conts., of a cap. >300 l, of plastics	REO1,2	2.92	92.27	0.10	0.0%	553.64	125.13	678.86
23	HS900510 : Binoculars	REO1,2	10.95	84.72	0.00	0.0%	508.33	26.62	534.94
24	HS540120 : Sewing thread of man-made filaments, whether or not put up for RS, of art. filaments	REO1,2	2.88	66.86	0.00	0.0%	401.13	4.70	405.84
25	HS410390 : Raw hides & skins of reptiles, n.e.s. in Ch.41 (fresh/salted/dried/limed/pickled/othw. presvd. but not tanned/parchment-dressed/furth. prepd.)	REO4,2	304.47	65.62	1 471.92	78.9%	393.70	0.00	1 865.62
26	HS846890 : Gas-operated mach. & app. for soldering/brazing/welding, other than hand-he ... - Parts of the mach. & app. of 84.68	REO1,2	6.78	59.52	0.00	0.0%	357.12	29.71	386.83
27	HS340590 : Polishes & creams, scouring pastes & powders & sim. preps. (excl. waxes of 34.04; excl. of 3405.10-3405.40)	REO1,2	0.83	46.76	0.00	0.0%	280.56	25.26	305.82
28	HS253090 : Kieserite, epsomite (nat. magnesium sulphates) - Mineral subs., n.e.s. in Ch.25	REO2,2	11.49	36.36	22.56	8.9%	218.14	13.69	254.40
29	HS330190 : Essential oils of bergamot - Extracted oleoresins; concs. of essential oils in fats/fixed oils/waxes/the like, obt. by enfleurage/maceration	REO1,2	0.89	32.16	0.10	0.0%	192.94	9.36	202.40
30	HS846120 : Broaching machines working by removing metal/cermets - Shaping/slotting machines working by removing metal/cermets	REO1,2	17.34	28.50	0.00	0.0%	171.00	3.44	174.44
31	HS441510 : Cases, boxes, crates, drums & sim. packings of wood; cable-drums of wood	REO3,2	2.53	27.54	45.51	19.1%	165.23	27.48	238.21
32	HS110290 : Cereal flour other than of wheat, meslin, rye, maize (corn), rice	REO1,2	19.78	14.22	0.00	0.0%	85.31	2.30	87.61
33	HS420340 : Articles of apparel, of leather/composition leather - Clothing accessories (excl. of 4203.21-4203.30), of leather/composition leather	REO1,2	3.23	8.75	0.00	0.0%	52.49	8.17	60.66
34	HS711711 :	REO3,2	2.08	5.20	12.88	28.5%	31.19	1.13	45.21

Cuff-links & studs of base metal, whether or not plated with precious metal									
35	HS410229 : Raw skins of sheep/lambs (excl. of 4102.10 & 4102.21), fresh/salted/dried.../othw. presvd. but not tanned/parchment- dressed...without wool on... [see complete text #57]	REO4,2	426.99	2.93	626.67	99.1%	5.85	0.00	632.53

Source: Authors, TRADE-DSM

While there are 35 HS6-digit product lines in total that the methodology identifies, the top 5 only are discussed in more detail in this section of the report.

### 5.4.6.1. Other tea (REO<sub>3,4</sub>)

The largest realistic export opportunity identified for Rwanda into Kenya is that of **HS090240: Other tea, black (fermented) & partly fermented tea, whether or not flavoured, in immediate packings of a content >3kg.**

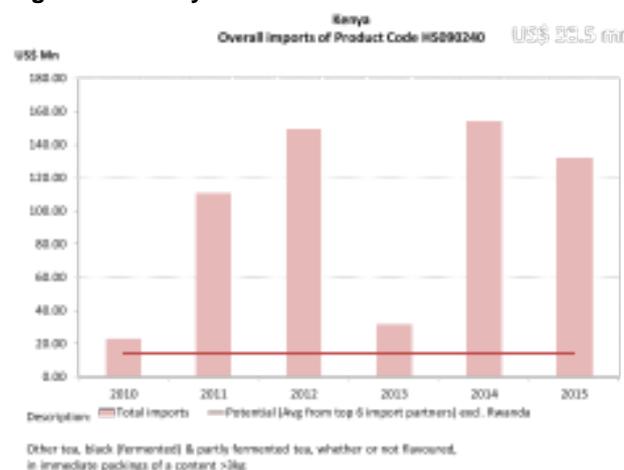
Growing of crops; market gardening; horticulture' farming of animals' growing of crops combined with farming of animals (S1110,1120,1130) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 537.36 for this product and potential estimated at US\$ 14.2 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 119 provides the imports of Kenya of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Kenya took a dip in 2013 but recovered to previous levels of around US 130 million by 2015.

Figure 120 depicts the export of this product from Rwanda to the top destinations with Kenya appearing at the top. At the same time top suppliers to Kenya are depicted and Rwanda is second as it supplies just more than 31 percent of Kenya's imports. Kenya is classified is a "brown fields" market for Rwanda as Rwanda is already supplying a large share of the imported demand into Kenya – therefore in the intensive margin both from a product as well as market perspective.

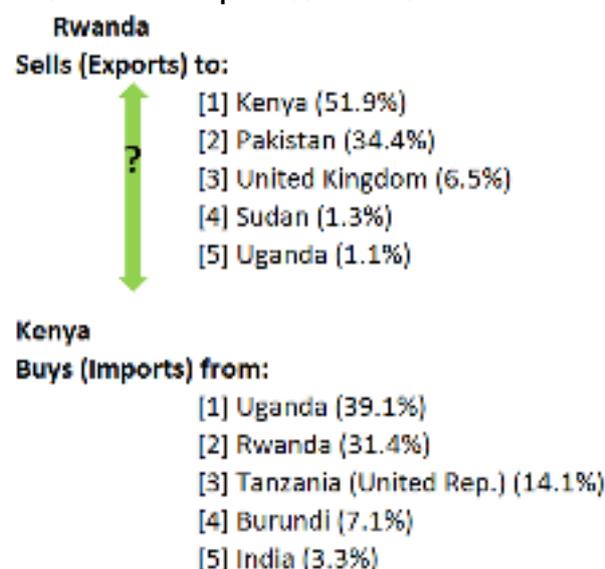
After Kenya, the next export destination from Rwanda is Pakistan (at 34.4 percent).

Figure 119: Kenya REO for HS090240



Source: Authors, TRADE-DSM

Figure 120: Kenya REO HS090240 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.6.2. Black tea (REO<sub>4,2</sub>)

The second largest realistic export opportunity identified for Rwanda into Kenya is that of **HS090230: Tea, black (fermented) & partly fermented tea, whether or not flavoured, in immediate packings of a content not >3kg.**

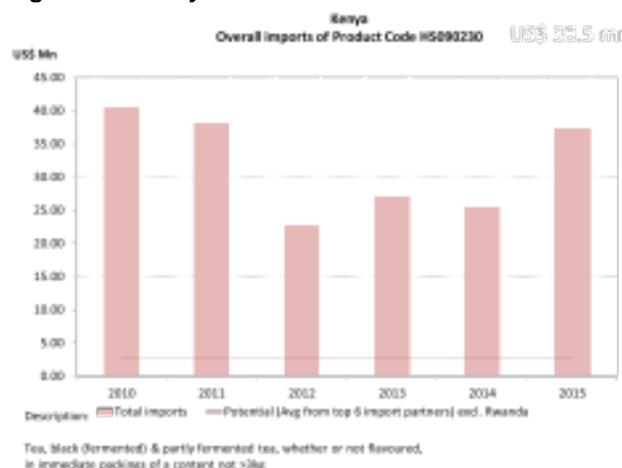
Growing of crops; market gardening; horticulture' farming of animals' growing of crops combined with farming of animals (S1110,1120,1130) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 233.98 for this product and potential estimated at US\$ 2.9 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 121 provides the imports of Kenya of this product over the period 2010 to 2015 (around US\$ 25-30 million per annum), as well as the realistic potential estimate.

Figure 122 depicts the export of this product from Rwanda to the top destinations (Kenya at 71.7 percent of Rwanda's exports). At the same time top suppliers to Kenya are depicted, with Rwanda featuring at number 2 after Uganda.

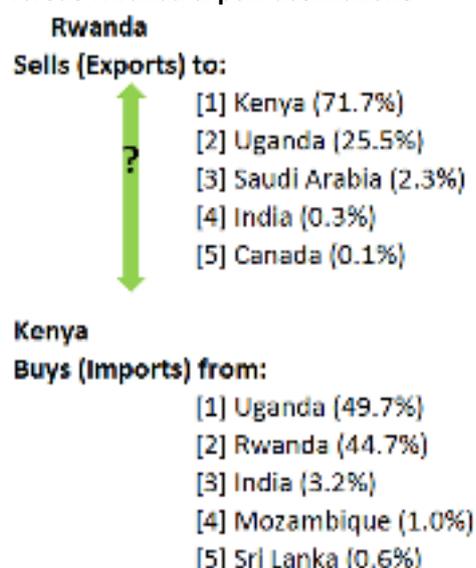
Other smaller import origins for Kenya are India, Mozambique and Sri Lanka.

Figure 121: Kenya REO for HS090230



Source: Authors, TRADE-DSM

Figure 122: Kenya REO HS090230 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.6.3. Peas (REO<sub>1,2</sub>)

The third largest realistic export opportunity identified for Rwanda into Kenya is that of **HS071310: Peas (Pisum sativum), dried, shelled, whether or not skinned/split.**

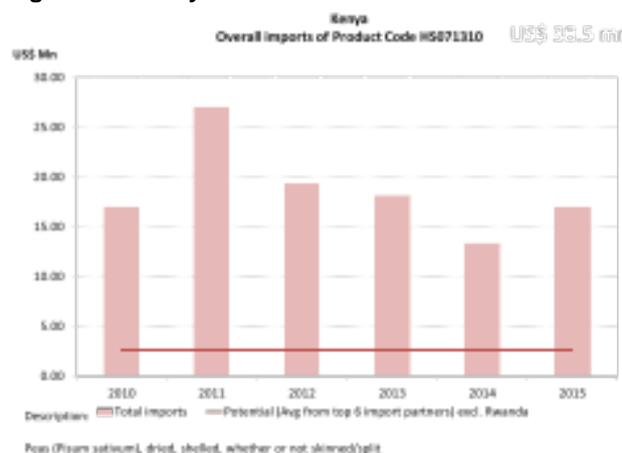
The product is produced in the Processing and preserving of fruit and vegetables sector (S3013) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 3.63 for this product and potential estimated at US\$ 2.6 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 123 provides the imports of Burundi of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that while the imports of this product into Kenya declined from 2011 highs to around US\$ 13 million in 2014, in 2015 the direction started turning and imports of this product started to increase again.

Figure 124 depicts the export of this product from Rwanda to the top destinations with Kenya not appearing as a destination. At the same time top suppliers to Kenya are depicted and Rwanda is does not appear on the list.

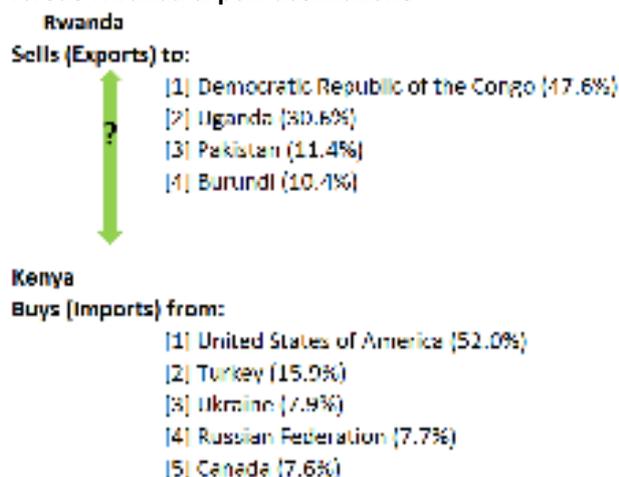
Kenya mainly sources from the United States, Turkey, the Ukraine, Russia and Canada.

Figure 123: Kenya REO for HS071310



Source: Authors, TRADE-DSM

Figure 124: Uganda REO HS071310 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

#### 5.4.6.4. Soybean oil cake (REO<sub>2,2</sub>)

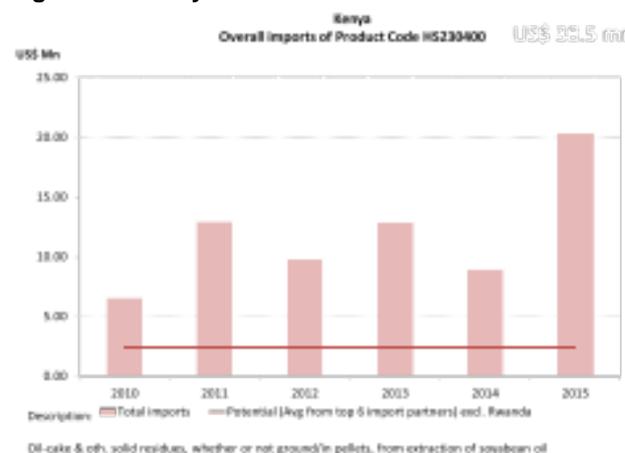
The fourth largest realistic export opportunity identified for Rwanda into Kenya is that of **HS230400: Oil-cake & oth. solid residues, whether or not ground/in pellets, from extraction of soybean oil.**

The product is produced in Manufacture of vegetable and animal oils and fats sector (S3014) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 1.05 for this product and potential estimated at US\$ 2.4 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 125 provides the imports into Kenya of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that while the imports of this product into Kenya have oscillated up and down over the period, strong growth was experienced between 2014 and 2015 reaching US\$ 20 million.

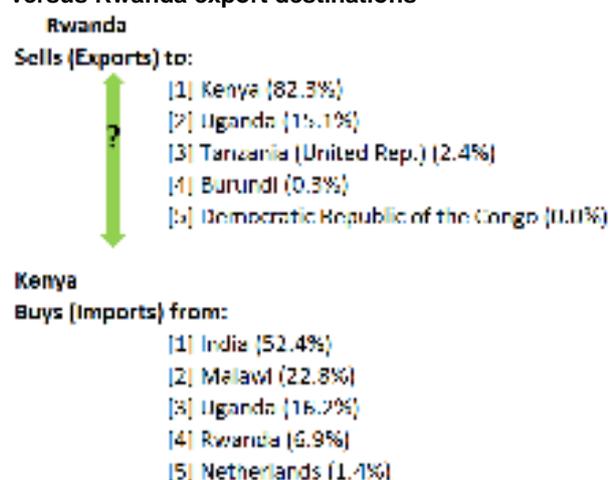
Figure 126 depicts the export of this product from Rwanda to the top destinations with Kenya the largest market. At the same time top suppliers to Kenya are depicted and Rwanda is only ranked at number 4 with 6.9 percent of Kenya's import demand fulfilled by Rwanda. The major supplier is India followed by Malawi and Uganda.

Figure 125: Kenya REO for HS230400



Source: Authors, TRADE-DSM

Figure 126: Kenya REO HS230400 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.6.5. Aircraft piston engines (REO<sub>1,2</sub>)

The fifth largest realistic export opportunity identified for Rwanda into Kenya is that of **HS840710: Spark-ignition reciprocating or rotary internal combustion piston engines for aircraft.**

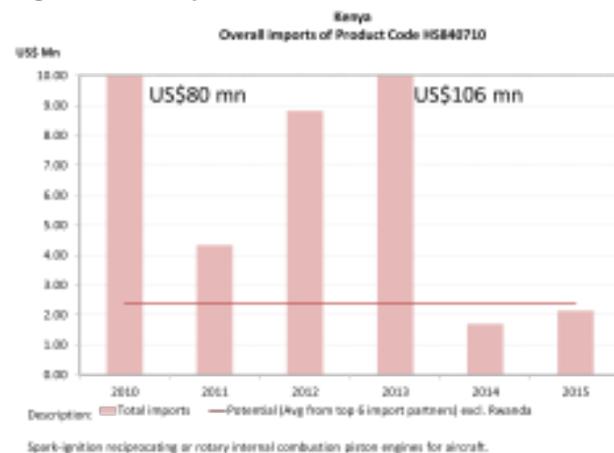
The product is produced in the sector group of Manufacture of aircraft and spacecraft (S3860) and classified as medium skill- and technology intensive manufactures. Rwanda has an RCA of 14.95 for this product and potential estimated at US\$ 2.4 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 127 provides the imports for Kenya of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Kenya exhibited exceptionally high values in 2010 (US\$ 80 million) and 2013 (US\$ 106 million). This may have to do with refurbishment of large aircraft.

Figure 128 depicts the export of this product from Rwanda – only to Germany (supporting the observation that it may have to do with refurbishment of existing planes). At the same time top suppliers to Kenya are depicted and main sources are the United States, United Kingdom, the Netherlands and Canada.

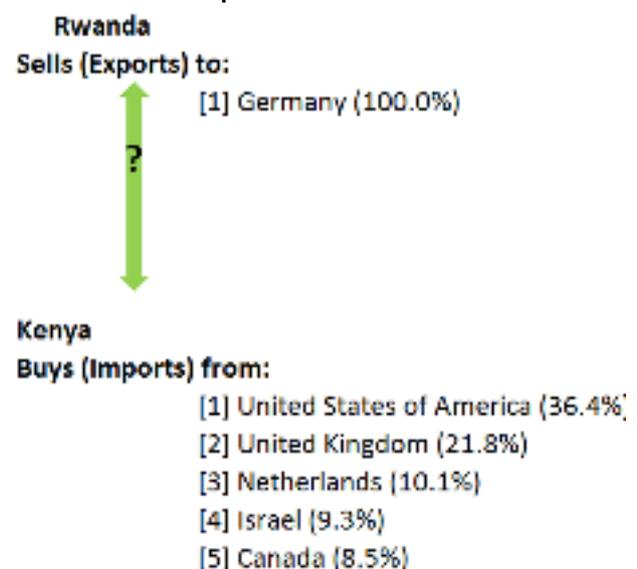
See previous observations on this product under Uganda analysis in section 5.4.5.

**Figure 127: Kenya REO for HS840710**



Source: Authors, TRADE-DSM

**Figure 128: Kenya REO HS840710 import origins versus Rwanda export destinations**



Source: Authors, TRADE-DSM

### 5.4.7. South Sudan (C728)

South Sudan does not border directly with Rwanda and is located to the north with Uganda in-between the two countries. Overall the country covers an area of 644 329 square kilometres and size wise is ranked as number 42 in the world. In terms of GDP the economy is estimated at US\$ 8 billion (2015) and the country's estimated population in 2015 was 12.3 million persons (United Nations, 2016). South Sudan's economy is relatively closed in terms of imports to GDP at 25.7 percent (2015). At independence in 2011, South Sudan produced nearly 75 percent of former Sudan's total oil output of nearly a half million barrels per day. South Sudan's economic conditions have deteriorated since January 2012 when the government decided to shut down oil production following bilateral disagreements with Sudan (the pipelines run through Sudan). Since December 2013, conflict between government and opposition forces led to a humanitarian crisis with millions of South Sudanese displaced and a major food crisis. In July 2016 fighting again broke out plunging the country back into conflict leading to the World Food Programme having to assist more than 4 million people throughout South Sudan (WFP, 2017g).

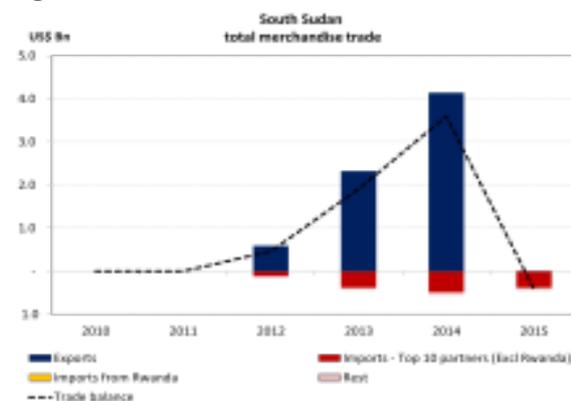
The impact of these events is clearly visible in Figure 130 with exports dropping away after 2014. In terms of imports it is evident from Figure 130 that merchandise imports are small and have decreased due to the instability in the region, while mostly being related to humanitarian aid. The top 10 trading partners (excluding Rwanda) supplies in excess of 82 percent of imports. Uganda is the largest source, followed by Pakistan and the United States. Evident from Figure 117 is that Rwanda only supplies around 0.7 percent of South Sudan's imports (on time-weighted basis valued at US\$ 2.79 million).

Figure 129: Map of South Sudan



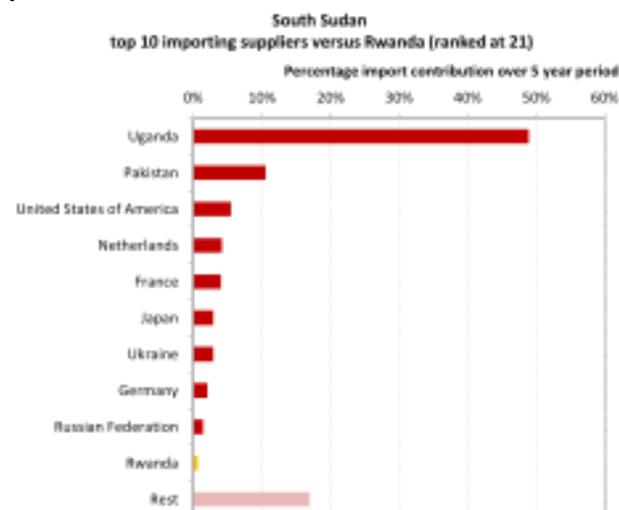
Source: The World Factbook (CIA)

Figure 130: South Sudan overall merchandise trade



Source: Authors, BACI data

Figure 131: South Sudan top overall importing partners



Source: Authors, BACI data

Based on the TRADE-DSM methodology, no export opportunities that meet all the requirements are identified through the filtering process for Rwanda into South Sudan.

The opportunity that comes the closest is that of **HS110220 : Cereal flour other than of wheat, meslin, rye, maize (corn), rice - Maize (corn) flour.**

While the product is indicated as a realistic export opportunity in the REO map in Table 29 as an REO<sub>1,3</sub> (large and growing opportunity with little or no sourcing from Rwanda), it does not actually pass the concentration filter, as all of the imports recorded for maize originates from Uganda according to the BACI data.

**Table 29: REO Map outcomes for South Sudan opportunities for Rwanda**

Map of Realistic Export Opportunities (REO) by type (Number and % of Total Number) (Potential Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0.000%)	Intermediate		Large: 4 (0.000%)	Grand Total
		Small: 2 (0.000%)	Large: 3 (0.000%)		
Large: 1	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}
Growing: 2 (short & long term):	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%} Mn US\$ 0.0 {0.00%}
Large & Growing: 3 (only short term):	1 (100.00%) Mn US\$ 14.6 (100.00%)	{0.00%}	{0.00%}	{0.00%}	1 (100.00%) Mn US\$ 14.6 (100.00%)
Large & Growing: 4 (only long term):	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%}	{0.00%}	{0.00%}	{0.00%}
Large & Growing: 5 (both short & long term):	{0.00%} Mn US\$ 0.0 {0.00%}	{0.00%}	{0.00%}	{0.00%}	{0.00%}
Grand Total	1 (100.00%) Mn US\$ 14.6 (100.00%)	{0.00%}	{0.00%}	{0.00%}	1 (100.00%) Mn US\$ 14.6 (100.00%)

Source: Authors, TRADE-DSM Navigator

This product therefore strictly is not an REO based on the TRADE-DSM methodology, but Rwanda does have a very high RCA for this product and may be able to supply into South Sudan. For this reason the overall DSM export maturity, market share, and growth and diversification matrix for South Sudan is not shown.

**Table 30: Identified REOs (1\*) for Rwanda into South Sudan (ranked descending by potential)**

Item	Product	REO type	RCA	[A] Realistic Export Potential to Target Market(s) '000 US\$	[B] Total Exports from Rwanda to Target Market(s) '000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s) Total Imports %	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) '000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) '000 US\$	[G] Target Market(s) Total Imports '000 US\$
		<b>1</b>	<b>465.02</b>	<b>14 571.38</b>	<b>0.00</b>	<b>0.0%</b>	<b>14 571.38</b>	<b>0.00</b>	<b>14 571.38</b>
<b>1</b>	HS110220 : Cereal flour other than of wheat, meslin, rye, maize (corn), rice - Maize (corn) flour	REO1,3	465.02	14 571.38	0.00	0.0%	14 571.38	0.00	14 571.38

Source: Authors, TRADE-DSM

\* While the product is indicated as a realistic export opportunity, it does not actually pass the concentration filter, as all of the imports recorded for maize originate from Uganda according to the BACI data. This product therefore strictly is not an REO based on the TRADE-DSM methodology, but Rwanda does have a very high RCA for this product and may be able to supply into South Sudan.

While there are actually no HS6-digit product lines in total that the methodology identifies, the as indicated previously maize (corn) flour (HS110220) is included in the discussion for South Sudan in this section of the report.

#### 5.4.7.1. Maize (corn) flour (REO<sub>1,3</sub>)

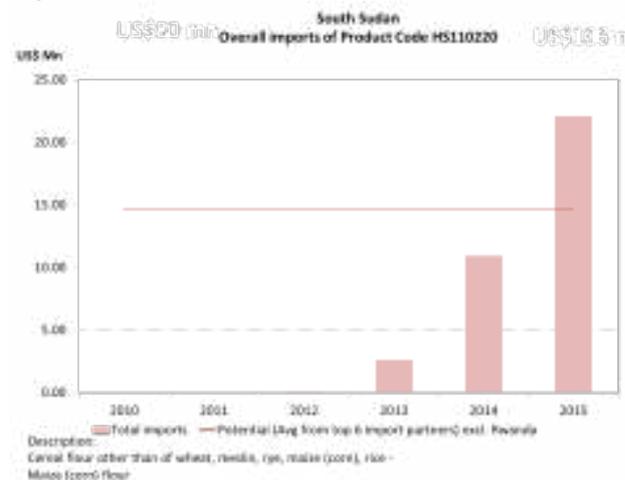
The possible export opportunity identified for Rwanda into South Sudan is that of **HS110220: Cereal flour other than of wheat, meslin, rye, maize (corn), rice - Maize (corn) flour**.

The product is produced in Manufacture of grain mill products sector (S3031) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 465.0 for this product and potential estimated at US\$ 14.5 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 132 provides the imports of South Sudan of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into showed a steep increase i from 2013 onwards, but is most probably related to the humanitarian aid challenges in South Sudan.

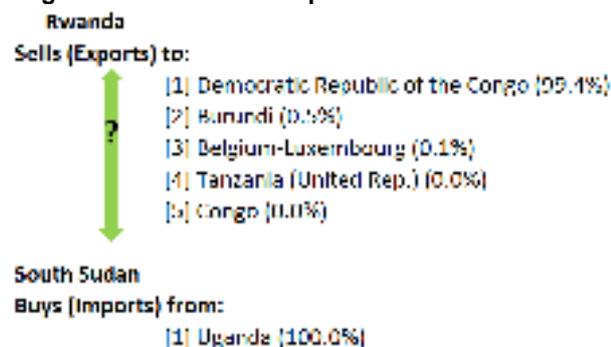
Figure 133 depicts the export of this product from Rwanda to the top destinations with South Sudan not appearing on the list. This is due to the fact that 100 percent of the imports into South Sudan are reported as being sourced from Uganda. The main export destination from Rwanda is the DRC (at 99.4 percent).

Figure 132: South Sudan REO for HS110220



Source: Authors, TRADE-DSM

Figure 133: South Sudan REO HS110220 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.8. Somalia (C706)

Somalia is two countries removed towards the east of Rwanda. Overall Somalia covers an area of 637 657 square kilometres and size wise is ranked as number 44 in the world. In terms of GDP the economy is estimated at US\$ 3 billion (2015) and the country's estimated population in 2015 was 10.8 million persons (United Nations, 2016). Somalia's economy is closed in terms of imports to GDP at 1.7 percent (2015). Agriculture is the most important sector, with livestock normally accounting for about 40% of GDP and more than 50% of export earnings. Nomads and semi-pastoralists, who are dependent upon livestock for their livelihood, make up a large portion of the population. Economic activity is estimated to have increased by 3.7% in 2016 because of growth in the agriculture, construction and telecommunications sector. Somalia's small industrial sector, based on the processing of agricultural products, has largely been looted and the machinery sold as scrap metal. Recent drought have added another 761 000 people to the already more than 3 million needing food assistance (WFP, 2017h). Based on the data as compiled by CEPII Burundi on average exported around US\$ 0.5 billion over the period 2010 to 2015, with a levelling from 2014 to 2015.

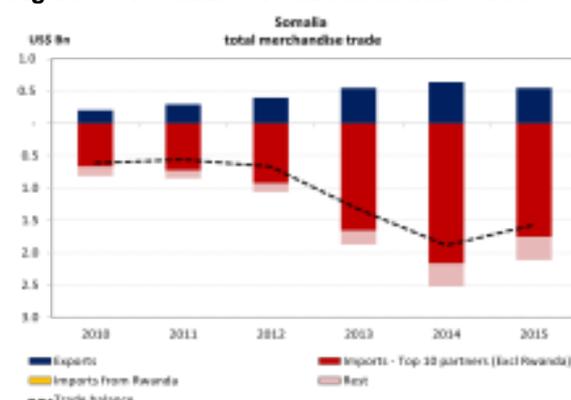
In terms of imports it is evident from Figure 135 that merchandise imports have increased steadily over the period 2010 to 2014, then started to decline. The top 10 trading partners (excluding Rwanda) supplies in excess of 73.4 percent of imports. Ethiopia and India are the leading sources of imports, followed by Oman, the United Arab Emirates, Turkey, Yemen and Egypt. Evident from Figure 136 is that Rwanda supplies virtually no imports to Somalia (on time-weighted basis).

Figure 134: Map of Somalia



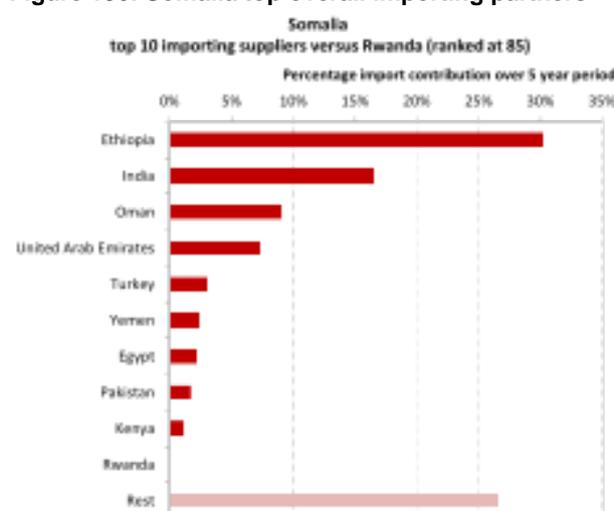
Source: The World Factbook (CIA)

Figure 135: Somalia overall merchandise trade



Source: Authors, BACI data

Figure 136: Somalia top overall importing partners



Source: Authors, BACI data

There are a total of only 4 opportunities identified for Rwanda into Somalia. Three are classified as growing in both short and long term, but overall not large opportunities (REO<sub>1,2</sub>), but Rwanda do not currently supply these products to Somalia. The overall potential is calculated at only around US\$ 0.2 million.

There is one opportunity that is classified as large and growing in the longer term (REO<sub>1,4</sub>) to the value of US\$ 18.1 million in the form of HS110100: Wheat/meslin flour.

Table 31: REO Map outcomes for Somalia opportunities for Rwanda

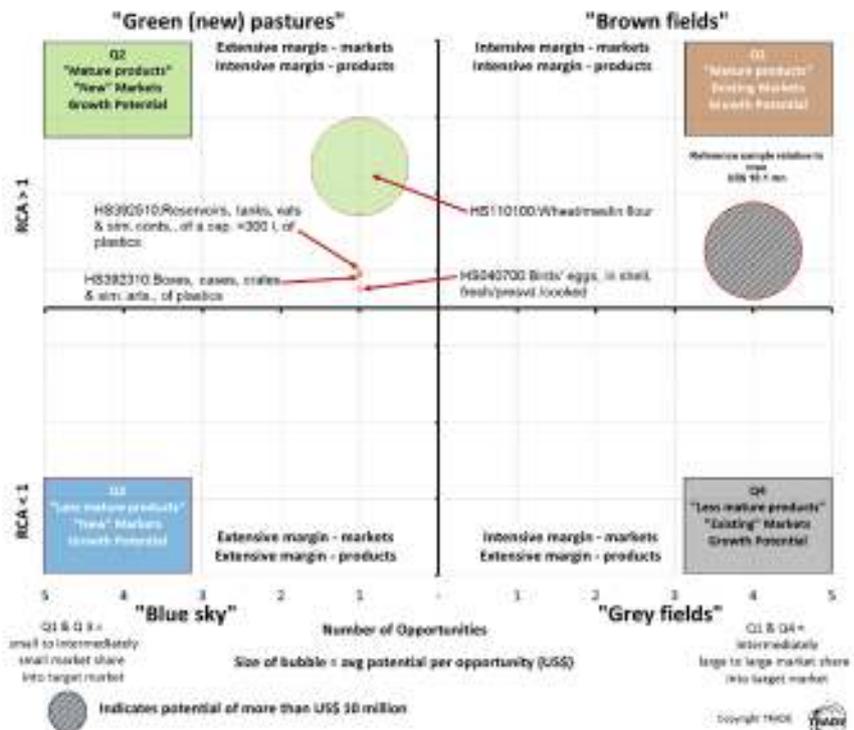
Map of Realistic Export Opportunities (REO) by type (Number and % of Total Number) (Potential Value (Mn US\$) and % of Total Value)	Relative Market Share (s) of home market (exporter country) into target market(s)				
	Small: 1 (0.00-10%)	Intermediate		Large: 4 (50.00-90%)	Grand Total
		Small: 2 (10.00-20%)	Large: 3 (20.00-50%)		
Large: 1	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Growing: 2 (short & long term)	3 (75.00%) Mn US\$ 0.2 (1.02%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	3 (75.00%) Mn US\$ 0.2 (1.02%)
Large & Growing: 3 (only short term)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Large & Growing: 4 (only long term)	1 (25.00%) Mn US\$ 18.1 (98.98%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	1 (25.00%) Mn US\$ 18.1 (98.98%)
Large & Growing: 5 (both short & long term)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)
Grand Total	4 (100.00%) Mn US\$ 18.3 (100.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	(0.00%) Mn US\$ 0.0 (0.00%)	4 (100.00%) Mn US\$ 18.3 (100.00%)

Source: Authors, TRADE-DSM Navigator

The 4 products that Rwanda could supply to Somalia are in Quadrant 2 (extensive margin for markets, intensive margins for the products) as depicted in Figure 137. More detail on each of these is provided in Table 32.

The largest opportunities seem to be in wheat/meslin flour, eggs, plastic large volume water containers (> 300 litres).

Figure 137: Rwanda REO opportunities for Somalia (excluding petroleum and gold)



Source: Authors, TRADE-DSM

**Table 32: Identified REOs (35) for Rwanda into Somalia (ranked descending by potential)**

Item	Product	REO type	RCA	[A] Realistic Export Potential to Target Market(s) '000 US\$	[B] Total Exports from Rwanda to Target Market(s) '000 US\$	[C] = [B] / [G] Total Exports from Rwanda / Target Market(s)Tot al Imports%	[E] Target Market(s) Imports from top 6 competitors (Excl Rwanda) '000 US\$	[F] Target Market(s) Imports from Rest of market (Excl Rwanda & top 6 competitors) '000 US\$	[G] Target Market(s) Total Imports '000 US\$
		<b>4</b>	-	<b>18 326.39</b>	<b>0.00</b>	<b>0.0%</b>	<b>109 958.35</b>	<b>540.23</b>	<b>110 498.58</b>
1	HS110100 : Wheat/meslin flour	REO1,4	70.62	18 139.26	0.00	0.0%	108 835.57	470.08	109 305.66
2	HS040700 : Birds' eggs, in shell, fresh/presvd./cooked	REO1,2	1.83	74.67	0.00	0.0%	448.01	14.84	462.85
3	HS392510 : Builders' ware of plastics, n.e.s. (excl. of 3925.10-3925.30) - Reservoirs, tanks, vats & sim. conts., of a cap. >300 l, of plastics	REO1,2	2.92	68.90	0.00	0.0%	413.42	9.33	422.75
4	HS392310 : Articles for the conveyance/packing of gds., of plastics (excl. of 3923.10- ... - Boxes, cases, crates & sim. arts., of plastics	REO1,2	2.65	43.56	0.00	0.0%	261.35	45.98	307.33

Source: Authors, TRADE-DSM

The 4 HS6-digit product lines that the methodology identifies are discussed in more detail in this section of the report.

### 5.4.8.1. Wheat/meslin flour (REO<sub>1,4</sub>)

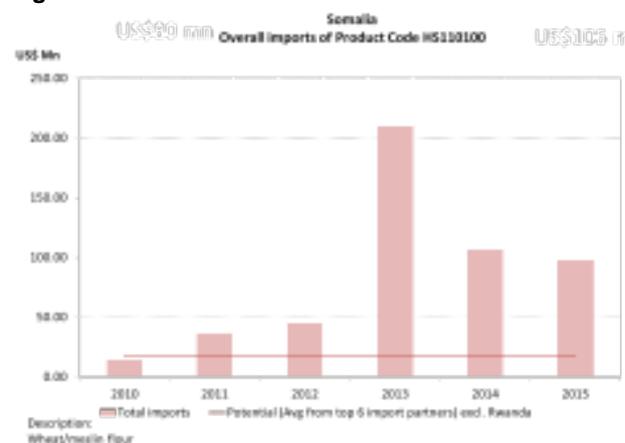
The largest realistic export opportunity identified for Rwanda into Somalia is that of **HS110100: Wheat/meslin flour**.

The product is produced in the Manufacture of grain mill products sector (S3031) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 70.62 for this product and potential estimated at US\$ 18 million (based on the calculation as explained in the appendix in section 9.1.6).

Figure 138 provides the imports of Somalia of this product over the period 2010 to 2015 (around US\$ 100 million for 2014 and 2015), as well as the realistic potential estimate.

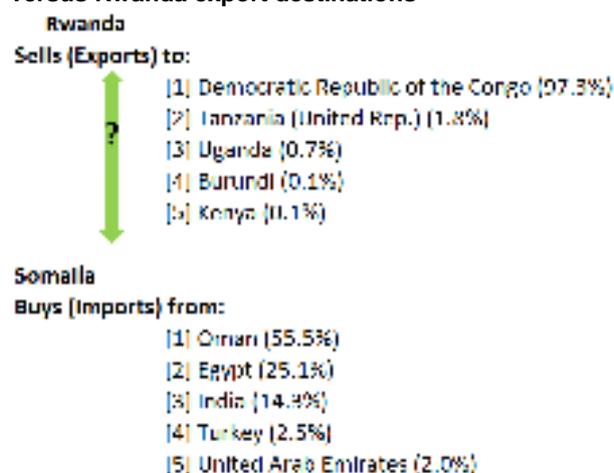
Figure 141 depicts the export of this product from Rwanda to the top destinations (the DRC at 97.3 percent of Rwanda’s exports). Somalia does not feature as an export destination from Rwanda. At the same time top suppliers to Somalia are depicted leading with Oman, Egypt, India, Turkey and the United States.

Figure 138: Somalia REO for HS110100



Source: Authors, TRADE-DSM

Figure 139: Somalia REO HS110100 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.8.2. Eggs (REO<sub>1,2</sub>)

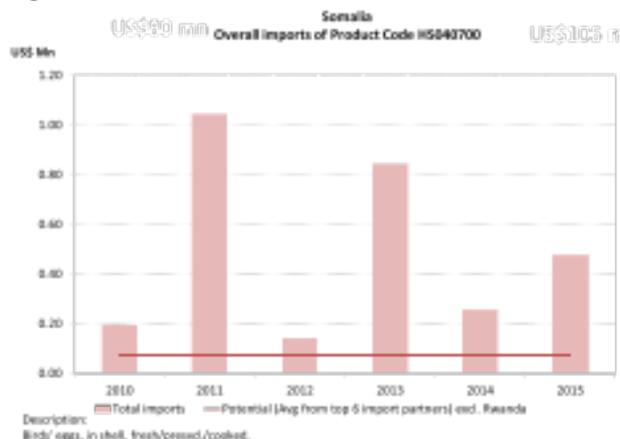
The second largest realistic export opportunity identified for Rwanda into Somalia is that of **HS040700: Birds' eggs, in shell, fresh/presvd./cooked.**

Growing of crops; market gardening; horticulture' farming of animals' growing of crops combined with farming of animals (S1110,1120,1130) and classified as non-fuel primary commodities (relatively low skill and technology intensity). Rwanda has an RCA of 6.73 for this product and potential estimated at US\$ 74.67 thousand (based on the calculation as explained in the appendix in section 9.1.6).

Figure 140 provides the imports of Somalia of this product over the period 2010 to 2015 (around US\$ 300-600 thousand per annum), as well as the realistic potential estimate.

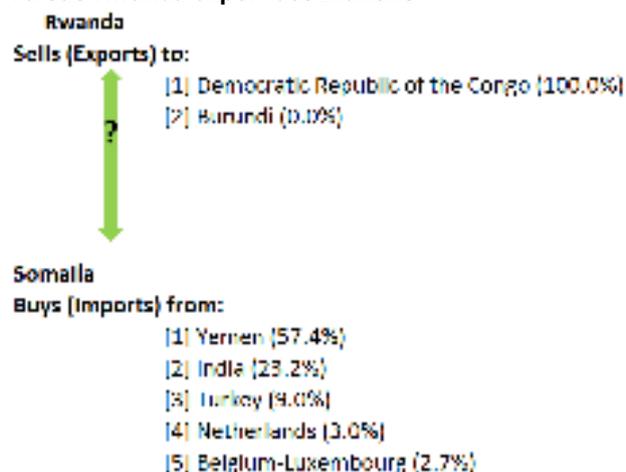
Figure 141 depicts the export of this product from Rwanda to the top destinations of Rwanda's exports (the DRC at rounded 100 percent and Burundi negligible). Somalia does not feature as a destination. At the same time top suppliers to Somalia are depicted, with the main import origins for Yemen, India, the Turkey, the Netherlands and Belgium.

Figure 140: Somalia REO for HS040700



Source: Authors, TRADE-DSM

Figure 141: Somalia REO HS040700 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

### 5.4.8.3. Plastic large volume water containers (REO<sub>1,2</sub>)

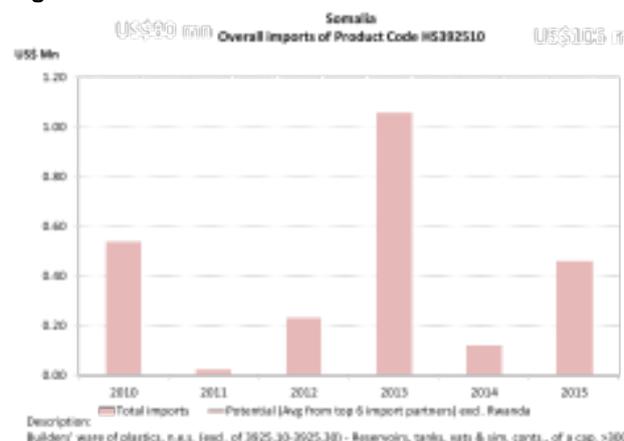
The third largest realistic export opportunity identified for Rwanda into Somalia is that of **HS392510: Builders' ware of plastics, n.e.s. (excl. of 3925.10-3925.30) - Reservoirs, tanks, vats & sim. conts., of a cap. >300 l, of plastics.**

The product is produced in the Manufacture of plastic products sector (S3380) and classified as relatively medium skill and technology intensive. Rwanda has an RCA of 2.92 for this product and potential estimated at US\$ 68 900 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 142 provides the imports of Somalia of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that the imports of this product into Somalia is erratic but exhibits a continued increase since 2014.

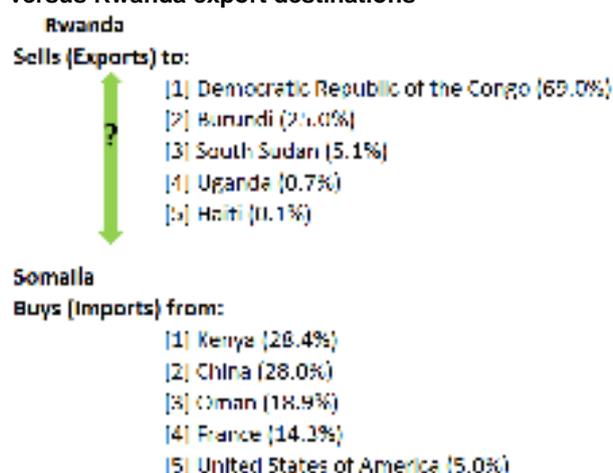
Figure 143 depicts the export of this product from Rwanda to the top destinations with Somalia not appearing as a destination. At the same time top suppliers to Somalia are shown and Kenya, China, Oman, France and the United States feature as suppliers.

Figure 142: Somalia REO for HS040700



Source: Authors, TRADE-DSM

Figure 143: Somalia REO HS040700 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

#### 5.4.8.4. Boxes, cases, crates & sim. arts., of plastics (REO<sub>1,2</sub>)

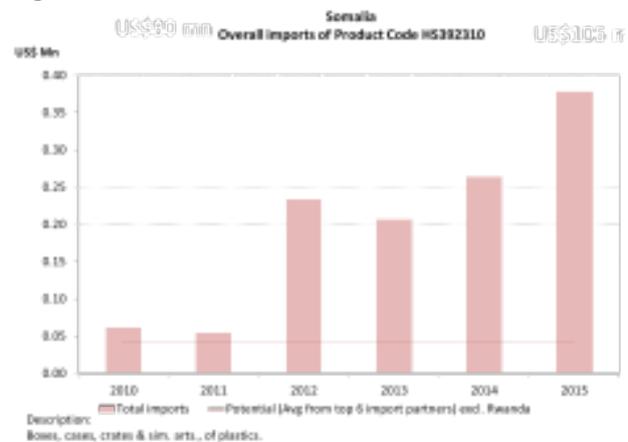
The final realistic export opportunity identified for Rwanda into Somalia is that of **HS392310: Boxes, cases, crates & sim. arts., of plastics.**

The product is produced in the Manufacture of plastic products sector (S3380) and classified as relatively medium skill and technology intensive. Rwanda has an RCA of 2.65 for this product and potential estimated at US\$ 43 560 (based on the calculation as explained in the appendix in section 9.1.6).

Figure 144 provides the imports into Somalia of this product over the period 2010 to 2015, as well as the realistic potential estimate. Evident is that while the imports of this product into Somalia is small it has shown steady growth in recent years to more than US\$ 350 000.

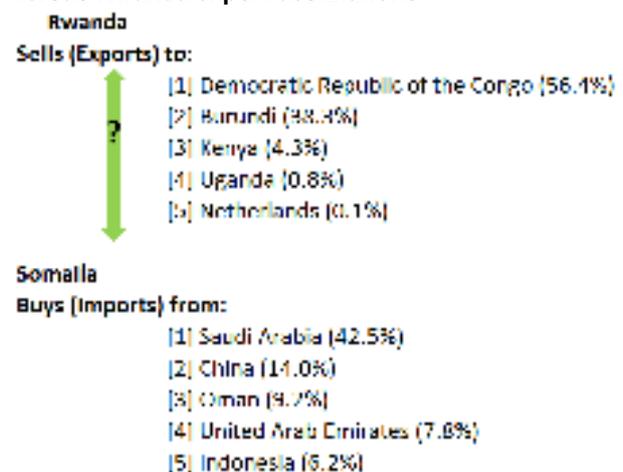
Figure 145 depicts the export of this product from Rwanda to the top destinations. Again Somalia does not appear as a destination. At the same time top suppliers to Somalia are Saudi Arabia, China, Oman, the United Arab Emirates and Indonesia.

Figure 144: Somalia REO for HS040700



Source: Authors, TRADE-DSM

Figure 145: Somalia REO HS040700 import origins versus Rwanda export destinations



Source: Authors, TRADE-DSM

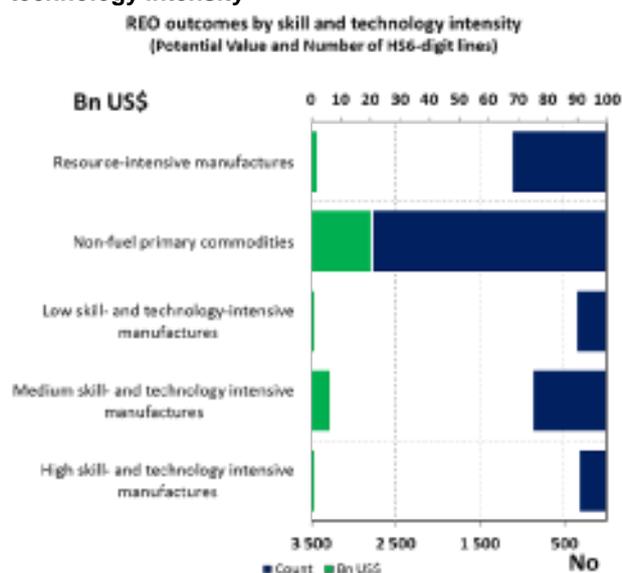
## 5.5. Outcomes by economic sector (excluding petroleum and gold) based on skill and technology intensity and export maturity (RCA $\geq$ 1)

In line with the recommendations from the Hausmann et al. (2015) study regarding the types of products to prioritise as informed by the product space approach, it is important for policy makers to have a view on what the skills and technology intensity make-up of sectors and products that are prioritised look like, since this aspect will determine how Rwanda will grow in the future. As explained in section 3 this dimension of potential realistic export opportunities therefor has been incorporated into the DSM for Rwanda for the purposes of this study.

Evident from Figure 146 is that the current outcomes of opportunities identified (excluding petroleum and gold) are focused around non-fuel primary commodities which are by (generalised<sup>35</sup>) nature lower skill and technology intensive.

This is mainly due to the fact that both the product space and DSM approach incorporates the RCA as a key variable in the underlying methodology. It is therefore important to consider and keep track of the development of sectors and industries that will assist with capacity building of human capital in the longer term. While the share of low, medium and high skill and technology in the current make-up of exports is relatively small, the opportunities associated with the three categories are shown in more detail next.

**Figure 146: REO overall outcomes by skill- and technology intensity**



Source: Authors, TRADE-DSM Navigator

Non-fuel primary commodities are not discussed in more detail, as the understanding is that policy makers would be interested in what the economy does not pose, as opposed to what it is well endowed with.

<sup>35</sup> There are specific exceptions as mentioned in the method section.

In terms of opportunities by non-fuel primary commodities two economic sectors stand out (in terms of economic sectors according to the Standard Industrial Classification sectors) – that of Agriculture, forestry & fishing (11-13) with potential of around US\$ 4.6 billion (542 product-country lines) and manufacturing and supply of Food (301-304) at US\$ 8 billion (1401 product-country lines).

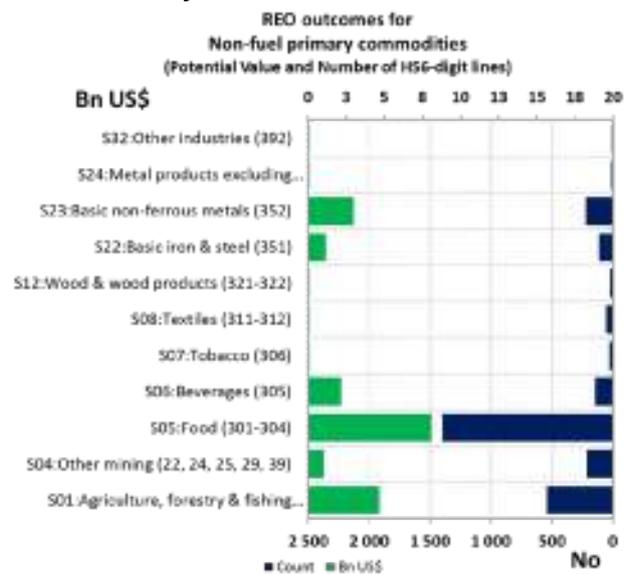
Basic non-ferrous metals (352), Beverages (305), Basic iron & steel (351) and Other mining (22, 24, 25, 29, and 39) also features.

While “low skill- and technology” seems to be at the lower end of achievements a policy maker may strive for, it is still a step-up from non-fuel primary commodities in terms of skills and value add in the economy.

Evident is that in terms of the REOs identified for Rwanda based on existing capability of the domestic economy, with the low skill- and technology intensity category, the largest sector in terms of both potential (US\$ 0.29 billion) and number (147) of product lines is that of Metal products excluding machinery (353-355) (see Figure 148).

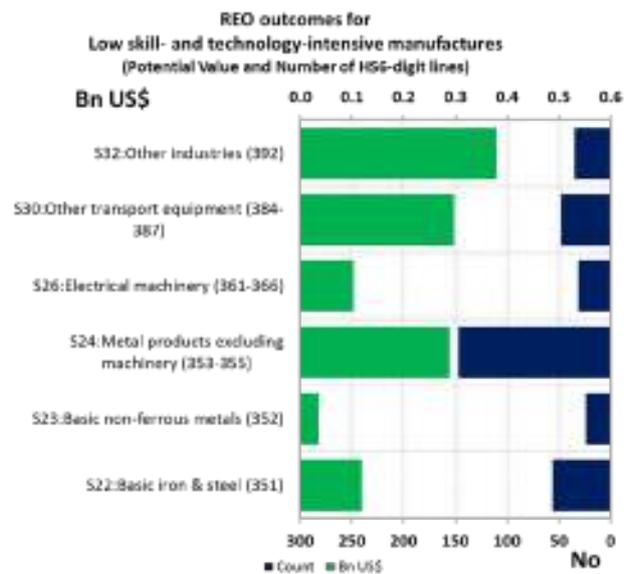
Other sectors include Other industries (392), Other transport equipment (384-387) and Basic iron & steel (351).

**Figure 147: REO overall outcomes – non-fuel primary commodities by economic sector**



Source: Authors, TRADE-DSM Navigator

**Figure 148: REO overall outcomes – Low skill- and technology-intensive manufactures by economic sector**

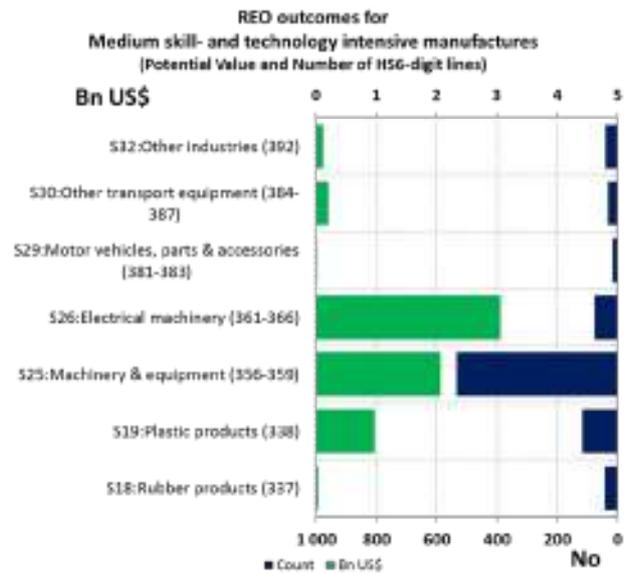


Source: Authors, TRADE-DSM Navigator

Medium skill- and technology related opportunities are mainly concentrated in the sectors of Electrical machinery (361-366), Machinery & equipment (356-359) and Plastic products (338) as is evident in Figure 149.

While Electrical machinery (361-366) has the highest potential value (US\$ 3 billion), Machinery & equipment (356-359) has relatively large potential in terms of both value (US\$ 2 billion) as well as number of product-country lines (532).

**Figure 149: REO overall outcomes – medium skill- and technology intensity manufactures by economic sector**

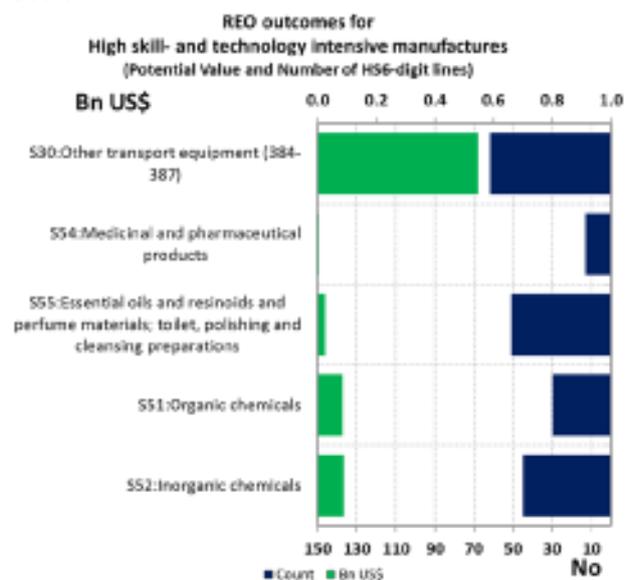


Source: Authors, TRADE-DSM Navigator

For high skill- and technology intensity opportunities these are mainly concentrated in the Other transport equipment (384-387) sector, with a potential value of around US\$ 0.55 billion and 62 product-country lines.

At much lower in terms of potential value, but similar in terms of number of opportunities, Organic and Inorganic chemicals (51, 52) as well as Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations (55) also feature but with potential in the millions of US\$, not billions.

**Figure 150: REO overall outcomes – high skill and technology intensity manufactures by economic sector**



Source: Authors, TRADE-DSM Navigator

## 5.6. Summary

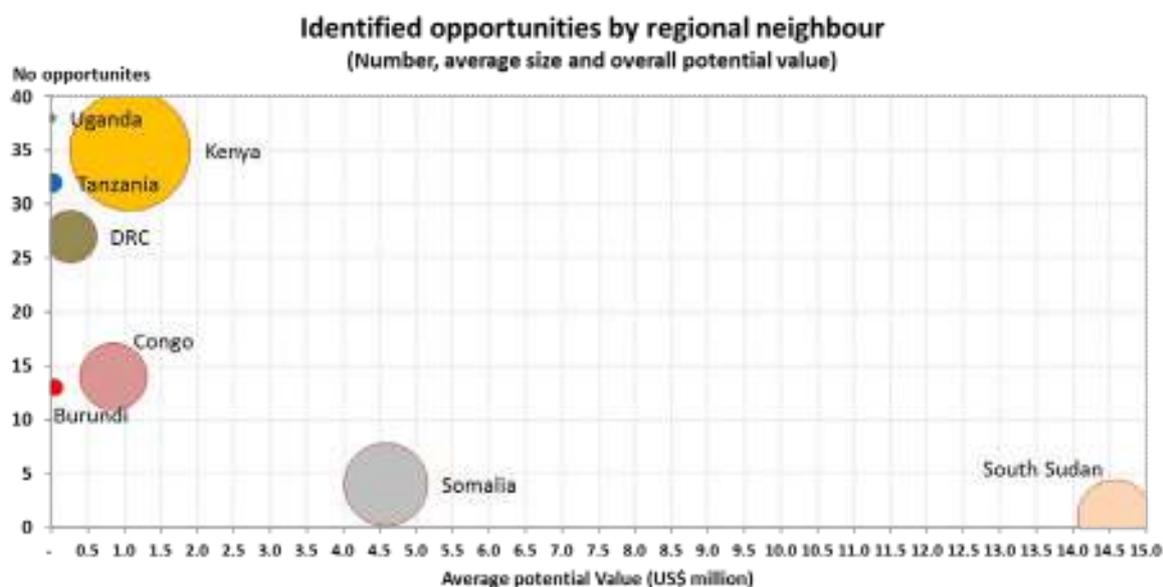
In terms of broad geographic areas, more than 80 percent of the identified potential in terms of *value* of market-product line combinations<sup>36</sup> is contained in the 6 geographic regions (in descending order of potential value) of Western Europe, Eastern Asia, Northern America, Southern Europe, South-Eastern Asia and Northern Europe (all not within the direct geographic vicinity of Rwanda). In terms of the *number* of opportunities, in addition to the first 6 regions, Western Asia, Eastern Europe and Western Africa contributes to reaching the 80 percent mark.

The single market of the United States of America should be investigated in more depth, as this market is indicated to have the most potential in value terms (more than US\$ 5 billion excluding petroleum and gold), while also presenting the second most opportunity based on *number* of product lines, 82 of which qualify for duty free access to this market under the current AGOA applicable to Rwanda.

In the short to medium term, close (to Rwanda) regional sub-Saharan markets in Middle Africa, Eastern Africa and Southern Africa do not pose large (relatively speaking) opportunities in either value or number of product lines, with the combined markets in these regions accounting for only 1.4 percent of the potential and 7.7 percent of the number of opportunities.

Direct neighbours to Rwanda are Burundi, the Democratic Republic of the Congo (DRC), Tanzania and Uganda. The Congo (Brazzaville), Kenya, Somalia and South Sudan are not directly bordering Rwanda but of regional interest.

**Figure 151: Comparison of regional neighbours - potential and number of opportunities**



Source: Authors' calculations from TRADE-DSM

The outcomes in relative terms are shown in Figure 151. Evident is that while South Sudan and Somalia have relatively large (size of bubble) opportunities, these are only few in number (vertical

<sup>36</sup> For purposes of this analysis large dominating energy and minerals such as petroleum and gold are excluded.

axis) and these are very much focused on humanitarian food aid type of products (wheat and corn flour).

Kenya provides a large set (35) of higher value (average potential around US\$ 1 million per opportunity) and diverse opportunities compared to that of Uganda (38) and Tanzania (32) with much lower per opportunity averages, while the DRC (27) and Congo (14) has fewer but also on average larger potential than Uganda and Tanzania. Therefore, Kenya, the DRC and Congo provide the best balance between diversity and value of opportunities out of the set of focus countries.

In terms of an economic sectoral perspective the following exhibits the majority of product-country lines associated potential for Rwanda's exports:

- Food,
- Agriculture, forestry & fishing,
- Electrical machinery,
- Basic non-ferrous metals,
- Beverages,
- Machinery & equipment,
- Basic iron & steel and
- Other transport equipment.

Further to the discussion on close (geographically) regional markets, as previously demonstrated, the transport cost into this region is quantitatively shown to be extremely (relatively speaking) unproductive and expensive relative to other destinations. However, this is an area of intervention that the government of Rwanda seems to be keenly aware of and is giving attention to.

In order to create a focus set of product groups or "portfolio" of focus products and markets, the outcomes obtained from the more detailed analysis on a country level for the focus countries was combined with that of higher level aggregate rest of the world outcomes in each quadrant. By taking the top 10 (based on average potential) for each HS 6-digit line (so 8 countries plus 4 quadrants times 10 product lines) and rationalising the set of outcomes a set of 25 HS 6-digit lines are identified that meets the focus countries as well as global opportunities requirement. The outcomes are grouped by sectors (2 digit Standard International Trade Classification (SITC) chapter indicated) and arranged in descending order based on the **average size** of potential across all markets within SITC sectors and **total** potential between SITC sectors. The results are provided in a summarised format in Table 33. For the individual countries the range of potential in monetary value terms are indicated based on the ranges indicated in the key, while for the rest of the world the number of opportunities (excluding the focus countries) are indicated, followed by the total average potential value across all potential markets.

**Table 33: Summarised outcomes across focus countries and global opportunities**

For focus countries value ranges of potential are indicated by colour of the cell:

**<= US\$ 0.5 mn**    **< US\$ 0.5 mn <= US\$ 1 mn**    **> US\$ 1 mn**

SITC Rev 4 Sector	Skill & Technology intensity	HS-6 digit	Description	Regional focus countries							Rest of World				Total No	Tot Average Potential (Min US\$)		
				Burundi	Congo	DRC	Kenya	Somalia	South Sudan	Tanzania	Uganda	Global Q1	Global Q2	Global Q3			Global Q4	
<b>S11:Beverages</b>	Non-fuel primary commodities	HS220300	Beer made from malt	1	1	1	-	-	-	1	-	-	31	-	-	35	38.47	
		HS220210	Waters, incl. min. waters & aerated waters, cont. added sugar/oth. sweetening matter/flavoured	-	-	-	-	-	-	-	1	-	-	42	-	-	43	16.42
		HS220110	Mineral waters (nat./art.) & aerated waters, not cont. added sugar/oth. sweetening matter/flavoured	-	1	1	-	-	-	-	1	-	-	-	-	-	3	4.77
<b>Sub-total (number, total potential value)</b>				<b>1</b>	<b>2</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>2</b>	<b>-</b>	<b>31</b>	<b>42</b>	<b>-</b>	<b>81</b>	<b>115.2</b>	
<b>S02:Dairy products and birds' eggs</b>	Non-fuel primary commodities	HS040700	Birds' eggs, in shell, fresh/presvd./cooked	-	1	-	1	1	-	-	1	-	39	-	-	43	58.69	
		HS040210	Milk in powder/granules/oth. solid form, fat content by wt. not >1.5%	-	-	1	1	-	-	-	1	-	-	-	-	3	31.29	
		HS040291	Milk & cream, concentrated (excl. in powder), unsweetened	-	-	1	-	-	-	-	-	-	-	30	-	31	25.25	
<b>Sub-total (number, total potential value)</b>				<b>-</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>2</b>	<b>-</b>	<b>39</b>	<b>30</b>	<b>-</b>	<b>77</b>	<b>59.7</b>	
<b>S04:Cereals and cereal preparations</b>	Non-fuel primary commodities	HS190531	Sweet biscuits	1	-	-	1	-	-	1	-	-	63	-	-	66	14.74	
		HS100640	Broken rice	-	-	1	-	-	-	-	-	-	-	-	-	1	6.07	
		HS110220	Maize (corn) flour	-	-	1	-	1	-	-	-	-	-	-	-	2	10.11	
<b>Sub-total (number, total potential value)</b>				<b>1</b>	<b>-</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>63</b>	<b>-</b>	<b>-</b>	<b>69</b>	<b>30.9</b>		
<b>S05:Vegetables and fruit</b>	Non-fuel primary commodities	HS200290	Tomatoes, prepd./presvd. othw. than by vinegar/acetic acid, other than whole/in pieces	-	1	-	1	-	-	-	-	-	34	-	-	36	13.22	
		HS071310	Peas (Pisum sativum), dried, shelled, whether or not skinned/split	-	-	-	1	-	-	1	1	-	28	-	-	31	4.04	
		<b>Sub-total (number, total potential value)</b>				<b>-</b>	<b>1</b>	<b>-</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>62</b>	<b>-</b>	<b>-</b>	<b>67</b>	<b>17.3</b>
<b>S28:Metalliferous ores and metal scrap</b>	Non-fuel primary commodities	HS260900	Tin ores & concs.	-	-	-	-	-	-	-	-	5	-	-	5	6.16		
<b>Sub-total (number, total potential value)</b>				<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>5</b>	<b>-</b>	<b>-</b>	<b>5</b>	<b>11.4</b>		
<b>S71:Power-generating machinery and equipment</b>	Medium skill- and technology intensive manufactures	HS840710	Spark-ignition recip./rotary int. comb. piston engines for aircraft	-	-	-	1	-	-	1	1	-	27	-	-	30	4.42	
		<b>Sub-total (number, total potential value)</b>				<b>-</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>27</b>	<b>-</b>	<b>30</b>	<b>9.0</b>
<b>S89:Miscellaneous manufactured articles, n.e.s.</b>	Medium skill- and technology intensive manufactures	HS392310	Boxes, cases, crates & sim. arts., of plastics	-	-	-	1	1	-	-	1	-	58	-	-	61	8.98	
		HS711790	Imitation jewellery other than of base metal	-	1	-	-	-	-	-	1	-	-	30	-	32	3.78	
<b>Sub-total (number, total potential value)</b>				<b>-</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>58</b>	<b>30</b>	<b>93</b>	<b>8.2</b>	

<b>S00:Live animals other than animals of division 03</b>	Non-fuel primary commodities	HS010290	Live bovine animals other than pure-bred breeding animals	-	-	1	-	-	-	-	-	-	-	1	6.14	
<b>Sub-total (number, total potential value)</b>														<b>7.7</b>		
<b>S72:Machinery specialized for particular industries</b>	Medium skill- and technology intensive manufactures	HS843143	Parts suit. for use solely/princ. with the boring/sinking mach. of 8430.41/8430.49	1	1	-	-	-	-	-	-	-	-	53	0.73	
<b>Sub-total (number, total potential value)</b>														<b>6.8</b>		
<b>S73:Metalworking machinery</b>	Medium skill- and technology intensive manufactures	HS845929	Drilling machines other than way-type unit head machines, op. by removing metal, other than numerically controlled	1	1	-	-	-	-	-	-	-	70	3.41		
<b>Sub-total (number, total potential value)</b>														<b>6.2</b>		
<b>S08:Feeding stuff for animals (not including unmilled cereals)</b>	Non-fuel primary commodities	HS230400	Oil-cake & oth. solid residues, whether or not ground/in pellets, from extraction of soyabean oil	1	-	-	1	-	-	1	-	-	26	7.71		
<b>Sub-total (number, total potential value)</b>														<b>6.1</b>		
<b>S21:Hides, skins and furskins, raw</b>	Non-fuel primary commodities	HS410120	Whole bovine (incl. buffalo)/equine hides & skins, wt. per skin not >8kg (simply dried)/10kg (dry-salted)/16kg (fresh/wet-salted/othw. presvd.)	-	-	-	1	-	-	-	-	1	2	0.48		
<b>Sub-total (number, total potential value)</b>														<b>6.1</b>		
<b>S07:Coffee, tea, cocoa, spices, and manufactures thereof</b>	Non-fuel primary commodities	HS090230	Tea, black (fermented) & partly fermented tea, whether or not flavoured, in immediate packings of a content not >3kg	-	-	-	1	-	-	-	-	-	1	11.38		
		HS090240	Other tea, black (fermented) & other partly fermented tea, whether or not flavoured, in immediate packings of a content >3kg	-	-	-	1	-	-	-	-	1	2	3.04		
<b>Sub-total (number, total potential value)</b>														<b>4.1</b>		
<b>S55:Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations</b>	High skill- and technology intensive manufactures	HS340540	Scouring pastes & powders & oth. scouring preps.	1	1	-	-	-	-	-	-	-	51	6.76		
<b>Sub-total (number, total potential value)</b>														<b>3.0</b>		
<b>S09:Miscellaneous edible products and preparations</b>	Non-fuel primary commodities	HS210320	Tomato ketchup & oth. tomato sauces	1	-	1	-	-	-	-	-	1	3	0.67		
<b>Sub-total (number, total potential value)</b>														<b>0.7</b>		
<b>S57:Plastics in primary forms</b>	High skill- and technology intensive manufactures	HS391590	Waste, parings & scrap, of plastics n.e.s. in 39.15	-	-	-	-	-	-	-	-	1	29	6.07		
<b>Sub-total (number, total potential value)</b>														<b>0.5</b>		
<b>Total</b>				<b>7</b>	<b>8</b>	<b>8</b>	<b>12</b>	<b>2</b>	<b>1</b>	<b>6</b>	<b>11</b>	<b>5</b>	<b>470</b>	<b>102</b>	<b>632</b>	<b>298</b>

Source: Authors, TRADE-DSM

Based on the more detailed analysis on a country level for the focus countries in the preceding sections, combined with opportunities for the rest of the world the following SITC sectors (2 digit SITC chapter indicated) exhibits the most opportunity are (arranged in descending order based on the average size of potential across all markets):

- S11: Beverages (total of 81 potential markets valued at total potential of US\$ 115.2 mn)
- S02: Dairy products and birds' eggs (total of 77 potential markets valued at a total potential of US\$ 59.7 mn)
- S04: Cereals and cereal preparations (total of 69 potential markets valued at a total potential of US\$ 30.9 mn)
- S05: Vegetables and fruit (total of 67 potential markets valued at a total potential of US\$ 17.3 mn)
- S28: Metalliferous ores and metal scrap (total of 5 potential markets valued at a total potential of US\$ 11.4 mn)
- S71: Power-generating machinery and equipment (total of 30 potential markets valued at a total potential of US\$ 9.0 mn)
- S89: Miscellaneous manufactured articles, n.e.s. (total of 93 potential markets valued at a total potential of US\$ 8.2 mn)
- S00: Live animals other than animals of division 03 (total of 1 potential markets valued at a total potential of US\$ 7.7 mn)
- S72: Machinery specialized for particular industries (total of 53 potential markets valued at a total potential of US\$ 6.8 mn)
- S73: Metalworking machinery (total of 70 potential markets valued at a total potential of US\$ 6.2 mn)
- S08: Feeding stuff for animals - not including unmilled cereals (total of 26 potential markets valued at a total potential of US\$ 6.1 mn)
- S21: Hides, skins and furskins, raw (total of 2 potential markets valued at a total potential of US\$ 6.1 mn)
- S07: Coffee, tea, cocoa, spices, and manufactures thereof (total of 3 potential markets valued at a total potential of US\$ 4.1 mn)
- S55: Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations
- S09: Miscellaneous edible products and preparations (total of 3 potential markets valued at a total potential of US\$ 0.7 mn)
- S57: Plastics in primary forms (total of 29 potential markets valued at a total potential of US\$ 0.5 mn)

In comparison with the major outcomes from the Hausmann (2015) study, this analysis confirms the main observation with regards to processed agricultural products, foods, beverages and agrochemicals (in this instance SITC S00, S02, S04, S05, S07, S08, S09, S11, and S21 in the list above) but with more specifics in terms of actual markets and size of potential. Note that these products all are classified as non-fuel primary commodities from a skills- and technology intensity perspective.

In terms of the second observation from the Hausmann (2015) study regarding specialized textiles and garments, the export opportunity analysis does not support these products on a portfolio level – with the exception of the detailed analysis for Uganda (for HS551311: Woven fabrics of polyester staple fibres, cont. <85% by wt. of such fibres, mixed mainly or solely with cotton, of a wt. not >170g/m<sup>2</sup>, plain weave, unbleached/ bleached).

With regards to the last major grouping from the Hausmann (2015) study named construction materials, metal and wood products; in the DSM analysis metal products are found in the portfolio (S28) but not wood and other construction material per sé.

While the product space approach mainly informs from a production perspective, the DSM approach focuses more on demand and incorporates more trade and transportation elements. As a result the approach indicates various additional potential products and SITC sectors over and above the “traditional” products that would be informed from a historical production perspective. These opportunities are associated with:

- S71: Power-generating machinery and equipment,
- S89: Miscellaneous manufactured articles, n.e.s. (plastic boxes, crates, cases etc. as well as imitation jewellery not made of base metals),
- S57: Plastics in primary forms (mainly waste, parings and scrap of plastics),
- S55: Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations,
- S72: Machinery specialized for particular industries, and
- S73: Metalworking machinery.

Given the relatively large travel distances and difficulty in terrain, combined with relatively weak transport infrastructure, the region does seem to have some aerospace<sup>37</sup> activity requiring maintenance, refurbishment and support services. In addition, the region also has major mining and exploration<sup>38</sup> activities that require similar products and services. Although these types of products are typically associated with medium- and higher skills- and technology intensity, Rwanda’s central location combined with these types of demand expressed in the region as well as internationally, could point to Rwanda focusing even more on becoming a transport (with a focus on aerospace and aerospace engineering) and mining and drilling equipment and support logistics hub<sup>39</sup>.

The analysis also points to Germany as a current potential key partner for the region in the aerospace related maintenance, refurbishment and support services. The fact that Volkswagen has also in recent times committed to developing automotive assembly and distribution in Rwanda signals the start of Rwanda potentially “skipping a few trees” and “jumping” further<sup>40</sup> than what the product space approach might indicate. By building further on these types of relationships, Rwanda could “short-circuit” the traditional development process for focus sectors. Similar to the automotive and aerospace sectors, based on the DSM analysis, the outcomes seem to indicate that it may make sense to approach the global major mining equipment producers in a similar fashion to explore potential options that could be beneficial to all parties.

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<sup>37</sup> Demonstrated by trade for HS840710 Spark-ignition recip./rotary int. comb. piston engines for aircraft.

<sup>38</sup> Demonstrated by trade for HS843143 Parts suit. for use solely/princ. with the boring/sinking mach. of 8430.41/8430.49.

<sup>39</sup> This observation is also previously and independently expressed in Steenbergen and Javorcik, 2016.

<sup>40</sup> Hausmann and Klinger (2006) uses a metaphor of monkeys in a forest jumping to nearby trees to explain the process of structural transformation for firms in the product space concept.

## 6. Observations and policy recommendations

In terms of the results and the background work that had to be conducted in order to inform on the question for identification of realistic export opportunities based on the DSM approach for Rwanda the following summary of observations may be relevant to policy making for Rwanda:

- a) Rwanda should continue with the regional engagement and integration drive in order to lower trade and logistics costs in all of its different dimensions. Based on various research papers and also as shown in this report reducing trade and logistics costs are major challenges, facing not only Rwanda but the whole region. Significant improvements in this regard in the long run are likely to have the most impact on the economies of the region.
- b) The requirement to develop human resources to become human capital in the production and export value chain is also well documented and a concerted effort around this element is key to future economic development. While Rwanda is relatively small and with comparatively fewer resources than some of its neighbours, human capital development can be a major differentiator. The drive to grow and diversify the economy of Rwanda should heed the recommendations from the Hausman (2015) study in terms of requirements around e.g. rural-to-urban migration as demand for more human capital in concentrated urban areas increase, as well as the implications for schooling and education.
- c) While regional economic integration and development is important, in the short to medium term the potential demand from neighbouring markets (with the exception of Kenya, the DRC and Congo) are extremely small. Therefore, a dual strategy should be followed in which regional market development is pursued in combination with developing relationships and enabling trade on the rest of the continent as well as further away international markets.
- d) Different strategies will be required for different market and product combinations and further detailed analysis around these dimensions need to form the basis for fact-based export and investment promotion activities.
- e) From an industry development perspective it would be prudent to further investigate some of the identified “non-traditional” products and sectors such as aeronautic maintenance and repairs and related services, mining and drilling maintenance and repairs and related services.
- f) Potentially, the manufacture of plastics and related industries (this could include the recycling and repurposing of waste plastics into required plastic products such as water tanks, cases and boxes) should be further investigated. While these are associated with higher skill- and technology intensive production processes, the region does have a demonstrated need and import demand for such products – also in terms of e.g. the primary activities in agriculture and mining as well as basic municipal services and related activities. This type of industry could have both a low skill, high employment requirement (on the waste plastic collection side), as well as higher skilled, import substitution production process with a focus to also supply to potential regional export markets, while being a “green” as well as relatively less heavy (from a transport cost perspective) type products. These activities could later link in with production of plastic related components also for the automotive value chain that could develop around the initial assembly activities envisioned for Rwanda by e.g. Volkswagen.

## 7. Conclusion

From an export promotion and industrialisation perspective, it was discussed how important it is to consider and keep track of the development of sectors and industries that will assist with capacity building of human capital in the longer term. While the share of medium and high skill and technology products (as opposed to lower skill and technology non-fuel primary commodities) in the current make-up of exports is relatively small, these will only develop if a focused effort is placed on ensuring a strategy that also considers this dimension explicitly. In this analysis, it was thus demonstrated how the DSM approach can assist in this regard and how these opportunities identified will contribute to this dimension of a strategy informed on this basis.

This research opens up alternative questions on research around diversification in terms of both markets and products for Rwanda, with three possible further focus sectors (aeronautic maintenance and repairs and related services, mining and drilling maintenance and repairs and related services and manufacture of plastics and related industries) highlighted by the outcomes of this approach.

In the final instance, it must be noted that this analysis is based on a modelled outcome, as opposed to observations from relationships in the data. However, assumptions for the modelling are informed from various international research studies and fields over a period of the last twenty years, as explained in this report the majority of which is documented in Cuyvers *et al.* (2012). As with any model, the outcomes are subject to defined structure and parameter assumptions. For this study the latest information on all relevant elements were incorporated, where possible, as discussed in the preceding sections of this report.

The purpose of this report is not to be exhaustive nor authoritative, but rather illustrative of how the outcomes from the DSM approach can be applied for decision making with specific relevance to Rwanda's policy makers in their journey of planning and building the country's economy. While an advantage is that the outcomes are provided at the HS6-digit product line detail, it can also pose a challenge since data quality and frequency of reporting at this level can be problematic for lesser developed countries as well as lesser traded products.

In conclusion, Rwanda should continue to focus on interventions that help build systems, create networks, develop institutions and align strategic priorities. As an immediate priority it would be useful to cross-check key assumptions and possibly deepen the analysis of current findings to ensure robustness. Thereafter, to sensibly and responsibly inform strategic decisions, more detailed investigation and evaluation of each of the opportunities identified for Rwanda by the DSM approach is required. However, the current outcomes help point the way in which policy makers could focus.

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## 9. Appendices

### 9.1. More detailed overview of the DSM methodology

#### 9.1.1. Filter 1: Identifying preliminary market opportunities

In filter 1 of the DSM, countries are eliminated that pose too high a political and/or commercial risk to the exporting country (filter 1.1) and do not show adequate macro-economic size or growth (filter 1.2). The rationale for this is that, with all the countries of the world as a starting point, filter 1 enables the researchers to eliminate uninteresting countries in order to concentrate in detail on a more limited set of product-country combinations in the consecutive filters. Small, high-risk countries that lack general potential are therefore eliminated in this filter.

##### 9.1.1.1. Filter 1.1: Political and commercial risk assessment

The first criteria that are considered in filter 1 are the *political and commercial risks* that exporters would face in doing business with the foreign countries under investigation.

Many academic, private and government institutions around the world rate countries on the basis of the political and commercial risks that an exporter would face in these countries<sup>41</sup>. In the DSM, the country risk ratings of the Belgian public credit insurance agency, *Office National du Dueroire (ONDD)*, are used in this part of filter 1. The rating methodology of ONDD conforms to the OECD's Arrangement on Guidelines for Officially Supported Export Credits<sup>42</sup> and are not conducted from the point of view of a specific exporting country. These ratings can readily be consulted on the ONDD website<sup>43</sup>. They can therefore be used by any exporter that wants to establish the degree of risk involved in dealing with a specific country.

Commercial risk can be defined as the risk resulting from the deterioration of the importer's financial situation, leading to the impossibility of payment for a consignment (ONDD, 2014). Indicators that are used to measure the overall commercial risk of a country include (i) *economic and financial indicators* that affect all companies' corporate results and balance sheets (e.g. devaluation of the currency, real interest rates, GDP growth and inflation), (ii) indicators reflecting the country's *payment experience* (the ONDD and other credit providers' past experience with the country) and (iii) indicators characterising the *institutional context* in which local companies operate (e.g. corruption index, transition economy) (ONDD, 2014).

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<sup>41</sup> See <http://www.countryrisk.com>

<sup>42</sup> For more information, see Cutts and West, 1998:12-14; Moravcsik, 1989:173-205.

<sup>43</sup> Previously [www.delcredere.be](http://www.delcredere.be), now [https://www.credendo.com/country\\_risk](https://www.credendo.com/country_risk) as the ONDD rebranded to Credendo Group in 2013.

Political risk is defined as any event occurring in the importing country that would assume the nature of *force majeure* for the importer, such as wars, revolutions, natural disasters, currency shortages and government action (ONDD, 2014). Techniques that are used to measure the political risk of a country include (i) an assessment of the *economic and financial situation*, (ii) an assessment of the *political situation* and (iii) a *payment experience analysis*. The assessment of the *financial situation* is based on external debt ratios and liquidity indicators, such as the level of foreign exchange reserves. A country's *economic situation* is evaluated by using three sets of indicators, namely indicators of economic policy performance (e.g. fiscal policy, monetary policy, external balance, structural reforms), indicators of the country's growth potential (e.g. income level, savings, investments) and indicators of external vulnerability (e.g. export diversification and aid dependency). The assessment of the political situation in a country is based on a quantitative analysis of the political risks associated with doing business in the country (not specified by the ONDD), while the *payment experience* analysis is based on data drawn from the ONDD and other credit insurers' past encounters with the country (ONDD, 2014).

The ONDD rates countries on a scale of 1 to 7 for political risk, where 1 indicates a low political risk and 7 indicates a high political risk. Political risk ratings are provided for the short, medium, and long term. The commercial risk rating is presented as either an 'A', 'B', or 'C', where an 'A' indicates low commercial risk and a 'C' indicates high commercial risk (ONDD, 2014).

The three political risk ratings for each country under investigation are transformed from a 1 to 7 scale to a 1 to 10 scale, whereas the commercial risk country rating is transformed in such a manner that a score of 3.33 is assigned to an 'A' rating, a score of 6.67 is assigned to a 'B' rating, and a score of 10 is assigned to a 'C' rating. This transformation is necessary to construct an overall country risk score. Firstly, an average political risk score (simple average of the three political risk scores) is calculated for each country under investigation. Secondly, the average political risk score and the commercial risk score are weighted equally to calculate an overall country risk score for each country under investigation. Countries with risk ratings of 6C, 7A, 7B or 7C are then eliminated.

#### **9.1.1.2. Filter 1.2: Macro-economic size and growth**

The second set of criteria that is used to screen the countries in filter 1 of the DSM is a country's *macro-economic size and growth*, measured by GDP and GDP per capita as well as GDP growth and GDP per capita growth values. The data are gathered from the World Bank.

Cut-off points for the GDP and GDP per capita values in each year under consideration are determined at the 20<sup>th</sup> percentile of the values for the countries for which all data necessary to run the DSM are available. Countries are selected if the GDP or GDP per capita values for the country are

higher than the cut-off values for at least two consecutive years of the most recent three-year period for which data are available. This ensures that countries that do not meet the requirements for only one year would not be eliminated for subsequent analysis (Cuyvers *et al.*, 1995:178).

The cut-off values for the GDP growth and GDP per capita growth values are determined at the world averages for each year. Countries should show above-average growth rates in both GDP and GDP per capita in all three of the most recent three-year periods in order to be selected on the basis of these criteria.

Countries can be selected in filter 1.2 either on the basis of macro-economic size (GDP or GDP per capita) or growth (GDP growth and GDP per capita growth).

To enter filter 2, a country should qualify based on filter 1.1 *and* filter 1.2 (as depicted by the coloured intersection of the circles in Figure 1).

### **9.1.2. Filter 2: Identifying possible opportunities**

Filter 2 assesses the import demand for the various HS 6-digit product categories in the remaining countries with a view to identifying product-country combinations (markets) with adequate import size and growth.

Three criteria are used in this filter, namely *short-term import growth*, *long-term import growth* and *import market size*. Import data were gathered from the CEPII BACI world trade database. This database is constructed from the United Nations Statistics Division's UN Comtrade database and reconciles the data reported by almost 150 countries. The CIF import values and FOB export values reported are reconciled to provide one trade figure for each bilateral trade flow, which excludes CIF costs. Furthermore, the CEPII team assesses the reliability of country reporting and takes these reporting quality weights into consideration when reconciling the bilateral trade flows. The BACI database covers bilateral trade values at the HS 6-digit product disaggregation for more than 200 countries since 1995 and is updated every year (CEPII, 2017).

*Short-term import growth* is considered to be the most recently-available, simple annual growth rate in imports. *Long-term growth* is calculated as the compounded annual percentage growth in imports over a period of five years. Finally, the *import market size* is the total imports of country *i* for product category *j* (Cuyvers *et al.*, 1995:178; Cuyvers, 2004:259-260).

Subsequently, a cut-off value for each criterion in filter 2 needs to be calculated. Cuyvers *et al.* (1995:179) argued that if the exporting country under consideration was already specialised in exporting a particular product category, the cut-off points for these markets had to be less stringent.

Therefore, the Revealed Comparative Advantage (RCA) index of Balassa (1964) is used to define cut-off points for each of the above-mentioned sub-criteria.

$$RCA_{n,j} = \left( \frac{X_{n,j}}{X_{W,j}} \right) \div \left( \frac{X_{n,tot}}{X_{W,tot}} \right)$$

where:

$X_{n,j}$ : exports of country  $n$  (which is the exporting country for which realistic export opportunities are identified) of product  $j$ ;

$X_{W,j}$ : worldwide exports of product  $j$ ;

$X_{n,tot}$ : total exports of country  $n$ ; and

$X_{W,tot}$ : worldwide exports of all product categories.

An RCA index closer to 0 means that country  $n$  either does not export ( $RCA = 0$ ) or exports very little of the product category. An RCA index larger than or equal to 1 means that country  $n$  is relatively specialised in exporting the product category under consideration (Cuyvers *et al.*, 1995:179).

Cut-off values for the variables of filter 2 are defined as follows (Cuyvers, 1997:5; 2004:260):

For *short- and long-term import growth*, a scaling factor,  $s_j$ , is firstly defined (Willeme & Van Steerteghem, 1993, as quoted by Cuyvers, 1997:5; 2004:260) in order to take the exporting country's degree of specialisation in the exports of product category  $j$  into account when defining cut-off values:

$$s_j = 0.8 + \frac{1}{(RCA_j + 0.85) \exp(RCA_j - 0.01)}$$

The cut-off values were then defined as:

$$g_{i,j} \geq G_j;$$

with  $g_{i,j}$  being the import growth rate of product category  $j$  by country  $i$ ; and

$$G_j = g_{W,j} \cdot s_j, \text{ if } g_{W,j} \geq 0; \text{ or}$$

$$G_j = g_{W,j} \div s_j, \text{ if } g_{W,j} < 0$$

with  $g_{W,j}$  being the total world imports of product category  $j$ . Table 34 illustrates these cut-off points.

**Table 34: Illustration of cut-off points for short- and long-term growth**

	$0 \leq RCA_{n,j} < 1$ (The exporting country for which the model is applied is not specialised in exporting product $j$ )	$RCA_{n,j} \geq 1$ (The exporting country for which the model is applied is specialised in exporting product $j$ )
$g_{w,j} > 0$ (World short- or long-term growth rate in product $j$ is positive)	Country $i$ 's short- or long-term import growth rate of product $j$ ( $g_{i,j}$ ) must be between one and two times the world growth rate for product $j$ . For example: If $RCA_{n,j} = 0$ and $g_{w,j} = 5\%$ , then $s_j = 1.988$ and $G_j$ (cut-off point) = 9.94%  If $RCA_{n,j} = 0.5$ and $g_{w,j} = 5\%$ , then $s_j = 1.25$ and $G_j = 6.25\%$	Country $i$ 's short- or long-term import growth rate of product $j$ ( $g_{i,j}$ ) is allowed to be a bit lower than, or equal to, the world growth rate for product $j$ . For example: If $RCA_{n,j} = 1$ and $g_{w,j} = 5\%$ , then $s_j = 1$ and $G_j = 5\%$  If $RCA_{n,j} = 1.5$ and $g_{w,j} = 5\%$ , then $s_j = 0.895$ and $G_j = 4.475\%$
$g_{w,j} < 0$ (World short- or long term growth rate in product $j$ is negative)	Country $i$ 's short- or long-term import growth rate of product $j$ ( $g_{i,j}$ ) must be higher than the world growth rate for product $j$ . For example: If $RCA_{n,j} = 0$ and $g_{w,j} = -5\%$ , then $s_j = 1.988$ and $G_j = -2.5\%$  If $RCA_{n,j} = 0.5$ and $g_{w,j} = -5\%$ , then $s_j = 1.25$ and $G_j = -4\%$	Country $i$ 's short- or long-term import growth rate of product $j$ ( $g_{i,j}$ ) is allowed to be a bit lower than, or equal to, the world growth rate for product $j$ . For example: If $RCA_{n,j} = 1$ and $g_{w,j} = -5\%$ , then $s_j = 1$ and $G_j = -5\%$  If $RCA_{n,j} = 1.5$ and $g_{w,j} = -5\%$ , then $s_j = 0.895$ and $G_j = -5.59\%$

Source: Authors' own table based on Cuyvers (1997:5; 2004:260)

This procedure is carried out for both short-term and long-term growth rates (Cuyvers, 1997:6; 2004:260). If the above-mentioned criteria are met by a particular country for a specific product, a '1' is assigned in the *short-term* and/or *long-term import growth* columns in Table 7. A '0' is assigned in cases where the criteria are not met.

Furthermore, the relative *import market size* of country  $i$  for product category  $j$  was considered sufficiently large if (Cuyvers, 1997:6; 2004:260):

$$Z_{i,j} \geq S_j$$

where  $Z_{i,j}$  is the total imports of country  $i$  for product category  $j$ ; and

$$S_j = 0.02Z_{w,j}, \text{ if } RCA_{n,j} \geq 1; \text{ or}$$

$$S_j = [(3 - RCA_{n,j})/100]Z_{w,j}, \text{ if } RCA_{n,j} < 1$$

Table 35 illustrates the implication of the above-mentioned cut-off points.

**Table 35: Illustration of cut-off points for import market size**

$0 \leq RCA_{n,j} < 1$ (The exporting country $n$ for which the model is applied is not specialised in exporting product $j$ )	$RCA_{n,j} \geq 1$ (The exporting country $n$ for which the model is applied is specialised in exporting product $j$ )
Country $i$ 's imports of product $j$ ( $Z_{ij}$ ) must be between 2% and 3% of total world imports of product $j$ . For example: If $RCA_{n,j} = 0$ , then $S_j$ (cut-off point) = $0.03 Z_{w,j}$ (3% of total world imports of product $j$ ) If $RCA_{n,j} = 0.5$ , then $S_j = 0.025 Z_{w,j}$ (2.5% of total world imports of product $j$ )	Country $i$ 's imports of product $j$ ( $Z_{ij}$ ) must be greater than or equal to 2% of total world imports of product $j$ .

Source: Authors' own table based on Cuyvers (1997:6; 2004:260)

Again, each product-country combination is assigned a '0' or a '1' in the relative import market size column, based on whether the above conditions, as illustrated in Table 35, are fulfilled or not.

The selection of markets in filter 2 is based on the categorisation illustrated in Table 36.

**Table 36: Categorisation of product-country combinations in filter 2**

Category	Short-term import market growth	Long-term import market growth	Relative import market size
0	0	0	0
1	1	0	0
2	0	1	0
3	0	0	1
4	1	1	0
5	1	0	1
6	0	1	1
7	1	1	1

Source: Cuyvers (1997:7; 2004:261)

A product-country combination is selected to enter filter 3 if it falls in category 3, 4, 5, 6 or 7 (Cuyvers, 1997:6; 2004:261). A market should therefore at least be growing adequately in the short or long term (see Table 34) and/or be of adequate size (see Table 35) to be considered for further analysis. The remaining product-country combinations subsequently enter filter 3.

### 9.1.3. Filter 3: Identifying probable and realistic export opportunities

According to Cuyvers *et al.* (1995:180), it holds true that being selected on the basis of size and growth does not necessarily mean that markets can be easily penetrated. In filter 3, trade restrictions are considered to further screen the remaining possible export opportunities. Two categories of barriers are considered in this filter, namely the degree of concentration (filter 3.1) and trade restrictions (filter 3.2) (Cuyvers *et al.*, 1995:180; Cuyvers, 1997:7; 2004:261).

### 9.1.3.1. Filter 3.1: Degree of import market concentration

According to Cuyvers *et al.* (1995:180), a market that is very concentrated is difficult to enter. A particular import market is considered to be concentrated if only a few exporting countries hold a relatively large market share, and therefore have a lot of market knowledge and are well known by local customers. To confirm their argument, Cuyvers *et al.* (1995:180) carried out a partial analysis that revealed a negative correlation between export performance and market concentration. Cuyvers *et al.* (1995:180) concluded that it would be inefficient for government export promotion agencies with limited resources to focus on heavily concentrated markets for which the chances of successful exporting are relatively small.

In the DSM the Herfindahl-Hirshmann Index (HHI) of Hirshmann (1964) is used to measure the degree of concentration in a market. The index is calculated as follows:

$$HHI_{i,j} = \sum \left( \frac{Z_{k,i,j}}{Z_{tot,i,j}} \right)^2$$

where:

$Z_{k,i,j}$ : the imports of country  $i$  from country  $k$ .<sup>44</sup> for product category  $j$ ; and

$Z_{tot,i,j}$ : country  $i$ 's total imports of product category  $j$ .

An HHI of 1 indicates that only one exporting country supplies the importing market and an HHI closer to 0 indicates a lower market concentration (importing market supplied by many exporting countries). It would therefore be more difficult for an exporting country to penetrate a particular market if the HHI for that market is relatively high (closer to 1) (Cuyvers *et al.* 1995:180; Cuyvers, 1997:7; 2004:261).

A cut-off point for market concentration had to be derived. Cuyvers *et al.* (1995:180) stated that it had to be kept in mind that concentration can be considered a bigger problem in a non-growing market (where a market share will have to be won from often firmly established competitors) than in a large, growing market. Therefore, the cut-off point for market concentration was designed to be dependent on the category to which the various markets were assigned in filter 2 (see Table 36).

The cut-off points are defined as follows:

$$h_k = HHI_{i,j}$$

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<sup>44</sup>The import from the country for which the model is applied is excluded in the numerator of this equation.

with:

$h_k = 0.4$ , for category 3

$h_k = 0.5$ , for category 4, 5 & 6

$h_k = 0.6$ , for category 7

Therefore, in relatively large markets, a concentration level of no more than 40% was allowed; in relatively large and growing markets, a degree of concentration of no more than 50% was allowed; and finally, in the most interesting markets that are relatively large and growing in the short and long term, 60% concentration was allowed.

To explain the rationale for these cut-off values, the following examples apply. If there are only two suppliers in a market, each holding an equal market share, the concentration in this market would be 50% (HHI = 0.5). The market can be considered difficult to enter by a newcomer. On the other hand, in a market with four suppliers of which three each hold a 10% market share and one holds a 70% market share, the concentration would be 52% (HHI = 0.52). Although concentrated by one player, it might be easier to take up some of the market share of the smaller players if the market is large and growing. Therefore, the cut-off values are set around 50% concentration.

### 9.1.3.2. Filter 3.2: Trade barriers

The second set of accessibility criteria used in filter 3 is *trade barriers*. An index for ‘revealed absence of barriers to trade’ is used as a proxy in this filter. The hypothesis is that if the neighbours of the exporting country for which the model is applied could establish a relatively strong market position in a particular market, then it would not be too difficult for the exporting country to overcome trade barriers in this market (Cuyvers *et al.*, 1995:181; Cuyvers, 1997:7; 2004:262). The revealed absence of barriers to trade ( $M_{i,j}$ ) is calculated as follows:

$$M_{i,j} = \frac{\frac{X_{Neighbour1,i,j}}{X_{Neighbour1,i}} + \frac{X_{Neighbour2,i,j}}{X_{Neighbour2,i}} + \frac{X_{Neighbour3,i,j}}{X_{Neighbour3,i}} + \dots}{\frac{X_{World,i,j}}{X_{World,i}}}$$

with:

$M_{i,j}$ : the corrected market share of the neighbours of the country for which the model is applied in country  $i$ 's imports of the HS 4-digit product category  $j$ ;

$X_{Neighbour1,i,j}$ : the exports of each of the neighbouring countries of the country for which the model is applied, of the HS 4-digit product category  $j$  to country  $i$ ;

$X_{Neighbour1,i}$ : the total exports of each of the neighbouring countries to country  $i$ ;

$X_{World,i,j}$ : total world exports of the HS 4-digit product category  $j$  to country  $i$ .

$X_{World,i}$ : total world exports to country  $i$ .

The cut-off point is defined with the assumption that a higher relative share  $M_{(i,j)}$  reflects a relative lack or a revealed absence of barriers to trade (Cuyvers *et al.*, 1995:181). Therefore, the higher the  $M_{(i,j)}$ -value, the easier it would be for the country for which the model is applied to access the market in question (Cuyvers *et al.*, 1995:181). Cuyvers (1997:8; 2004:263) applied the following rule of thumb to define a cut-off point for this criterion:

$$M_{i,j} \geq 0.95$$

This implies that, with a margin of error of 5%, if at least one of the neighbouring countries of the exporting country for which the model is applied has a ‘Revealed Comparative Advantage’ in exporting to a particular market, it is assumed that there are no “revealed barriers to trade” for the exporting country for which the model is applied in that market (Cuyvers, 1997:8; 2004:263).

This analysis is carried out on an HS 6-digit level. It implies that if the neighbouring countries do have a significant presence in a market on an HS 4-digit level, but not necessarily on an HS 6-digit level, all the HS 6-digit level products within the HS 4-digit product category will still be selected in this filter. This allows for more products to be selected than only those exported competitively by the neighbouring countries.

However, for the Rwanda case the proxy approach was not applied – refer to section 2.4 in the main report for changes to this filter as applied to the Rwanda case.

To enter filter 4, product-country combinations need to have sufficiently low-market concentration and barriers to trade. In other words, both the conditions in filter 3 have to be met in order for a market to enter filter 4.

#### **9.1.4. Filter 4: Final analyses of opportunities**

In the last stage of the analysis, the realistic export opportunities identified in filters 1 to 3 are categorised and prioritised and no markets are eliminated.

For each of the markets that entered filter 4, the relative market share of the exporting country (country  $n$ ) of product category  $j$  in country  $i$  is calculated as follows:

$$\mu_{n,i,j} = \left( \frac{X_{n,i,j}}{X_{Six,i,j}} \right)$$

where:

$X_{n,i,j}$ : country  $n$ 's exports of product category  $j$  to country  $i$ ;

$X_{six,i,j}$ : top six countries' total exports of product category  $j$  to country  $i$ .

A comparison is therefore made between the relative market share of country  $n$  in each market that entered filter 4 and the relative market share of the six largest competitors in these markets.

The following categories of market importance are identified (Cuyvers, 1997:14; 2004:267):

$\mu_{n,i,j} < 0.05$ : Country  $n$ 's relative market share is relatively small.

$0.05 \leq \mu_{n,i,j} < 0.25$ : Country  $n$ 's relative market share is intermediately small.

$0.25 \leq \mu_{n,i,j} < 0.5$ : Country  $n$ 's relative market share is intermediately high.

$\mu_{n,i,j} \geq 0.5$ : Country  $n$ 's relative market share is relatively high.

The entire filtering process leads to the following matrix (Table 37) to categorise the realistic export opportunities that were identified in filters 1 to 3 in terms of size and growth in demand and the exporting country's current market share in these markets.

**Table 37: Final categorisation of realistic export opportunities**

Size and growth of importing market	Market share of country $n$ (filter 4)			
	Relatively small	Intermediately small	Intermediately large	Relatively large
Large product market	Cell 1	Cell 6	Cell 11	Cell 16
Growing (short- and long-term) product market	Cell 2	Cell 7	Cell 12	Cell 17
Large product market with short-term growth	Cell 3	Cell 8	Cell 13	Cell 18
Large product market with long-term growth	Cell 4	Cell 9	Cell 14	Cell 19
Large product market with short- and long-term growth	Cell 5	Cell 10	Cell 15	Cell 20

Source: Cuyvers (2004:269)

The classification in the rows of Table 37 is obtained from filter 2 (see Table 36), which indicates the size and growth of imports of the different markets, while the columns are based on the relative market share of the exporting country calculated in filter 4.

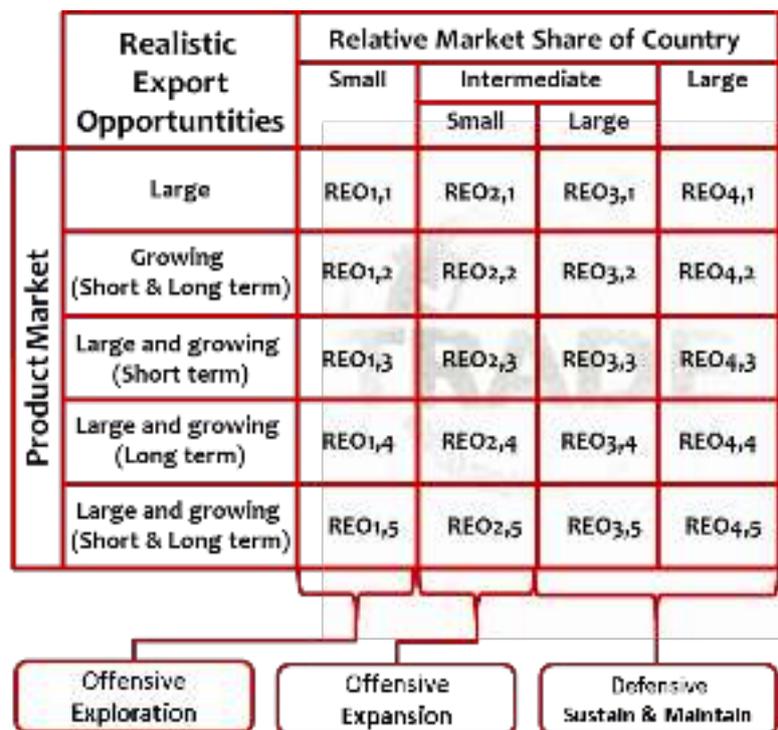
A total of 20 different kinds of markets are distinguished, and the product-country combinations that entered filter 4 are each assigned to one of these markets (Cuyvers *et al.*, 1995:182; Cuyvers, 1997:15; 2004:269). The exporting country for which the model is applied will therefore know what the potential (demand) in a particular market is (import size and growth) and to what degree it has already utilised this opportunity (based on the relative market share). If a product-country combination is classified in cell 5, for instance, it means that the demand in that market is large and growing in the short and long term, but the exporting country for which the model is applied has a

relatively small market share in that market. This is therefore a market opportunity that has not been exploited to its full potential by the exporting country.

Export promotion agencies can also use these cells to formulate export promotion strategies for the markets (product-country combinations) identified in the DSM as realistic export opportunities. Cuyvers *et al.* (1995:183) suggest that an offensive market exploration export promotion strategy be used for export opportunities in cells 1 to 10, based on the exporting country’s relatively small market share in these markets. An offensive market expansion strategy is suggested for export opportunities in cells 11 to 15. As the exporting country already has an intermediately large market share in these markets and the demand is large and/or growing, market expansion is recommended. For export opportunities in cells 16 to 20, a defensive export promotion strategy of market maintenance is recommended by Cuyvers *et al.* (1995:183).

For ease of understanding and reference, the above matrix of cells is translated into a realistic export opportunities map as depicted in Figure 152.

Figure 152: REO Map™



Source: Authors

#### 9.1.4.1. REOs' 'home market' market share characteristics

Evident from the map is that the characteristics of the REOs (which are the result of the process described at a high level above) can be used to inform appropriate, though still broadly defined, export promotion or marketing strategies, as follows:

- d) **REO<sub>1,1</sub> to REO<sub>2,5</sub>**: The 'home market' (in this case, Rwanda) has a non-existent to low market share for various reasons, and an offensive market **exploration** strategy is appropriate for products where a comparative advantage exists or can be developed;
- e) **REO<sub>3,1</sub> to REO<sub>3,5</sub>**: The 'home market' has a relatively medium-large market share and REOs are situated in large and/or growing market segments; therefore, an offensive market **expansion** strategy can be advocated; and
- f) **REO<sub>4,1</sub> to REO<sub>4,5</sub>**: The 'home market' has already gained an important relative market share; therefore, a defensive market **sustain and maintain** strategy seems most appropriate.

#### 9.1.4.2. REOs' 'target market' characteristics

The target (or importing) market's characteristics in terms of both size and growth can also be used to inform strategies.

- f) **REO<sub>1,1</sub>; REO<sub>2,1</sub>; REO<sub>3,1</sub>**: 'Breaking into' a large, 'relatively' new market, especially when the market share of the 'home market' is still relatively small (REO<sub>1,1</sub> and REO<sub>2,1</sub>);
- g) **REO<sub>1,2</sub>; REO<sub>2,2</sub>; REO<sub>3,2</sub>**: 'Taking advantage of a growing market', i.e. opportunities in target markets that are growing in both the short and long term;
- h) **REO<sub>1,3</sub>; REO<sub>2,3</sub>; REO<sub>3,3</sub>**: 'Growing and consolidating', i.e. opportunities in target markets that experienced growth in the recent past/emerging opportunities;
- i) **REO<sub>1,4</sub>; REO<sub>2,4</sub>; REO<sub>3,4</sub>**: 'Leapfrogging', i.e. opportunities in target markets that exhibit long-term growth;
- j) **REO<sub>1,5</sub>; REO<sub>2,5</sub>; REO<sub>3,5</sub>**: 'Jumping on the bandwagon', i.e. opportunities in target markets that show large import volumes and growth in both the short and long term.

#### 9.1.5. Taking the exporting country's production capability into consideration

So far, the DSM approach mostly focuses on the demand potential (size, growth, concentration and market access) for products in different countries and does not take into consideration the production capacity of the exporting country. It may therefore be that the DSM so far identifies export opportunities for a specific product in many countries, but the exporting country might not have the capacity to produce this product.

The production capacity of the exporting country can therefore be taken into account by introducing the following additional criterion after categorising the export opportunities in filter 4:

$$RCA \geq 1$$

with:

$$RCA_{n,j} = \left( \frac{X_{n,j}}{X_{World,j}} \right) \div \left( \frac{X_{n,tot}}{X_{World,tot}} \right)^{45}$$

where  $X_{n,j}$  is the exporting country  $n$ 's exports of product  $j$ ,  $X_{n,tot}$  is country  $n$ 's total exports of all products,  $X_{World,j}$  is the world's exports of product  $j$  and  $X_{World,tot}$  is the total world exports of all products.

The literature suggests that an RCA of at least 1 indicates that a country is specialised in producing and exporting a particular product (Balassa, 1964). By considering the exporting country's Revealed Comparative Advantage, it can be ensured that only products in which the exporting country has a significant presence are selected as export opportunities.

### 9.1.6. The calculation of potential export values

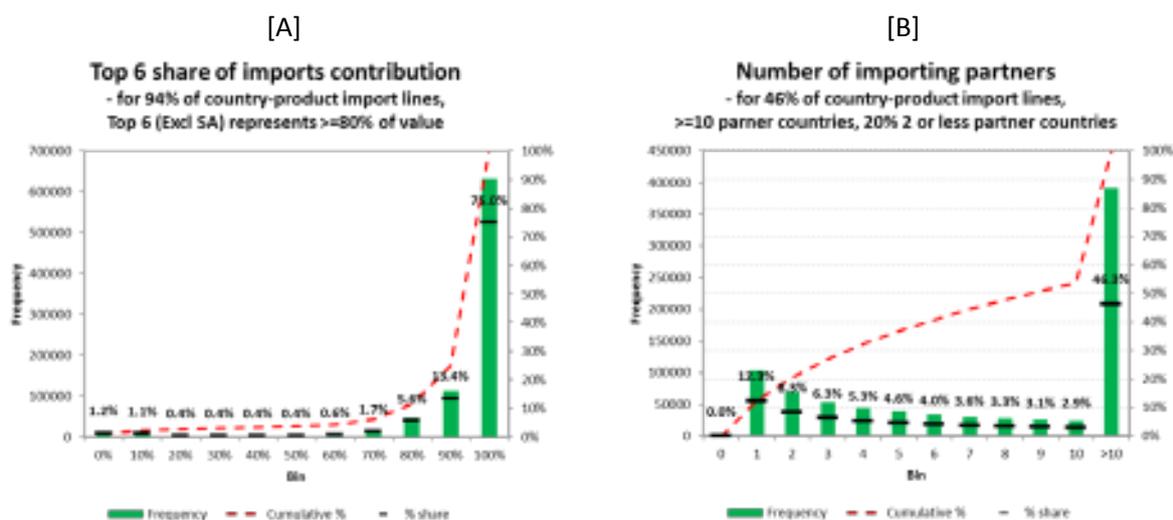
Up until this point, only lists of realistic export opportunities can be provided, and it is difficult to prioritise between export opportunities and between regions, countries, sectors and products, as no value is attached to the product-country combinations. By way of an example from a previous application of the DSM, small wares and toilet articles had export opportunities in 41 countries and ranked second when compared with other products, while motor vehicles for the transportation of goods or materials ranked 20<sup>th</sup> with opportunities in 35 countries. The size of the export opportunities was not considered and a ranking based on the number of opportunities is not accurate.

However, a statistical analysis of all the product codes on which trade is recorded over a five-year period shows that for 94 percent of country-product import lines (more than 800,000 in the data set), the top six supplying countries supply more than 80 percent of a country's imports in value terms (see Figure 153 panel [A]).

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<sup>45</sup> This formula is also used in filter 2 to calculate the cut-off values.

Figure 153: Analysis of import partners



Source: Authors' calculation from CEPII BACI data

Further analysis also shows that 46 percent of these country-product import lines have more than 10 supplying trading partners (exporters to the importing country), while 20 percent have two or less partners.

Therefore, the calculation of a potential export value for each product-country combination that was selected as a realistic export opportunity is introduced at this point:

$$Pot\_exp_{i,j} = average(Z_{Six1,i,j}, Z_{Six2,i,j}, \dots, Z_{Six6,i,j})$$

where:

$Z_{Six1..6,i,j}$  is country  $i$ 's imports of product  $j$  from each of the top six competitors (excluding the exporting country for which the model is applied).

The potential export value is therefore considered the average market value of the top six competitors in each market (excluding the exporting country for which the model is applied). It gives a better indication of the size of the export opportunities relative to one another and is in line with filter 4 in which the exporting country's market share in each market is compared to that of the top six competitors. The potential value will therefore be much higher than the exporting country's actual export value if the export opportunity is classified into cells 1 to 10, while it will be much closer for export opportunities in cells 11 to 20. It is possible that the actual export value can be higher than this potential export value, which means that the exporting country is one of the main exporters in a particular market and exceeds the average market value of its top six competitors.

### 9.1.7. Determining local production versus re-exports

Some countries, e.g. the Netherlands, Singapore and Hong Kong, are transit countries for many goods going into Europe and other regions. Therefore, an indication need to be given in the results as to whether the product under consideration is locally produced or probably only re-exported. This is determined by using the Revealed Trade Advantage (RTA) index of Vollrath (1991).

The RCA index is often used as an indicator of relative export advantage or competitiveness, but it only accounts for exports. Hence, the RTA index accounts for exports and imports simultaneously and is used as an indicator of product-level competitiveness. An  $RTA > 0$  reveals positive comparative trade advantage or trade competitiveness. It can be assumed that an  $RTA > 0$  implies that the majority of the product exported is locally produced as it corrects for re-exports.

$$RTA_{ij} = RCA_{ij} - RMA_{ij}$$
$$RMA_{ij} = \left[ \left( M_{ij} / \sum_{t, t \neq j} M_{it} \right) / \left( \sum_{n, n \neq i} M_{nj} / \sum_{n, n \neq i} \sum_{t, t \neq j} M_{nt} \right) \right]$$

where:

$M$  represents imports,  $i$  is a country,  $j$  is a product,  $t$  is a year, and  $n$  represents all countries.

### 9.1.8. Method references

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## 9.2. Treatment of underlying trade data applied in the modelling

As mentioned in section 2.2 the CEPII BACI world trade database (2017 – HS2007 revision) forms the basis of the underlying trade data applied in the model. In past versions of the model the latest year's data was used to determine various variables such as:

- a) The HS code and country combinations set applied;
- b) The calculation of the exporting or “home” market actual exports and market share;
- c) The calculation of the top 6 competing countries supplying into the “target” market, as well as the exporting or “home” market relative (to these top 6 competitors) market share (as applied in filter 4);
- d) The RCA calculation as applied in filter 2 and filter 4;
- e) The market concentration calculations of filter 3.1; and
- f) The “revealed absence of barriers to trade” in filter 3.2.

Due to real world practicalities it could happen that this “single year” approach may yield a set of outcomes that are only relevant for the specific year, as opposed to over a period. To improve on this shortcoming the method was adjusted to include all HS code and country combinations that was present in the data set over the period of investigation (5 years), irrespective of whether the specific combination only appear in the last year of the period under investigation.

This change will allow for product-country combinations and subsequent realistic export opportunities (if adhering to the rest of the filtering process requirements) to be identified and included that may not exist in the final year due to e.g.

- a) data capturing or reporting issues;
- b) in agricultural product trade Sanitary and Phytosanitary Measures (SPS) that could be implemented on a “temporary” basis; and
- c) real world events e.g. factories that “temporarily” are out of action, and for that reason trade is interrupted, but then continues again once production is restored.

Due to the fact that the model is based on “delayed” data (only up to 2015 currently) this approach therefore minimises the type of error (of omission) that could be encountered with using only a “snapshot” of the last year as basis for most of these calculations. In addition, it also introduces some additional “robustness” in the approach that will make the outcomes less sensitive to the specific end year selected.

### 9.2.1. Inclusion of Botswana and Namibia in the underlying data set

In the current formal version of the CEPII BACI world trade database (2017 version) the Southern African Customs Union (area or country code 711) only is provided, while the trade for the member states (South Africa [710], Botswana [072], Lesotho [426], Namibia [516] and Swaziland [748]) are aggregated under this code [711] in the CEPII data set. However, the individual members of South Africa, Botswana and Namibia has been reporting historically on HS 6 digit level, while Lesotho only

reported data for 2001 to 2003, then again for 2007 to 2014, while Swaziland only reported 2001 to 2007, then again 2011 to 2015. For the 5 year period (2011 to 2015) as applied in the current modelling South Africa, Botswana and Namibia therefore has sufficient information as reported by the UN Comtrade via the ITC to create a data set for these countries on a consistent basis within the CEPII BACI world trade database.

The data set as applied in the modelling therefore is an “adjusted” version of the CEPII BACI world trade database (2017 version), where the SACU [711] region does not occur anymore, replaced by the individual 5 countries’ individual information. The totals for the aggregate still corresponds to that of the SACU [711] entry, while additional bilateral flows between the 5 member countries has been added to the data set based on information obtained from their various statistical agencies (with the exception of Lesotho and Swaziland).

### 9.2.2. Time-weighted approach applied to all key time-related variables

Owing to the potentially volatile nature of international export transactions on a detailed, product-by-country level, the method applied to analyse share and ranking information is based on the process of consistently applying a weighted 5-year share calculation.

The fundamental premise applied is that transactions occurring further back in history are less likely to influence current decisions and information than more recent information. Therefore a “discount” is applied to the contribution of each historical data point based on how far back the point is in terms of time relative to the latest point. There are various weighting schemes that can be applied for this purpose, depending on how fast one would want the historical influences to diminish. For the current modelling initiative an arbitrary near exponential weighting scheme is applied where the most recent value is allocated a weight of 1, the preceding historical points are each allocated a weight of 0.5 the of the previous weight and normalised. For any set of data, the weighting would therefore be provided by the following formula:

$$TW_{t-1} = \left( \frac{0.5 TW_t}{\sum_1^n TW_t} \right)$$

and

$$TW_t = 1 \text{ for } t = n$$

Where

$TW_t$  = Time-weight allocated to period  $t$

$n$  = number of time periods

$t$  = 1 to  $n$

In this context, the example in Figure 154 and Figure 155 provides an illustration of the difference in outcomes when weighted versus unweighted calculations is used for growth rates, shares, ratios or composite indicators. In the illustration (Figure 154), Examples 2 and 3 will have exactly the same percentage share (for Example 2 / Total (Example 1 + 2 + 3) and Example 3 / Total (Example 1 + 2 +

3)) over the 5-year<sup>46</sup> period for the normal arithmetic (or weight = 1 for each period) calculation of. However, the trend pattern for Example 2 is declining, while that for Example 3 is increasing. Therefore, in the outcome applied for the DSM approach, one would expect Example 3 to feature more prominently in contributing towards a realistic export opportunity than Example 2 (except if the decision centres on how to reverse or influence declining trends). The differences in actual ratios calculated for this example is provided in and Figure 155.

Figure 154: Example data set for share calculations

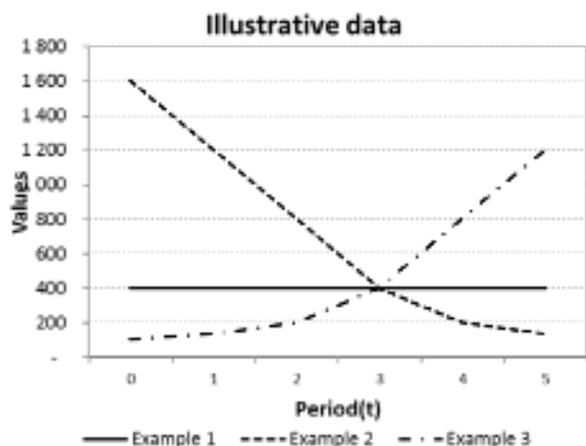
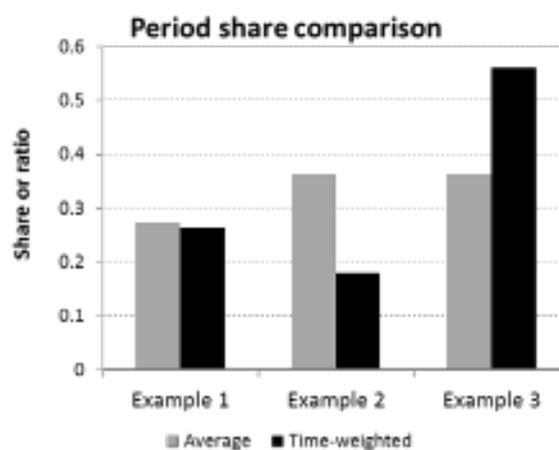


Figure 155: Time-weighted vs. average share calculation outcomes



Source: Authors

Evident from the example is that where a ratio is applied, example 2 and 3 would have the same outcome (in the case of the normal arithmetic average calculation) over the period, while in actual fact example 3 should be positioned at a higher priority than example 2 (as in the case of the time-weighted calculation). For the constant case (example 1) it is evident that the time-weighted and normal arithmetic average calculations yields very close results.

Figure 156: Example data set for growth calculations

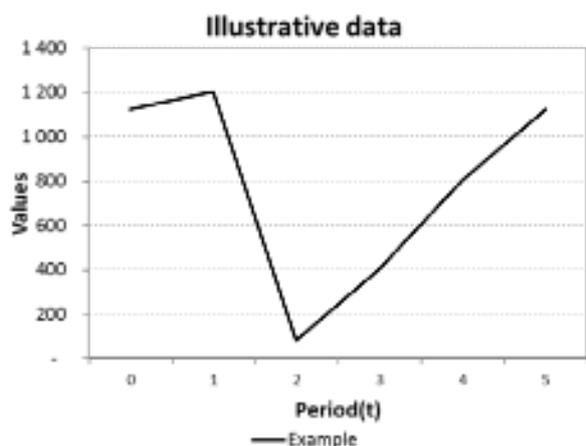
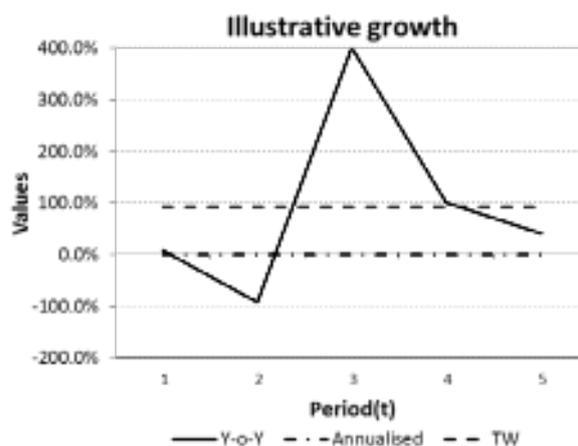


Figure 157: Time-weighted versus unweighted growth calculation outcomes



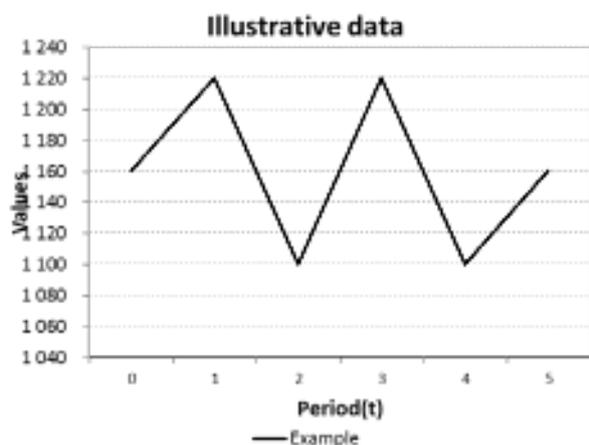
Source: Authors

<sup>46</sup> The sample contains 6 years ( $t$ ) for calculation of 5 year annual year-on-year growth rates. The ratio and other calculations is only applied for  $t=1$  to 5.

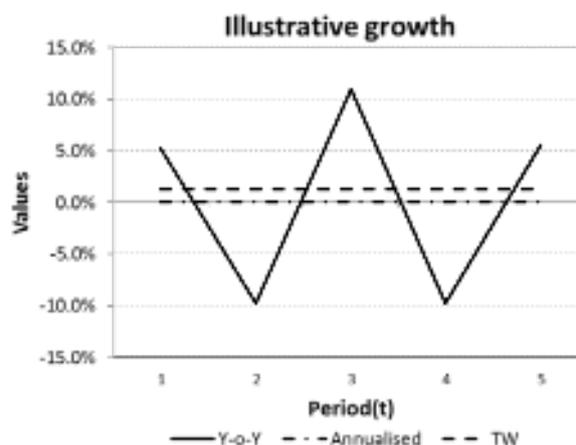
In this second example, the weighted implications for growth rates are demonstrated. In the numeric example displayed in Figure 158 in the furthest back period a major decline in the values can be observed. However, the trend is reversed and the series ends at the same level than the initial starting value. When evaluating the long-term growth outcome for this example, the resulting growth is zero (Figure 159). If however, the dataset is shortened just a single year, the outcome would have been positive. In the following year's data update this may be the case. The question is then from a practical advice perspective whether it would be sensible to indicate that the long-term growth in this instance was zero or negative, while a year later the answer may be exactly the opposite. The time-weighted result in this example therefore discounts the changes further back in history and the result for the long-term outcome is positive.

Similarly, for a trend that is predominantly cyclical, the time-weighted long-term growth calculation will emphasize the nearer term part of the cycle stronger than the normal arithmetic average calculation (illustrated in Figure 158 and Figure 159).

**Figure 158: Example data set for cyclical growth calculations**



**Figure 159: Time-weighted versus unweighted share calculation outcomes**



Source: Authors

It is evident that in the context of looking for 'emerging' or increasing opportunities and shares, the weighted calculation therefore yields a result that may be more insightful for current decision making. However, this exposé also demonstrates the need for decision-makers to not only simply look at the REO outcome, but in addition to also understand the trend context of such an REO.

### 9.3. Selected additional tables

The following table provides a list of 29 countries that are completely eliminated through the filtering process associated for tests related to concentration and accessibility. Note that while all opportunities for South Sudan are eliminated by filter 3.1, South Sudan was included in the analysis irrespective based on the request to also investigate this close regional destination. However, only a single product line was identified for this country (see section 5.4.7).

**Table 38: Countries completely eliminated due to concentration and accessibility constraints**

Item	Country	Region	Sub-region	Concentration (Filter 3.1)	Accessibility (Filter 3.2)
1	Antigua and Barbuda	Caribbean			X
2	Bahamas	Caribbean			X
3	Barbados	Caribbean			X
4	Belize	Central America			X
5	Bermuda	North America	Caribbean		X
6	Bolivia	South America			X
7	Canada	North America	Northern America		X
8	Cayman Islands	Caribbean			X
9	Colombia	South America			X
10	Costa Rica	Central America			X
11	Cuba	Caribbean			X
12	Democratic People's Republic of Korea (North)	Asia	Eastern Asia		X
13	Ecuador	South America			X
14	El Salvador	Central America			X
15	Guatemala	Central America			X
16	Haiti	Caribbean			X
17	Honduras	Central America			X
18	Jamaica	Caribbean			X
19	Kiribati	Oceania			X
20	Mexico	Central America			X
21	Nicaragua	Central America			X
22	Panama	Central America			X
23	Peru	South America			X
24	Samoa	Oceania			X
25	South Sudan	Africa	Northern Africa	X	
26	Tonga	Oceania			X
27	Trinidad and Tobago	Caribbean			X
28	Vanuatu	Oceania			X
29	Venezuela	South America			X

Source: Authors, TRADE-DSM

#### 9.4. Technical observations related to Rwanda import and export statistics

International trade ASYCUDA data as reported by Rwanda official systems seems to contain some problematic in terms of content - possible erroneous entries - shared with Victor Steenbergen on 27 April 2017.

One would expect where the flow is imports, all the [destinationcountryname] values should be Rwanda (unless it is transit cargo). However, there are numerous records that show [seriesflowtypecode] of [imports] where [destinationcountryname] is NOT Rwanda - but also not surrounding neighbours as could be the case for transit - amounting to between 11 percent to 15 percent of all imports over the years 2008 - 2016 spread across 3 - regimes (but no clear indication if this is indeed transit cargo), namely:

B - Importation Simplified Declaration;

C - Consumption (Home) and Reimportation

S - Sensitive Items (Customs Warehousing Regime, Export Transit Procedures, Import Transit Procedures, Temporary Importation, Warehouse after movement bond); but

in value terms of the 3 regimes S represents 99 percent of the value.

The following example for year 2010 demonstrates the issue:

Flow = Import

Export country = United Arab Emirates

Destination country = Japan

HS87033390

becproductdescription = Passenger motor cars

officeofentryexitname = Rusumo

The information implies that an entry for passenger motor cars have been captured originating in the United Araba Emirates destined for Japan. The question is then why would the UAE send motor cars or any other cargo to Japan via Rwanda - or the other way around? This seems to be a data capturing issue.

A further challenge is that flows destined for southern African countries via road is not clear from the export data - as only the point of exit and destination country is captured, but not transit information. So when cargo exits at e.g. Rusumo, whether cargo is destined for sea transport via Dar es Salaam or road down to e.g. South Africa or Mozambique etc. this information is not captured in the supplied data. This complicates the logistics analysis, since without this information a high level assumption has to be made on split between road and sea transport to such destinations. The treatment applied for this issue is discussed in the appendices section 9.5.2.

## 9.5. Detailed assumptions for international logistics as applied for the Rwanda case

This appendix provides an overview of international logistics assumptions applied for various geographic regions as well as more detail focused more specifically on Rwanda's neighbouring countries and Southern Africa.

### 9.5.1. High level international shipping routing assumptions for various geographic regions

Figure 160 shows the typical maritime leg of the routing from Dar es Salaam to most Southern European countries, namely:

- Albania
- Andorra
- Bosnia Herzegovina
- Croatia
- Gibraltar
- Greece
- Italy
- Macedonia, FYR
- Malta
- Montenegro
- Portugal
- San Marino
- Serbia
- Slovenia
- Spain

**Figure 160: Most probable maritime routing from Dar es Salaam to Southern Europe**



Source: Searates.com

Figure 161 shows the typical maritime leg of the routing from Dar es Salaam to most Eastern European countries, namely:

- Belarus
- Bulgaria
- Czech Republic
- Hungary
- Poland
- Rep. of Moldova
- Romania
- Russia
- Slovakia
- Ukraine

**Figure 161: Most probable maritime routing from Dar es Salaam to Eastern Europe**



Source: Searates.com

The average route distance for this group of countries from Kigali in Rwanda is around 11 935 kilometres and 58 days total travel time. Some of the Eastern European countries are accessed from the south via the Black Sea, while others are accessed from the north (see previous Belarus example in Figure 7).

Figure 162 shows the typical maritime leg of the routing from Dar es Salaam to most North America countries, namely:

- Canada
- Saint Pierre and Miquelon
- Turks and Caicos Islands
- United States

The average route distance for this group of countries from Kigali in Rwanda is around 18 082 kilometres and 94 days total travel time.

**Figure 162: Most probable maritime routing from Dar es Salaam to North America**



Source: Searates.com

Figure 163 shows the major routes to Central America and the Caribbean around the Cape of Good Hope at the southern tip of Africa. The average route distance for this group of countries from Kigali in Rwanda is around 18 038 kilometres and 93 days total travel time.

- |                       |                                  |
|-----------------------|----------------------------------|
| - Anguilla            | - Montserrat                     |
| - Antigua and Barbuda | - Neth. Antilles                 |
| - Aruba               | - Puerto Rico                    |
| - Bahamas             | - Saint Maarten                  |
| - Barbados            | - St. Kitts and Nevis            |
| - Bermuda             | - St. Lucia                      |
| - Bonaire             | - St. Vincent and the Grenadines |
| - Br. Virgin Isds     | - Trinidad and Tobago            |
| - Cayman Isds         | - Belize                         |
| - Cuba                | - Costa Rica                     |
| - Curaçao             | - El Salvador                    |
| - Dominica            | - Guatemala                      |
| - Dominican Republic  | - Honduras                       |
| - Grenada             | - Mexico                         |
| - Haiti               | - Nicaragua                      |
| - Jamaica             | - Panama                         |

**Figure 163: Most probable maritime routing from Dar es Salaam to Central America and the Caribbean**



Source: Searates.com

It should be noted that depending on the latitude of the location and volumes of traffic either north-bound (via the Suez canal) or south-bound (via the Cape of Good Hope) routes are used (as depicted in Figure 164 for the Bahamas and Figure 163 for Central America and the Caribbean islands).

**Figure 164: Most probable maritime routing from Dar es Salaam to Caribbean**



Source: Searates.com

Figure 165 and Figure 166 show the major routes to the east and west coasts of South America respectively.

#### East coast of South America

- Argentina
- Brazil
- Colombia
- Falkland Islands Malvinas
- Guyana
- Paraguay
- Suriname
- Uruguay
- Venezuela

The average route distance for this group of countries from Kigali in Rwanda is around 14 415 kilometres and 72 days total travel time.

#### West coast of South America

- Bolivia
- Chile
- Ecuador
- Peru

The average route distance for this group of countries from Kigali in Rwanda is around 17 562 kilometres and 89 days total travel time.

**Figure 165: Most probable maritime routing from Dar es Salaam to South America (east coast)**



Source: Searates.com

**Figure 166: Most probable maritime routing from Dar es Salaam to South America (west coast)**



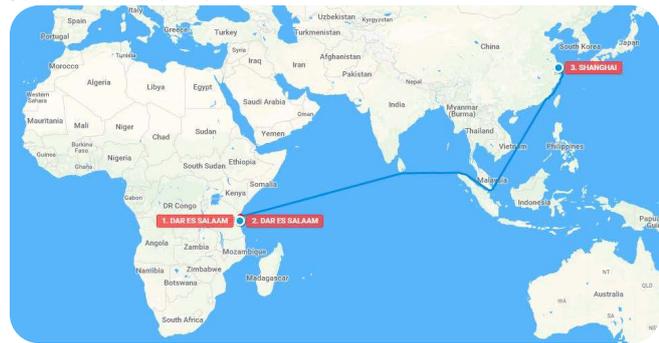
Source: Searates.com

Figure 167 shows the East Asian route. There are however multiple legs along the route to divert to e.g. the Gulf countries, ports in the Arabian sea and Bay of Bengal. Not all routes are shown.

Some countries are landlocked as well. The average route distance for this group of countries from Kigali in Rwanda is around 9 744 kilometres and 47 days total travel time (however in this region individual countries' distance and travel time e.g. Mongolia is as high as 15 698 kilometres and 73 days' travel.)

- Afghanistan
- Bangladesh
- Bhutan
- British Indian Ocean Territories
- China
- Dem. Peoples Rep. of Korea (North)
- Hong Kong, China
- India
- Iran
- Iraq
- Japan
- Korea (South)
- Macau
- Maldives
- Mongolia
- Nepal
- Pakistan
- Sri Lanka

**Figure 167: Most probable maritime routing from Dar es Salaam to East Asia**



Source: Searates.com

The South-East Asia area lies more or less on the same latitude than Dar es Salaam as is evident from Figure 168. The average route distance for this group of countries from Kigali in Rwanda is around 9 627 kilometres and 48 days total travel time.

- Brunei Darussalam
- Cambodia
- Christmas Islands
- Cocos Islands
- Indonesia
- Lao PDR
- Malaysia
- Myanmar
- Philippines
- Singapore
- Thailand
- Timor-Leste
- Vietnam

**Figure 168: Most probable maritime routing from Dar es Salaam to Australia and Oceania**



Source: Searates.com

Figure 169 depicts the significant distance that the Oceanic islands are from Dar es Salaam. The average route distance for this group of countries from Kigali in Rwanda is around 16 677 kilometres and 81 days travelling.

- American Samoa
- Australia
- Cook Islands
- Fiji
- French Polynesia
- Guam
- Kiribati
- Marshall Islands
- Micronesia
- N. Mariana Islands
- Nauru
- New Caledonia
- New Zealand
- Niue
- Norfolk Islands
- Palau
- Papua New Guinea
- Pitcairn
- Samoa
- Solomon Islands
- Tokelau
- Tonga
- Tuvalu
- Vanuatu
- Wallis and Futuna Islands

**Figure 169: Most probable maritime routing from Dar es Salaam to Australia and Oceania**



Source: Searates.com

Figure 170 shows the routing for accessing West Africa as well as some of the more westerly located Middle African countries. For the purposes of this analysis Rwanda’s neighbouring countries in Middle Africa are assumed to be accessed directly via land routes – therefore the Democratic Republic of the Congo will not be serviced via Dar es Salaam. The average route distance for this group of countries from Kigali in Rwanda is around 10 450 kilometres and 52 days travelling.

- Benin
- Burkina Faso
- Cape Verde
- Côte d'Ivoire
- Gambia
- Ghana
- Guinea
- Guinea-Bissau
- Liberia
- Mali
- Mauritania
- Niger
- Nigeria
- Senegal
- Sierra Leone
- Togo
- Angola
- Cameroon
- Central African Republic
- Congo, Rep.
- Equatorial Guinea
- Gabon
- Sao Tome and Principe

**Figure 170: Most probable maritime routing from Dar es Salaam to West and western Middle African countries**



Source: Searates.com

**Figure 171** shows the routing for accessing Northern Africa via the Suez canal. Again, for the purposes of this analysis Rwanda’s neighbouring countries in Northern Africa are assumed to be accessed directly via land routes – therefore South Sudan and Somalia will not be serviced via Dar es Salaam. The average route distance for this group of countries from Kigali in Rwanda is around 7 013 kilometres and 33 days total travel time.

- Algeria
- Chad
- Egypt
- Libya
- Morocco
- Sudan
- Tunisia

**Figure 171: Most probable maritime routing from Dar es Salaam to West and western Middle African countries**



Source: Searates.com

## 9.5.2. Details of neighbouring and focus markets

For the neighbouring countries around Rwanda specific assumptions regarding land routes, time and costs had to be made. These were informed from the ASYCUDA trade data and surveyed information reported in CCTFA (2016) and NCTCA (2016).

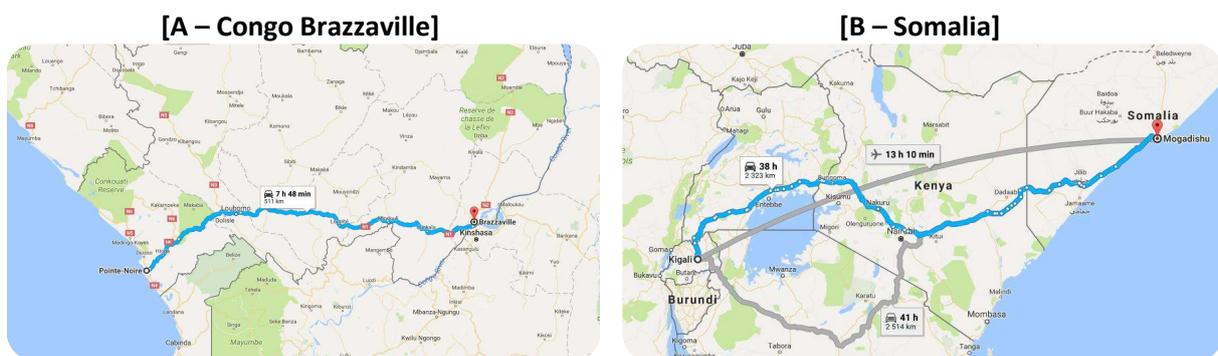
**Figure 172: Assumptions regarding Rwanda's direct neighbours**



Source: Google Maps and author annotations

In the case for countries directly sharing borders as well as within the EAC the current assumption applied is that 100 percent of trade from Rwanda to the DRC will be delivered via road to Kisangani, to Bujumbura for Burundi, Kampala in Uganda, to Tanzania at Dar es Salaam, at Nairobi for Kenya and Juba for South Sudan as depicted in Figure 172.

**Figure 173: Assumptions Congo Brazzaville and Somalia**



Source: Google Maps

Assumptions regarding the exit points and routes for Congo Brazzaville, Somalia and other southern African countries were informed from the ASYCUDA data as shown in Table 39. When cargo leaves for any non-neighbouring country like South Africa or Botswana e.g. via Rusumo, no specific information is available to inform on whether the cargo is shipped via road transport to South Africa, or via maritime transport out of the port at Dar es Salaam.

**Table 39: Rwanda exit point and route assumptions based on ASYCUDA data**

Destination country	Exit point 1	% share	Exit point 2	% share	Rest	Assumption Applied	% share	Mode	Exit Port	Entry Port
<b>Congo</b>	Mururu	56.2%	Gisenyi-Corniche	28.6%	15.3%	Mururu	100%	Road	-	
<b>Somalia</b>	Gatuna	100%				Gatuna	100%	Road	-	
<b>Angola*</b>	Kigali-Aeroport	90.9%	Rusumo	9.1%	0.0%	Rusumo	100%	Road+Ship	Dar es Salaam	Luanda
<b>Malawi</b>	Rusumo	99.7%	Kigali-Aeroport	0.3%	0.0%	Rusumo	100%	Road	-	
<b>Mozambique</b>	Rusumo	59.4%	Gatuna	26.2%	14.4%	Rusumo	100%	Road+Ship	Dar es Salaam	Maputo
<b>Zambia</b>	Rusumo	73.3%	Kigali-Aeroport	23.6%	3.2%	Rusumo	100%	Road		
<b>Zimbabwe</b>	Rusumo	92.3%	Kigali-Aeroport	7.7%	0.0%	Rusumo	100%	Road		
<b>Botswana*</b>	Kigali-Aeroport	88.4%	Rusumo	11.6%	0.0%	Rusumo	100%	Road		
<b>Lesotho</b>	-	0%	-	0%	0%	Rusumo	100%	Road+Ship	Dar es Salaam	Durban
<b>Namibia*</b>	Kigali-Aeroport	100%	-	0.0%	0.0%	Rusumo	100%	Road+Ship	Dar es Salaam	Walvisbay
<b>South Africa</b>	Kigali-Aeroport	87.5%	Rusumo	11.3%	1.1%	Rusumo	100%	Road+Ship	Dar es Salaam	Durban
<b>Swaziland**</b>	Gatuna	92.8%	Rusumo	4.9%	2.2%	Gatuna	100%	Road+Ship	Mombassa	Durban

Source: Authors – derived from ASYCUDA data

\* While the ASYCUDA data informs the fact that most / all exports by value recorded destined for Angola, Botswana and Namibia flows by air transport, the current applied model does not provide for this mode of transport. Hence the assumptions as made for these destinations as illustrated in Figure 175 and Table 40.

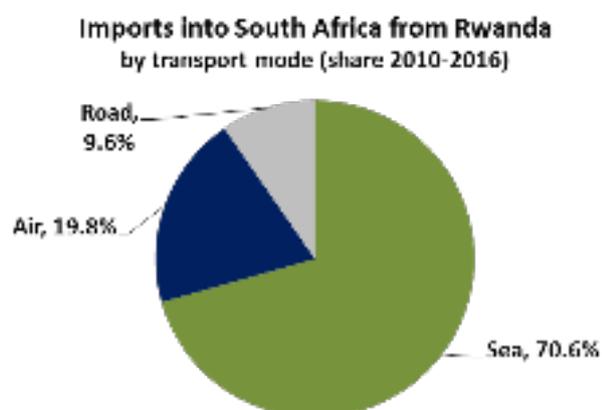
\*\* Exports in value terms from Rwanda to Swaziland are recorded to mainly flow via Gatuna (92.8%) which implies via Mombassa to Durban, South Africa.

For South Africa an analysis of imports by entry point into South Africa for exports from Rwanda was conducted based on data available from the South African Revenue Services – Department of Customs and Excise.

The analysis shows that around 70 percent in of imports from Rwanda in value terms arrives by sea and for the purposes of this analysis and modelling it can therefore safely be assumed that the bulk of trade with South Africa will flow via Dar es Salaam port.

However, not all countries have information available to inform on this aspect and some broad assumptions had to formulated based on the available information.

**Figure 174: South Africa's imports from Rwanda by entry point**



Source: Calculated from South Africa's trade data by port of entry/exit, Department of Customs and Excise, South African Revenue Services (SARS).

Figure 175 provides a view of the assumed routes for Southern African destinations. While this section only shows information on assumptions for these few focus countries, similar detailed analysis informed the rest of the 231 destinations to inform exit and port flow assumptions.

Based on the assumptions applied Figure 176 demonstrates the additional cost relative to the value of a typical export container (assumed to be US\$ 50 000.00) based on the approach and assumptions used to construct the routing and costing tables.

Evident is that the Republic of the Congo (Brazzaville) and Angola (Luanda) has the highest *ad valorem* equivalent impacts at 66.5 percent and 67.0 percent respectively. However, the underlying reason for the cost increase is different for the two destinations. In the case of Congo (Brazzaville) the assumption is made that transport is via the DRC on road (Figure 173 panel A), at a distance of around 2 554 kilometres and a rate per kilometre of 6.4 US\$ (NCTTCA, 2016, p.33, table 22).

In the case of Luanda the distance is 8 939 kilometres. However the overall costs are relatively lower than that of overland to Congo (Brazzaville). E.g. the overland section from Kigali to Dar es Salaam is at a much lower rate of 2.48 US\$ per kilometre (derived from Dar es Salaam to Kigali at a cost of 3 700 US\$ per 20 or 40 foot container and 1 495 kilometre CCTFA (2016, p.37, table 3)).

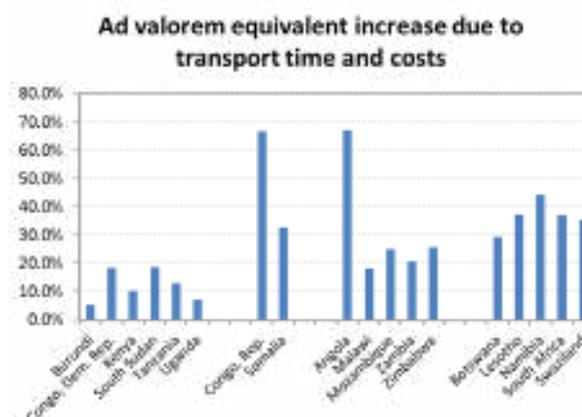
Even with the additional costs, time delays at the port and maritime transport costs added, the route from Kigali to Congo (Brazzaville) amounts to 20.74 US\$ per hour travel, while that of Angola (Luanda) only to 4.57 US\$ per hour travel. Hence, although Luanda in Angola is in distance terms much further, in total transaction time versus cost productivity terms the Angola route operates at a much lower overall cost per hour rate.

**Figure 175: Map of routing assumptions for Southern African countries**



Source: Google Maps with author annotations

**Figure 176: Ad valorem equivalent increase in costs**



Source: Authors' calculations

**Figure 177: Ad valorem equivalent increase in costs**



Source: Authors' calculations

**Table 40: Details of main assumptions for neighbouring and focus markets**

Destination country	EAC (1) COMESA (2) BOTH (3)	Destination city	Exit point	Mode Road (R) Ship (S)	Total route distance (km)	Total time (weeks @ 24 hrs x 7 days) including import documentation time, transport time etc.	Transit countries	Domestic admin cost to import (US\$)	Domestic admin time to import (Days @ 24 hrs)	International transport cost (US\$)	International transport time (Days @ 24 hrs)	Ad valorem transport cost + time equivalent (based on full container load / 15 metric tons / valued @ US\$ 50 000)
<b>Neighbours</b>												
Burundi	3	Bujumbura	Rutete	R	275	0.2	-	146.90	1.4	1 788.87	0.29	5.2%
Congo, Dem. Rep.	2	Kisangani	Mururu	R	900	1.1	-	391.40	3.4	5 760.00	4.33	18.4%
Kenya	3	Nairobi	Gatuna	R	1 201	1.1	1	134.05	2.3	2 041.70	5.09	10.3%
South Sudan	3	Juba	Gatuna	R	1 138	1.2	1	152.35	3.5	5 803.80	4.93	18.6%
Tanzania	3	Dar es Salaam	Rusumo	R	1 495	0.9	-	172.50	2.7	3 707.60	3.82	13.0%
Uganda	3	Kampala	Gatuna	R	514	0.7	-	78.50	1.2	1 593.03	3.37	7.0%
<b>Close regional</b>												
Congo, Rep.	-	Brazzaville	Mururu	R	2 554	5.3	1	2 086.70	28.6	16 345.60	8.47	66.5%
Somalia	-	Mogadishu	Gatuna	R	3 524	3.1	2	1 338.65	9.0	6 223.10	12.98	32.7%
<b>Southern Africa</b>												
Angola	-	Luanda	Rusumo	R+S	8 939	9.4	1	1 481.25	21.7	5 728.63	44.06	67.0%
Malawi	2	Lilongwe	Rusumo	R	1 891	1.1	1	116.75	3.2	5 862.10	4.62	18.2%
Mozambique	-	Maputo	Rusumo	R+S	3 397	2.6	1	611.25	4.3	4 561.16	14.10	25.0%
Zambia	2	Lusaka	Rusumo	R	2 134	1.3	1	141.75	3.9	6 616.36	5.10	20.7%
Zimbabwe	2	Harare	Rusumo	R	2 624	1.6	2	185.20	5.2	8 133.10	6.08	25.7%
<b>SACU</b>												
Botswana	-	Gaborone	Rusumo	R	3 595	1.9	2	279.00	4.2	8 915.60	9.27	29.2%
Lesotho	-	Maseru	Rusumo	R+S+R	5 033	4.4	2	761.25	10.5	5 438.93	20.26	37.0%
Namibia	-	Windhoek	Rusumo	R+S+R	7 670	5.5	1	294.25	3.1	6 456.63	35.28	44.2%
South Africa	-	Johannesburg	Rusumo	R+S+R	5 051	4.3	1	956.25	10.2	5 365.46	20.27	37.0%
Swaziland	2	Mbabane	Rusumo	R+S+R	5 451	3.9	2	107.25	2.4	6 741.41	24.85	35.5%

Source: Authors

## 9.6. Summary of selected outcomes tables

The following tables provide the details for the entire set of product by market opportunities as depicted in Figure 23 in section 5.2 for the overall DSM export maturity, market share, and growth and diversification matrix for Rwanda. The “No REOs” indicates how many markets are classified into which quadrant for each product line listed that has passed all the DSM methodology’s filter requirements. The shaded (red) line indicates where the cumulative average potential reaches 80% of the cumulative average potential.

**Table 41: Detail on selected outcomes for quadrant 1 – “Brown fields”, intensive margins (both product and market)**

Item	Product	No REOs	Potential	RCA	Cumulative Potential (US\$)	Cumulative %	Average Potential (US\$)
1	HS090240:Other tea, black (fermented) & partly fermented tea, whether or not flavoured, in immediate packings of a content >3kg	2	14 171 439.27	537.36	14 171 439.3	24.0%	7 085 720
2	HS090230:Tea, black (fermented) & partly fermented tea, whether or not flavoured, in immediate packings of a content not >3kg	1	2 949 021.23	233.98	17 120 460.5	29.1%	2 949 021
3	HS261590:Niobium/tantalum/vanadium ores & concs.	10	23 284 706.52	12 708.17	40 405 167.0	68.6%	2 328 471
4	HS100640:Broken rice	1	1 843 198.71	56.29	42 248 365.7	71.7%	1 843 199
5	HS260900:Tin ores & concs.	5	7 550 897.61	3 659.21	49 799 263.3	84.5%	1 510 180
6	HS261100:Tungsten ores & concs.	7	7 146 570.79	2 889.66	56 945 834.1	96.6%	1 020 939
7	HS210320:Tomato ketchup & oth. tomato sauces	1	408 528.03	20.86	57 354 362.2	97.3%	408 528
8	HS110220:Maize (corn) flour	1	206 469.40	465.02	57 560 831.6	97.7%	206 469
9	HS410120:Whole bovine (incl. buffalo)/equine hides & skins, wt. per skin not >8kg (simply dried)/10kg (dry-salted)/16kg (fresh/wet-salted/othw. presvd.)	2	358 697.02	205.51	57 919 528.6	98.3%	179 349
10	HS220110:Mineral waters (nat./art.) & aerated waters, not cont. added sugar/oth. sweetening matter/flavoured	1	149 121.50	3.48	58 068 650.1	98.5%	149 122
11	HS220850:Gin & Geneva	1	106 591.54	6.10	58 175 241.6	98.7%	106 592
12	HS010290:Live bovine animals other than pure-bred breeding animals	1	102 881.58	19.61	58 278 123.2	98.9%	102 882
13	HS040210:Milk in powder/granules/oth. solid form, fat content by wt. not >1.5%	1	93 695.08	2.03	58 371 818.3	99.1%	93 695
14	HS640199:Waterproof footwear with outer soles & uppers of rubber/plastics (excl. of 6401.10)...(excl. of 6401.91 & 6401.92) [see complete text #106]	1	91 989.64	21.18	58 463 807.9	99.2%	91 990
15	HS151590:Fixed vegetable fats & oils (excl. of 1515.11-1515.50), incl. jojoba oil & fractions thereof, whether or not ref. but not chemically modified	1	90 549.17	5.87	58 554 357.1	99.4%	90 549
16	HS410390:Raw hides & skins, n.e.s. in Ch.41 (fresh/salted/dried/limed/pickled/othw. presvd. but not tanned/parchment-dressed/furth. prepd.) [see complete text #43]	1	65 617.43	304.47	58 619 974.5	99.5%	65 617
17	HS720430:Waste & scrap of tinned iron/steel	1	59 070.91	16.95	58 679 045.4	99.6%	59 071
18	HS110311:Groats/meal of wheat	1	53 521.51	21.19	58 732 566.9	99.7%	53 522
19	HS040130:Milk & cream, not concentrated/sweetened, fat content by wt. >6%	1	45 243.40	3.55	58 777 810.3	99.7%	45 243

<b>20</b>	HS110620:Flour, meal & powder of sago/roots/tubers of 07.14	1	28 564.73	209.60	58 806 375.1	99.8%	28 565
<b>21</b>	HS441510:Cases, boxes, crates, drums & sim. packings of wood; cable-drums of wood	1	27 537.70	2.53	58 833 912.8	99.8%	27 538
<b>22</b>	HS820190:Hand tools of a kind used in agriculture/horticulture/forestry (excl. of 8201.10-8201.60)	1	18 835.12	35.21	58 852 747.9	99.9%	18 835
<b>23</b>	HS800120:Tin alloys, unwrought	1	18 429.61	17.86	58 871 177.5	99.9%	18 430
<b>24</b>	HS640420:Footwear with outer soles of leather/composition leather & uppers of textile mats.	1	10 960.13	1.80	58 882 137.6	99.9%	10 960
<b>25</b>	HS261000:Chromium ores & concs.	1	8 221.84	6.87	58 890 359.5	99.9%	8 222

Source: Authors, TRADE-DSM

**Table 42: Detail on selected outcomes for quadrant 2 – “Green pastures”, intensive margins (product) and extensive margins (market)**

Item	Product	No REOs	Potential	RCA	Cumulative Potential (US\$)	Cumulative %	Average Potential (US\$)
1	HS740400:Copper waste & scrap	28	2 120.17	1.12	2 120.17	7.7%	75.72
2	HS230400:Oil-cake & oth. solid residues, whether or not ground/in pellets, from extraction of soybean oil	26	1 525.98	1.05	3 646.15	13.2%	58.69
3	HS090111:Coffee, not roasted, not decaffeinated	43	2 081.92	85.83	5 728.07	20.8%	48.42
4	HS854370:Other machines and apparatus	64	3 065.31	1.08	8 793.38	31.9%	47.90
5	HS220300:Beer made from malt	34	1 307.81	5.82	10 101.19	36.7%	38.47
6	HS720421:Waste & scrap of stainless steel	26	708.04	7.52	10 809.23	39.2%	27.23
7	HS843143:Parts suit. for use solely/princ. with the boring/sinking mach. of 8430.41/8430.49	52	1 313.08	1.28	12 122.31	44.0%	25.25
8	HS100630:Semi-milled/wholly milled rice, whether or not polished/glazed	51	1 106.91	9.92	13 229.22	48.0%	21.70
9	HS220290:Non-alcoholic beverages other than waters of 2202.10 (not incl. fruit/veg. juices of 20.09)	31	615.48	3.70	13 844.70	50.3%	19.85
10	HS410411:Tanned/crust hides & skins of bovine (incl. buffalo)/equine animals, without hair on, in the wet state (incl. wet-blue), full grains, unsplit; grain splits but not furth. prepd.	16	298.21	2.07	14 142.91	51.3%	18.64
11	HS800110:Tin, not alloyed, unwrought	27	492.76	2.13	14 635.67	53.1%	18.25
12	HS040221:Milk in powder/granules/oth. solid form, unsweetened, fat content by wt. >1.5%	31	509.34	1.02	15 145.00	55.0%	16.43
13	HS261400:Titanium ores & concs.	16	246.31	22.72	15 391.32	55.9%	15.39
14	HS392310:Boxes, cases, crates & sim. arts., of plastics	61	899.28	2.65	16 290.60	59.1%	14.74
15	HS970300:Original sculptures & statuary, in any mat.	35	379.24	1.31	16 669.84	60.5%	10.84
16	HS880211:Helicopters of an unladen wt. not >2000kg	17	177.81	2.60	16 847.65	61.2%	10.46
17	HS040120:Milk & cream, not concentrated/sweetened, fat content by wt. >1% but not >6%	47	489.17	1.69	17 336.82	62.9%	10.41
18	HS901420:Instruments & appls. for aeronautical/space navigation (excl. compasses)	39	402.09	1.14	17 738.91	64.4%	10.31
19	HS190531:Sweet biscuits	65	656.83	6.73	18 395.74	66.8%	10.11
20	HS070190:Potatoes other than seed potatoes, fresh/chilled	35	295.78	6.44	18 691.52	67.9%	8.45
21	HS880390:Parts of gds. of 88.01/88.02, n.e.s. in 88.03	45	369.04	5.28	19 060.56	69.2%	8.20
22	HS410419:Tanned/crust hides & skins of bovine (incl. buffalo)/equine animals, without hair on, in the wet state (incl. wet-blue), whether or not split but not furth. prepd. (excl. of 4104.11)	20	153.05	1.45	19 213.61	69.8%	7.65
23	HS110100:Wheat/meslin flour	35	264.41	70.62	19 478.03	70.7%	7.55
24	HS720429:Waste & scrap of alloy steel other than stainless steel	32	228.00	3.17	19 706.02	71.5%	7.12
25	HS840710:Spark-ignition recip./rotary int. comb. piston engines for aircraft	30	202.89	14.96	19 908.91	72.3%	6.76
26	HS261510:Zirconium ores & concs.	23	152.38	18.87	20 061.29	72.8%	6.63
27	HS860900:Containers (incl. conts. for the tpt. of fluids) specially designed & equipped for carriage by one/more modes of tpt.	48	296.88	1.55	20 358.17	73.9%	6.18

28	HS040700:Birds' eggs, in shell, fresh/presvd./cooked	43	265.00	1.83	20 623.17	74.9%	6.16
29	HS200290:Tomatoes, prepd./presvd. othw. than by vinegar/acetic acid, other than whole/in pieces	36	218.36	1.53	20 841.53	75.7%	6.07
30	HS130219:Vegetable saps & extracts (excl. of 1302.11-1302.14)	35	197.56	29.27	21 039.09	76.4%	5.64
31	HS440929:Pegwood; ceiling boards and flooring boards; strips and friezes for parquet flooring, not assembled	43	241.36	1.15	21 280.45	77.3%	5.61
32	HS040390:Buttermilk/curdled milk & cream/kephir & oth. fermented/acidified milk & cream, whether or not concentrated/sweetened/flavoured/cont. fruit/nuts/cocoa	32	178.30	1.18	21 458.74	77.9%	5.57
33	HS843049:Boring/sinking mach. (excl. of 8430.10-8430.40), other than self-propelled	53	294.56	12.74	21 753.31	79.0%	5.56
34	HS482390:Paper, paperboard, cellulose wadding & webs of cellulose fibres, cut to size/shape; oth.arts.of paper pulp/paper/paperboard/cellulose wadding/webs of cellulose fibres, n.e.s.	46	250.50	1.29	22 003.81	79.9%	5.45
35	HS151790:Edible mixts./preps. of animal/veg. fats/oils/fractions of diff. fats/oils of Ch.15, other than edible fats/oils/fractions of 15.16/non-liquid margarine	55	297.05	4.98	22 300.86	81.0%	5.40
36	HS080260:Macadamia nuts	17	86.22	5.27	22 387.08	81.3%	5.07
37	HS780199:Unwrought lead other than refined, n.e.s. in 78.01	18	90.81	14.22	22 477.89	81.6%	5.04
38	HS230230:Bran, sharps & oth. residues, whether or not in the form of pellets, derived from the sifting/milling/oth. working of wheat	21	97.23	54.43	22 575.12	82.0%	4.63
39	HS071310:Peas (Pisum sativum), dried, shelled, whether or not skinned/split	31	136.90	3.63	22 712.02	82.5%	4.42
40	HS720410:Waste & scrap of cast iron	27	117.13	2.44	22 829.15	82.9%	4.34
41	HS830890:Clasps, frames with clasps, buckles, buckle-clasps, and the like, of base metal...(excl. of 8308.10), incl. parts; beads & spangles, of base metal... [see complete text #134]	44	183.56	1.14	23 012.71	83.6%	4.17
42	HS940429:Mattresses of oth. mats. (excl. cellular rubber/plastics)	46	171.72	14.98	23 184.43	84.2%	3.73
43	HS710310:Precious stones (excl. diamonds) & semi-precious stones, unwk'd./simply sawn/roughly shaped but not strung/mounted/set	35	129.39	10.03	23 313.82	84.6%	3.70
44	HS090112:Coffee, not roasted, decaffeinated	21	74.26	25.39	23 388.08	84.9%	3.54
45	HS121190:Plants & parts of plants, incl. seeds & fruits, of a kind used primarily in perfumery/pharmacy/for insecticidal/fungicidal/sim. purps., n.e.s. in Ch.12, fresh/dried, whether or not cut/crushed/powdered	46	158.85	21.43	23 546.93	85.5%	3.45
46	HS071333:Kidney beans, incl. white pea beans (Phaseolus vulgaris), dried, shelled, whether or not skinned/split	44	150.66	4.16	23 697.59	86.0%	3.42
47	HS940550:Non-electrical lamps & lighting fittings	31	103.63	1.78	23 801.22	86.4%	3.34
48	HS780191:Unwrought lead other than refined, cont. by wt. antimony as the principal oth. element	19	63.27	1.46	23 864.49	86.6%	3.33
49	HS720610:Iron & non-alloy steel in ingots (excl. iron of 72.03)	9	29.33	6.63	23 893.82	86.7%	3.26
50	HS680100:Setts, curbstones & flagstones, of nat. stone (except slate)	26	84.23	4.28	23 978.05	87.1%	3.24
51	HS722810:Bars & rods of high speed steel	21	67.87	1.48	24 045.92	87.3%	3.23
52	HS460219:Basketwork, wickerwork & oth. arts., made directly to shape from veg. mats./made up from gds. of 46.01; arts. Other	22	68.93	13.50	24 114.84	87.6%	3.13
53	HS950890:Roundabouts, swings, shooting galleries & oth. fairground amusements;	39	121.69	4.23	24 236.54	88.0%	3.12

	travelling theatres						
54	HS253090:Mineral subs., n.e.s. in Ch.25	45	137.95	11.49	24 374.49	88.5%	3.07
55	HS252321:White cement, whether or not artificially coloured	18	52.82	9.75	24 427.31	88.7%	2.93
56	HS440290:Other	41	120.26	2.48	24 547.57	89.1%	2.93
57	HS291830:Carboxylic acids with aldehyde/ketone function but without oth. oxygen function, their anhydrides, halides, peroxides, peroxyacids & their derivs.	28	81.84	2.12	24 629.41	89.4%	2.92
58	HS070610:Carrots & turnips, fresh/chilled	35	99.89	1.40	24 729.29	89.8%	2.85
59	HS920790:Musical instr. (excl. keyboard instruments other than accordions), the sound of which is produced/must be amplified, electrically	41	113.30	1.19	24 842.59	90.2%	2.76
60	HS130239:Mucilages & thickeners (excl. of 1302.31 & 1301.32), whether or not modified, derived from veg. prods.	41	105.20	1.93	24 947.79	90.6%	2.57
61	HS070820:Beans (Vigna spp., Phaseolus spp.), shelled/unshelled, fresh/chilled	41	97.30	15.77	25 045.09	90.9%	2.37
62	HS410621:Tanned/crust hides & skins of goats/kids, without wool/hair on, in the wet state (incl. wet-blue) whether or not split but not furth. prepd.	7	16.37	57.88	25 061.46	91.0%	2.34
63	HS810197:Tungsten (wolfram) waste & scrap	12	27.81	2.50	25 089.27	91.1%	2.32
64	HS841940:Distilling/rectifying plant, whether or not electrically heated	66	152.22	2.71	25 241.49	91.6%	2.31
65	HS740321:Copper-zinc base alloys (brass), unwrought	23	52.58	1.78	25 294.07	91.8%	2.29
66	HS410190:Bovine (incl. buffalo)/equine hides & skins (excl. of 4101.20 & 4101.50), incl. butts, bends & bellies (fresh/salted/dried/limed/pickled/othw. presvd.) [see complete text #39]	20	44.97	25.07	25 339.03	92.0%	2.25
67	HS520819:Woven fabrics of cotton (excl. of 5208.11-5208.13), unbleached, cont. 85%/more by wt. of cotton, weighing not >200g/m2	19	42.52	5.20	25 381.55	92.2%	2.24
68	HS842612:Mobile lifting frames on tyres & straddle carriers	24	52.87	1.20	25 434.42	92.3%	2.20
69	HS040110:Milk & cream, not concentrated/sweetened, fat content by wt. not >1%	32	69.76	6.53	25 504.18	92.6%	2.18
70	HS520842:Woven fabrics of cotton, cont. 85%/more by wt. of cotton, of yarns of diff. colours, plain weave, weighing >100g/m2	21	44.72	1.51	25 548.90	92.8%	2.13
71	HS230210:Bran, sharps & oth. residues, whether or not in the form of pellets, derived from the sifting/milling/oth. working of maize (corn)	6	12.55	17.70	25 561.45	92.8%	2.09
72	HS611300:Garments made up of knitted or crocheted fabrics of 59.03/59.06/59.07	49	102.14	1.34	25 663.59	93.2%	2.08
73	HS200949:Pineapple juice (excl. of 2009.41), unfermented & not cont. added spirit, whether or not cont. added sugar/oth. sweetening matter	26	52.14	1.63	25 715.73	93.4%	2.01
74	HS282590:Inorganic bases other than hydrazine & hydroxylamine & their inorganic salts; oth. metal oxides, hydroxides & peroxides, n.e.s.	45	89.50	239.21	25 805.23	93.7%	1.99
75	HS930320:Sporting/hunting/target-shooting shotguns, incl. combination shotgun-rifles (excl. muzzle-loading)	34	65.08	1.47	25 870.31	93.9%	1.91
76	HS160413:Sardines, sardinella & brisling/sprats, prepd./presvd., whole/in pieces (excl. minced)	19	33.28	25.67	25 903.59	94.0%	1.75
77	HS940410:Mattress supports	41	70.49	181.94	25 974.09	94.3%	1.72
78	HS040299:Milk & cream, concentrated (excl. in powder), sweetened	52	88.30	6.73	26 062.39	94.6%	1.70
79	HS071220:Onions, dried, whole/cut/sliced/broken/in powder but not furth. prepd.	19	32.25	8.39	26 094.64	94.7%	1.70

80	HS700100:Cullet & oth. waste & scrap of glass; glass in the mass	26	43.60	4.64	26 138.24	94.9%	1.68
81	HS070810:Peas ( <i>Pisum sativum</i> ), shelled/unshelled, fresh/chilled	25	39.95	5.79	26 178.19	95.0%	1.60
82	HS261790:Ores & concs. (excl. of 2601.11-2617.10)	9	14.38	52.06	26 192.57	95.1%	1.60
83	HS090122:Coffee, roasted, decaffeinated	32	51.05	1.40	26 243.62	95.3%	1.60
84	HS842831:Continuous-action elevators & conveyors, for gds./mats., specially designed for underground use (excl. of 8428.10 & 8428.20)	15	22.87	14.20	26 266.49	95.4%	1.52
85	HS800300:Tin bars, rods, profiles & wire	53	80.20	4.84	26 346.68	95.7%	1.51
86	HS810110:Tungsten (wolfram) powders	24	36.20	7.66	26 382.88	95.8%	1.51
87	HS845921:Drilling machines other than way-type unit head machines, op. by removing metal, numerically controlled	32	48.19	35.10	26 431.07	96.0%	1.51
88	HS230240:Bran, sharps & oth. residues, whether or not in the form of pellets, derived from the sifting/milling/oth. working of cereals other than maize (corn)/rice/wheat	12	16.99	11.48	26 448.06	96.0%	1.42
89	HS110814:Manioc (cassava) starch	8	10.62	11.26	26 458.68	96.1%	1.33
90	HS392510:Reservoirs, tanks, vats & sim. conts., of a cap. >300 l, of plastics	55	72.31	2.92	26 530.99	96.3%	1.31
91	HS410691:Tanned/crust hides & skins, n.e.s., without wool/hair on, in the wet state (incl. wet-blue) whether or not split but not furth. prepd.	4	5.25	1.25	26 536.24	96.3%	1.31
92	HS900510:Binoculars	46	60.34	10.95	26 596.58	96.6%	1.31
93	HS551311:Woven fabrics of polyester staple fibres, cont. <85% by wt. of such fibres, mixed mainly or solely with cotton, of a wt. not >170g/m2, plain weave, unbleached/bleached	24	31.33	14.75	26 627.91	96.7%	1.31
94	HS292221:Aminohydroxynaphthalenesulphonic acids & their salts	2	2.61	1.73	26 630.52	96.7%	1.30
95	HS240130:Tobacco refuse	22	28.63	2.66	26 659.15	96.8%	1.30
96	HS071029:Leguminous vegetables (excl. of 0710.21 & 0710.22), shelled/unshelled, uncooked/cooked by steaming/boiling in water, frozen	27	33.67	1.80	26 692.82	96.9%	1.25
97	HS722710:Bars & rods, hot-rolled, in irregularly wound coils, of high speed steel	4	4.98	1.60	26 697.80	96.9%	1.24
98	HS250610:Quartz, other than nat. sands	21	26.09	1.20	26 723.89	97.0%	1.24
99	HS090220:Tea, green (not fermented), whether or not flavoured, in immediate packings of a content >3kg	22	27.17	2.10	26 751.07	97.1%	1.24
100	HS251749:Granules, chippings & powder, of stones of 25.15/25.16 (excl. marble), whether or not heat-treated	30	34.56	1.95	26 785.62	97.2%	1.15
101	HS071339:Beans ( <i>Vigna</i> spp., <i>Phaseolus</i> spp. (excl. of 0713.31-0713.33)), dried, shelled, whether or not skinned/split	25	28.66	47.11	26 814.29	97.4%	1.15
102	HS740500:Master alloys of copper	25	26.87	24.52	26 841.16	97.4%	1.07
103	HS960329:Shaving brushes, hair brushes, nail brushes, eyelash brushes & oth. toilet brushes for use on the person, incl. such brushes constituting parts of appls.	29	30.94	1.05	26 872.10	97.6%	1.07
104	HS160300:Extracts & juices of meat/fish/crustaceans/molluscs/oth. aquatic invertebrates	22	22.78	14.58	26 894.88	97.6%	1.04
105	HS120810:Flours & meals of soya beans	21	21.62	9.52	26 916.50	97.7%	1.03
106	HS842220:Machinery for cleaning/drying bottles/oth. conts.	53	53.15	4.91	26 969.65	97.9%	1.00
107	HS630510:Sacks & bags, of a kind used for the packing of gds., of jute/of oth. textile bast fibres of 53.03	18	17.05	9.22	26 986.69	98.0%	0.95

108	HS200551:Beans (Vigna spp., Phaseolus spp.), shelled, prepd./presvd. othw. than by vinegar/acetic acid, not frozen, other than prods. of 20.06	29	27.01	1.60	27 013.71	98.1%	0.93
109	HS810199:Tungsten (wolfram) & arts. thereof , n.e.s. in 81.01	53	47.96	27.16	27 061.66	98.3%	0.90
110	HS050710:Ivory; ivory powder & waste	4	3.52	1.95	27 065.19	98.3%	0.88
111	HS631090:Used/new rags, scrap twine, cordage, rope & cables & worn out arts. of twine/cordage/rope/cables, of textile mats. (excl. sorted)	31	25.49	1.09	27 090.68	98.4%	0.82
112	HS870520:Mobile drilling derricks	16	12.93	4.34	27 103.61	98.4%	0.81
113	HS720690:Iron & non-alloy steel in primary forms other than ingots (excl. iron of 72.03)	22	17.65	3.75	27 121.26	98.5%	0.80
114	HS401320:Inner tubes, of rubber, of a kind used on bicycles	43	33.94	4.55	27 155.20	98.6%	0.79
115	HS110290:Cereal flour other than of wheat, meslin, rye, maize (corn), rice	37	28.60	19.78	27 183.80	98.7%	0.77
116	HS681011:Building blocks & bricks, of cement/concrete/art. stone, whether or not reinf.	26	19.51	1.15	27 203.32	98.8%	0.75
117	HS701890:Articles of glass beads, imitation pearls, imitation precious/semi-precious stones...; glass eyes (excl. prosthetic arts.); statuettes & oth. ornaments...glass [see complete text #122]	31	23.10	2.47	27 226.42	98.8%	0.75
118	HS490900:Printed/illustrated postcards; printed cards bearing personal greetings/messages/announcements, whether or not illustrated, with/without envelopes/trimmings	33	24.25	4.70	27 250.67	98.9%	0.73
119	HS845310:Machinery for preparing/tanning/working hides/skins/leather	23	16.10	4.36	27 266.77	99.0%	0.70
120	HS846890:Parts of the mach. & app. of 84.68	58	39.99	6.78	27 306.76	99.1%	0.69
121	HS845929:Drilling machines other than way-type unit head machines, op. by removing metal, other than numerically controlled	70	47.03	4.72	27 353.79	99.3%	0.67
122	HS110419:Rolled/flaked grains of cereals other than oats	29	15.26	1.24	27 369.05	99.4%	0.53
123	HS480990:Copying/transfer papers (incl. coated/impregnated paper for duplicator stencils/offset plates), whether or not printed, in rolls/sheets (excl. of 4809.10 & 4809.20)	44	22.56	11.69	27 391.61	99.4%	0.51
124	HS610329:Men's/boys' ensembles, knitted or crocheted, of oth. textile mats. (excl. 6103.21-6103.23)	23	11.74	5.60	27 403.36	99.5%	0.51
125	HS340540:Scouring pastes & powders & oth. scouring preps.	51	24.60	2.14	27 427.95	99.6%	0.48
126	HS844314:Letterpress printing machinery, reel fed (excluding flexographic printing)	18	7.30	2.04	27 435.25	99.6%	0.41
127	HS240290:Cigars, cheroots, cigarillos & cigarettes of tobacco substitutes	8	3.22	1.48	27 438.48	99.6%	0.40
128	HS520951:Woven fabrics of cotton, cont. 85%/more by wt. of cotton, printed, plain weave, weighing >200g/m2	24	9.50	17.68	27 447.97	99.7%	0.40
129	HS420340:Clothing accessories (excl. of 4203.21-4203.30), of leather/composition leather	41	15.58	3.23	27 463.56	99.7%	0.38
130	HS293920:Alkaloids of cinchona and their derivatives; salts thereof	13	4.54	15.78	27 468.09	99.7%	0.35
131	HS950810:Travelling circuses & travelling menageries	10	3.40	504.98	27 471.50	99.7%	0.34
132	HS846120:Shaping/slotting machines working by removing metal/cermets	25	8.46	17.34	27 479.96	99.8%	0.34
133	HS841392:Parts of liquid elevators	42	11.87	2.31	27 491.83	99.8%	0.28
134	HS090190:Coffee husks & skins; coffee substitutes cont. coffee in any proportion	40	10.61	133.00	27 502.44	99.9%	0.27
135	HS960500:Travel sets for personal toilet/sewing/shoe/clothes cleaning	37	9.69	68.70	27 512.13	99.9%	0.26

136	HS050100:Human hair, unwktd., whether or not washed/scoured; waste of human hair	10	2.62	1.54	27 514.75	99.9%	0.26
137	HS440420:Hoopwood; split poles; piles, pickets & stakes of wood...non-coniferous [see complete text #48]	24	6.13	114.97	27 520.87	99.9%	0.26
138	HS521213:Woven fabrics of cotton (excl. of 52.08-52.11), dyed, weighing not >200 g/m2	17	3.81	5.83	27 524.69	99.9%	0.22
139	HS071332:Small red (Adzuki) beans (Phaseolus/Vigna angularis), dried, shelled, whether or not skinned/split	14	3.04	9.58	27 527.72	99.9%	0.22
140	HS481720:Letter cards, plain postcards & correspondence cards, of paper/paperboard	26	5.00	64.20	27 532.72	100.0%	0.19
141	HS540120:Sewing thread of man-made filaments, whether or not put up for RS, of art. filaments	21	3.94	2.88	27 536.66	100.0%	0.19
142	HS370239:Photographic film in rolls (excl. film for X-rays & instant print film), without perforations, of a width not >105mm, n.e.s.	16	1.99	2.86	27 538.65	100.0%	0.12
143	HS030510:Flours, meals & pellets of fish, fit for human consumption	19	2.26	5.58	27 540.91	100.0%	0.12
144	HS811219:Beryllium & arts. thereof , n.e.s. in 81.12	9	0.89	10.93	27 541.79	100.0%	0.10
145	HS010420:Live goats	3	0.28	15.17	27 542.07	100.0%	0.09
146	HS851950:Telephone answering machines	12	0.89	13.35	27 542.96	100.0%	0.07
147	HS850630:Primary cells & primary batteries, mercuric oxide	13	0.58	1.23	27 543.54	100.0%	0.04
148	HS021091:Meat & edible meat offal of primates, salted/in brine/dried/smoked, incl. edible flours/meals	1	0.02	2.20	27 543.56	100.0%	0.02

Source: Authors, TRADE-DSM

**Table 43: Detail on selected outcomes for quadrant 3 – “Blue sky”, extensive margins (product) and extensive margins (market)**

Item	Product	No REOs	Potential	RCA	Cumulative Potential (US\$)	Cumulative %	Average Potential (US\$)
1	HS090121:Coffee, roasted, not decaffeinated	41	858.38	0.80	858.38	21.3%	20.94
2	HS870390:Vehicles princ. designed for the tpt. of persons (excl. of 87.02 & 8703.10-8703.24), with C-I int. comb. piston engine (diesel/semi-diesel), n.e.s. in 87.03	32	662.77	1.00	1 521.15	37.7%	20.71
3	HS220210:Waters, incl. min. waters & aerated waters, cont. added sugar/oth. sweetening matter/flavoured	43	706.19	0.88	2 227.34	55.2%	16.42
4	HS391590:Waste, parings & scrap, of plastics n.e.s. in 39.15	29	341.39	0.85	2 568.73	63.7%	11.77
5	HS611430:Garments, n.e.s., knitted or crocheted, of man-made fibres	34	250.67	0.83	2 819.40	69.9%	7.37
6	HS810320:Unwrought tantalum, incl. bars & rods obt. simply by sintering; powders	7	43.26	0.91	2 862.66	70.9%	6.18
7	HS711790:Imitation jewellery other than of base metal	32	194.16	0.87	3 056.82	75.8%	6.07
8	HS870310:Vehicles (excl. of 87.02) princ. designed for the tpt. of persons, specially designed for travelling on snow; golf cars & sim. vehicles	38	167.90	0.87	3 224.72	79.9%	4.42
9	HS040291:Milk & cream, concentrated (excl. in powder), unsweetened	31	129.36	0.91	3 354.08	83.1%	4.17
10	HS620452:Women's/girls' skirts & divided skirts (excl. knitted or crocheted), of cotton	33	121.60	0.96	3 475.68	86.1%	3.68
11	HS292242:Glutamic acid & its salts	27	94.38	0.93	3 570.06	88.5%	3.50
12	HS294200:Organic comps. n.e.s. in Ch.29	30	83.27	0.85	3 653.33	90.5%	2.78
13	HS070110:Seed potatoes, fresh/chilled	19	49.55	0.93	3 702.88	91.8%	2.61
14	HS090412:Pepper (genus Piper), crushed/ground	31	60.64	0.95	3 763.52	93.3%	1.96
15	HS100610:Rice in the husk (paddy/rough)	19	36.96	0.95	3 800.49	94.2%	1.95
16	HS340590:Polishes & creams, scouring pastes & powders & sim. preps. (excl. waxes of 34.04; excl. of 3405.10-3405.40)	41	70.97	0.83	3 871.45	95.9%	1.73
17	HS330190:Extracted oleoresins; concs. of essential oils in fats/fixed oils/waxes/the like, obt. by enfleurage/maceration [see complete text #34]	48	72.12	0.89	3 943.58	97.7%	1.50
18	HS551211:Woven fabrics of synth. staple fibres, cont. 85%/more by wt. of polyester staple fibres, unbleached/bleached	16	23.42	0.94	3 966.99	98.3%	1.46
19	HS430390:Articles of furskin other than apparel & clothing accessories	30	23.61	0.96	3 990.60	98.9%	0.79
20	HS760519:Wire of aluminium, not alloyed (excl. of 7605.11)	33	22.72	0.92	4 013.33	99.5%	0.69
21	HS520210:Yarn waste (incl. thread waste), of cotton	16	7.91	0.88	4 021.23	99.7%	0.49
22	HS780420:Lead powders & flakes	7	2.81	0.96	4 024.04	99.7%	0.40
23	HS550999:Yarn other than sewing thread, of synth. staple fibres n.e.s. in 55.09 (excl. of 5509.91 & 5509.92), not put up for retail sale	17	4.57	0.93	4 028.61	99.8%	0.27
24	HS910390:Clocks with watch movements (excl. of 91.04), other than electrically operated	21	4.01	0.98	4 032.61	99.9%	0.19
25	HS010632:Live birds (order Psittaciformes), incl. parrots/parakeets/macaws/cockatoos	22	2.61	0.92	4 035.23	100.0%	0.12

Source: Authors, TRADE-DSM

**Table 44: Detail on selected outcomes for quadrant 4 – “Grey fields”, extensive margins (product) and intensive margins (market)**

Item	Product	No REOs	Potential	RCA	Cumulative Potential (US\$)	Cumulative %	Average Potential (US\$)
1	HS040291:Milk & cream, concentrated (excl. in powder), unsweetened	1	40 503.05	0.91	40 503.05	74.3%	40 503
2	HS391590:Waste, parings & scrap, of plastics n.e.s. in 39.15	1	13 978.27	0.85	54 481.32	100.0%	13 978

Source: Authors, TRADE-DSM

\*\*\*\*\* END OF REPORT \*\*\*\*\*

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