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## Planning and Assessing Export Promotion Activities Using Large International Trade Datasets: The Evolution of the Decision Support Model, 1995-2025

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# Planning and Assessing Export Promotion Activities Using Large International Trade Datasets: The Evolution of the Decision Support Model, 1995-2025

## Abstract

In this paper we explain and review the Decision Support Model (DSM) methodology, for planning and assessing export promotion activities. This model was first presented in the *International Journal of Research in Marketing* in 1995 by Cuyvers et al. (1995) and applied to the case of Belgium. We provide the theoretical and empirical basis underlying the DSM and describe how the DSM applied this to export marketing strategy development. When first implemented in 1995, the extent of big data in trade, availability of accessible computing resources and the ease of software solutions constrained the use of the model. We describe how in the extended DSM big data and software can now be better leveraged to provide a user-friendly export marketing dashboard for a variety of export assessment uses. We also compare the extended DSM, with its software driven dashboard, with a comparable tool offered by the International Trade Centre (ITC). In doing so we highlight the DSM's distinct ability to incorporate risk and more realistic transport costs and transit dimensions, and to support innovation in export marketing. We conclude by discussing the limitations of the approach and offering recommendations for future research.

## JEL classification

F13, F17, F14, M31

## Keywords

exports, international trade, data-driven decision making, trade facilitation

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## 1. Introduction

In 1995, in an article in *International Journal of Research in Marketing*, Cuyvers et al. (1995) proposed a "decision support model for the planning and assessment of export promotion activities by government export promotion institutions" and illustrated the model for the case of Belgium. They described this decision support model (DSM) as consisting "*of four consecutive filters that are constructed using and applying a set of selection and decision rules. Information related to country and product category is brought together, and realistic export opportunities for Belgium are finally filtered out*" (Cuyvers et al. 1995: 173).

Since then, the DSM has been applied for a growing number of countries, also for firms and organizations outside of government export promotion institutions, and moreover in light of the growth in big trade data, computing resources and software developments, has been improved and extended in terms of methodology and reach. By 2023 the global multilateral International Trade Centre noted that the DSM had become "*the only other comprehensive approach that combines supply, demand, and market access conditions to provide advice on export opportunities at a detailed product level*" (ITC, 2023:5).

The extended DSM has indeed become one of few tools available to pull together the insights from big trade data and software to help organisations in export marketing, particularly to identify new export opportunities, along both the intensive and extensive margins. The promotion of exports on a country level is done by virtually all governments worldwide, based on theoretical arguments and empirical evidence that links export growth and diversification to economic development, growth, productivity gains for firms, and better macro-economic outcomes (Grossman and Helpman, 2015; Hagemeyer and Mućk, 2019; Wagner, 2007; Herzer and Felicitas Nowak-Lehmann, 2006; Naudé and Rossouw; 2011). Recent turbulence and uncertainty in global markets have given a further impetus to the strategic use of international big trade data (Naudé and Cameron, 2025).

The challenge is to find realistic export opportunities, amidst the mountain of big data. It is akin to finding a needle in a haystack. For instance, the value of global trade reached a new

record height of approximately US\$ 33 trillion in 2024, having expanded by roughly 20 times since 1970. Using the World Customs Organization 's (WCO) Harmonized System (HS) to categorise goods<sup>1</sup>, trade in more than 5,300 distinct product groups (at the 6-digit HS code level) are recorded and released by governments on a monthly basis, and made available for around 200 countries and territories by the UN Comtrade. A popular format of the UN Comtrade data is the BACI database provided by CEPII, who annually cleans and corrects the UN annual frequency data to make it consistent for use in economic models.

The CEPII-BACI and UN-Comtrade data are large trade datasets which are invaluable for policy makers and researchers in the field of international trade. The challenge however of shifting through this data to identify export opportunities is however clear.

In this paper we describe the DSM methodology as a pragmatic solution. Section 2 establishes its scientific credentials in international trade theory and empirics. Section 3 argues that, based on these theoretical and empirical insights, that best practice in export promotion involves reduction of informational frictions. In section 4 we discuss how the DSM has evolved between 1995 and 2025. We explain how the extended DSM has been operationalized using software, and compare it to the ITC's tool, its Export Potential MAP. Section 5 concludes, noting shortcomings and areas requiring further research and innovation.

## **2. The Scientific Basis of the DSM**

Any tool that aims to identify export opportunities needs to have a solid grounding in the determinants of export growth and export diversification. Fortunately, much theoretical and empirical work in the fields of international trade and business have over the past two hundred years provided a rich basis. In this section we draw on our earlier paper to summarise these from the point of view of the DSM (see Naudé and Cameron, 2021).

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<sup>1</sup> The WCO updates the HS nomenclature every 5 years. The last revision was implemented in January, 2022.

One of the founding fathers of modern economics, Adam Smith, saw exports as being determined by a "vent-for surplus"; that is that exports serves firms as a channel through which "at least some of the products that are available in excess supply may be exchanged for goods produced abroad for which there is a domestic demand" (Kurz, 1992:480). Around the same time, David Ricardo, a founder of neoclassical trade theory proposed exports is determined by a country's comparative costs and technology. The most recent neoclassical trade theory, the Heckscher-Ohlin-Samuelson (H-O-S) model posits that exports are determined by a country's relative factor endowments, such as labour, capital and land. According to Feenstra (2016:1) the Ricardian model, by emphasizing technological differences between countries as determinant of their exports, is "as relevant as it has ever been," while the H-O-S model is "hopelessly inadequate" to explain exports empirically.

There are two significant flaws in classical and neoclassical trade theories. The first, that they neglect trade costs and their determinants, such as logistical distance or logistical 'friction'. As such, they fail to account for transportation costs (freight and time), policy barriers (tariffs), information costs, contract enforcement, and legal costs (Anderson and van Wincoop, 2004). A second flaw is that these theories assume that exports between countries takes place through "representative" firms. This fails to account for the fact that in practice firms are heterogeneous. Subsequent trade theories have aimed to rectify these shortcomings.

Trade costs, distance and time, critical determinants of exports, were given attention in the so-called *New Trade Theory*, where market size, scale economies, networks and monopolistic competition are key determinants of exports (see e.g. Krugman, 1979; 1980) and in the *New Economic Geography* (e.g. Krugman, 1991) where agglomeration advantages and "iceberg" transport costs (following from Samuelson, 1952) are key determinants of both location and trade patterns. For example, a central result in new economic geography is that when transport costs fall enough, firms will tend to engage in more product differentiation and locate closer to their consumers. A recent review of geography and trade is provided by Redding (2020).

*New New Trade Theory*, also known as the theory of heterogeneous firms in trade (HFT) moves away from the classical and neoclassical models' assumption of a representative firm. Seminal contributions, such as by Melitz (2003) and Bernard and Jensen (2004) posit that firms are heterogeneous in their productivity and that significant fixed trade costs exist in exporting. Because exporting involves high fixed costs, only the most productive firms can afford to enter international markets (Anderson and van Wincoop, 2004). Consequently, exporters tend to be more productive than non-exporters, and trade liberalization is generally accompanied by an increase in aggregate industry productivity as resources are reallocated to these more efficient firms (Bernard et al., 2018).

*New New Trade Theory* provides specific insights into what drives export behaviour, particularly distinguishing between the volume of exports (intensive margin) and the number of firms or products exported (extensive margin). For instance, a change in variable trade costs primarily affects the volume of existing exports (intensive margin). In contrast, a change in fixed trade costs affects the productivity threshold required to export, thereby influencing whether new firms enter the export market (extensive margin) (Persson, 2013; Helpman et al., 2008; Hummels and Klenow, 2005; Dennis and Shepherd, 2011).

More recent contributions on the determinants of exports include the ideas on *Product Space and Economic Complexity*. In this regard, Hausmann et al. (2007) argue that "what you export matters," showing that countries with high initial levels of productivity associated with their export basket (a measure known as EXPY) tend to experience higher subsequent export growth.

Relatedly, Hidalgo et al. (2007) introduced the concept of the "Product Space" network, explaining development as the process of moving into "nearby" products that require similar capabilities but gradually allow for a country's export basket to become more complex over time. The concepts of product space and economic complexity provide a framework for understanding development of exporting on the extensive margin and the capabilities required to produce such export goods.

The theory of product space and economic complexity posits that countries do not grow only by deepening specialization in what they already produce, but also by diversifying into new products. This diversification is driven by existing capabilities – such as infrastructure, knowledge, and resources—that can be repurposed.

A key metric within the Product Space is "density." If a country has developed a comparative advantage in many products that are closely related to (or "surrounding") a potential new product in the network, the country is said to have a high density for that new product. Empirical analysis suggests that an increase in density significantly raises the probability of a country successfully moving into that new product within five years. By analysing the Product Space, policymakers can identify products that lie at a country's knowledge and capability frontier – goods that the country does not yet export but for which it possesses the necessary productive knowledge and resources. For instance, an analysis of Rwanda identified over 100 tradable products that were within the country's capabilities but were not yet being exploited.

While valuable for longer-term supply-side strategy, using the notions of Product Space and Economic Complexity in isolation to find export opportunities suffers from several shortcomings. First, the Product Space focuses on what a country can produce but does not explicitly identify where – to which target markets – those products can be sold. It lacks a demand-side perspective, which is critical for practical export promotion. The approach also does not account for the size of competition in the target market or real-world logistics factors such as transport costs and distance. Determining potential export opportunities requires knowing not just what can be produced, but also where the demand lies and whether the logistics costs make exporting feasible.

Another recent theoretical model of exporting, which like the theory of Product Space and Economic Complexity is concerned with growing exports at the extensive margin, is the Balls-and-Bins model of Armenter and Koren (2014). This model conceptualizes exporting by treating products as "balls" and export destinations as "bins". The model posits that the total number of product-destination combinations filled at any point in time depends on the

volume of products traded (balls) and the number of countries (bins) participating in trade. From the perspective of a specific exporting country, some bins remain empty while others contain varying quantities of balls.

This theoretical framework addresses the observation that global trade data is sparse. For example, data from the United States in 2005 showed that for 22 million export shipments and over 2 million possible country-product combinations; more than 40 percent of these pairs had only one or two shipments, while many potential "bins" remained empty. This sparseness suggests the existence of significant unutilized export opportunities.

The Balls-and-Bins model demonstrates that the extensive margin of trade is dependent on the number of available bins. Simulations based on this model indicate that shutting down a fraction of exporting bins (destination markets) causes a significant drop in the share of exporters. Consequently, the theory suggests that opening more export bins provides the basis for increasing the extensive margin of a country's trade.

Another perspective on export diversification with potential implications for policy is the “Big Hits” model of Easterly et al. (2009). This model is based on the empirical observation (that also underlies the Balls-and-Bins model) that in terms of product-destinations most countries export only a few products to a very limited number of destinations. The insight which the Big Hits model focuses on is that most export successes - "balls in bins" is the result of the country scoring one “big hit” in terms of a product-destination. As they describe the concept of a “big hit” in exporting: “Out of 2985 possible manufacturing products in our dataset and 217 possible destinations, Egypt gets 23 percent of its total manufacturing exports from exporting one product [...] Ceramic bathroom kitchen sanitary items not porcelain [...] to one destination, Italy, capturing 94 percent of the Italian import market for that product” (Easterly et al., 2009: 1-2). In the extended DSM model the idea of Big Hits finds immediate expression in Filter 4, where the fact is used that for 94% of a country’s product-by-destination imports, 80% or more of the value of these are supplied by six or fewer trading partners.

Given the learning-by-doing effects and the productivity levels associated with various baskets of exports (Hausmann et al., 2007), for countries to find a “Big Hit” requires export diversification as a form of experimentation and learning – and luck – before being able to find a particular product-destination niche where the country is good in. This is akin to the entrepreneurial knowledge-spillover mechanism described in Hausmann and Rodrik (2003). How to best engage in export diversification as a learning-by-doing-process to help a country find a big hit, Easterly et al. (2009:4) stresses the existence of a knowledge / informational gap stating that “in addition to the possible knowledge externality to a successful export, there is also a knowledge problem about the discovery itself” (Easterly et al., 2009:4). In section 3 below we will argue that filling this knowledge/informational gaps is a key task in best practice export promotion.

Trade theory, from Adam Smith to New Trade Theory, Heterogeneous Firms in Trade (HFT) theories and notions of Product Space and Economic Complexity, have thus identified a wide range of factors that determines the exports from a country and its firms along the intensive and extensive margins. While these theories provide much insight into explaining exports, their ability to describe and predict actual exports between countries, have remained a challenge – trade theories and trade data are not perfectly matched (Baldwin and Harrigan, 2011). The most successful model to describe the actual data of exports from one country to another, has been the *Gravity Equation*. The Gravity Equation has been “hugely successful in predicting trade flows” (Armenter and Koren, 2014: 2131).

A typical Gravity Equation, which would specify the value of exports from country  $j$  to country  $k$  ( $V_{jk}$ ) following Carrère et al. (2020: 889) can be written as follows.

$$V_{jk} = \left( \frac{t_{jk}}{\Pi_j P_k} \right)^{1-\sigma} \frac{Y_j E_k}{Y_w} \quad (2)$$

where

$$\Pi_j^{1-\sigma} = \sum_{h=1}^n \left(\frac{t_{jh}}{P_h}\right)^{1-\sigma} \frac{E_h}{Y_w} \quad (3)$$

and

$$P_k^{1-\sigma} = \sum_{h=1}^n \left(\frac{t_{hk}}{\Pi_h}\right)^{1-\sigma} \frac{Y_h}{Y_w} \quad (4)$$

Equation (2) is a structural gravity equation denoting that the value of exports from country  $j$  to country  $k$  ( $V_{jk}$ ) is a function of expenditure in the importing country  $k$  weighted by the relative size of the exporting country  $j$  in the world economy ( $\frac{Y_j}{Y_w}$ ), as well as of the trade costs ( $t_{jk}$ ) of transporting the product from  $j$  to  $k$ , expressed as a fraction of the product of indices of the cost of living in countries  $j$  and  $k$  respectively (equations 3 and 4). The import demand elasticity is denoted by  $(1 - \sigma)$ . It results from assuming the consumer preferences following a Constant Elasticity of Substitution (CES) specification (Carrère et al., 2020).

The Gravity Equation reconciles the volumes of trade data with theoretical and structural determinants of exports. Moreover, the Gravity Equation, consistently with HFT models, provides a motivation for trade facilitation / export promotion efforts by governments that aims to reduce informational frictions that are part of trade costs. Thus, as per the Gravity Equation described here, trade costs, ( $t_{jk}$ ) includes informational frictions (Artopoulos et al., 2013; Chaney, 2014).

Despite its predictive success, the Gravity Equation has several limitations. While useful for explaining broad trade patterns, the model is not well-suited for answering specific, real-world commercial questions such as which specific product (at e.g. the HS6-digit level) should be targeted for export and to which specific market.

In addition, since the standard explanation for why distance matters for trade is that the cost of transport associated with the increased distance impacts negatively on trade flows, Gravity

Equation modelling typically use geodesic distance as a proxy for transport and other trade costs, which is however a poor proxy for actual transport and associated logistical costs.

A panel gravity model investigation by the World Bank covering 130 countries over 35 years found that using an augmented trade barrier function considering e.g. real price of oil, index of infrastructure, and share of primary exports in total bilateral trade provided better estimates of the effect of transport and logistics related costs than a simplified geodesic distance proxy (Brun et al., 2005).

Another study focusing on European countries found that only real distance is not a good proxy for transportation costs and identify the central variables influencing road and maritime transportation costs: for both modes, *transport conditions* (as reflected by state and performance levels of infrastructure and therefore costs) are strong determinants. In terms of efficiency and service quality these were found to be more important for maritime transport costs, while geographical distance (associated with e.g. road conditions and congestion) is more important for road transport. Road and maritime *transport costs* (not distance) are central explanatory factors of exports and they seem to deter trade to a greater extent than road or maritime *transit time* when endogeneity is considered (Martínez-Zarzoso and Nowak-Lehmann, 2006).

Brun et al. (2005) therefore found that the coefficient on distance *increased* over 2 decades, contrary to various observations that “distance is dead” in trade – the popular assumption that (*ceteris paribus*) the average distance of trade should increase (as lower transport costs would open more distant markets) (Carrère and de Melo, 2009).

The increased distance sensitivity of trade is a result of how industries are affected by relative trade costs. Using geodesic distance in trade models oversimplifies reality. It risks misestimating trade costs, especially for regions with poor infrastructure, being landlocked or complex borders. Modern trade cost proxies should incorporate logistics performance indices, transport connectivity, and policy barriers rather than relying solely on straight-line distance between main economic centers.

### 3. From Theory to Best Practice in Export Promotion

The question is, how did the body of international trade theory and empirical testing thereof impact on the practice of export promotion? In this section we discuss how theory and empirics have translated into what can be called best practice in export promotion. The purpose is to lay the ground to show that the extended DSM model is consistent with, and furthers, this best practice.

The key policy insight that emanated from classical and neoclassical trade theories as surveyed in section 2 is that trade liberalisation - removing tariff and other barriers to international trade - is the best policy, through which all countries gain in welfare (Shu and Steinwender, 2018). Exports, according to these theories, can best be promoted by opening up markets, reducing or eliminating tariffs and non-tariff barriers, not distort exchange rates, and allowing countries to specialize according to their comparative advantage. Industrial policies aimed at import substitution, or providing subsidies to domestic firms to export, are seen in this approach to distort markets, encourage inefficient investment, lobbying and rent-seeking, and ultimately ignite a race to the bottom where all countries will be worse off in terms of welfare.

Subsequent theoretical developments which addressed the key shortcomings of classical and neoclassical trade theories have significantly modified this traditional wisdom. *New New* Trade Theory, which recognises the heterogeneity among firms, suggests that government intervention should move beyond simple tariff reduction toward trade facilitation, defined as policies that reduce the transaction costs of international trade. From *New New* Trade theory it can be argued that governments should implement policies to reduce the fixed and sunk costs of exporting, such as administrative burdens and informational barriers. As was pointed out in section **Error! Reference source not found.**, trade costs include informational frictions, and reducing these through e.g. relevant brochures, websites, online tools and seminars can help firms overcome the effects of asymmetrical information, which can cause international market identification to fail.

*New New Trade Theory* also suggests that since productivity is a prerequisite for exporting, policies should promote innovation and the adoption of new technologies. However, information provision alone may only be effective for firms that are already productive; underdeveloped firms require policies specifically aimed at productivity improvement (focused on ultimately being able to export) before they can compete globally. This could include addressing domestic market conditions: trade facilitation measures that reduce market entry costs can increase export diversification (the extensive margin), which is welfare-enhancing. Dennis and Shepherd (2011:102) finds that “reducing by 10 per cent the costs of exporting, international transport or market entry can increase export diversification by 3, 4 and 1 per cent, respectively.” Similarly, Persson (2013) found, using data on 130 developing countries, that if the costs of exporting (measured by the time to export) would decline by 1 per cent, that trade at the extensive margin would increase by 0,6% and at the intensive margin by 0,3%.

The theory of *Product Space and Economic Complexity* offers guidance for how governments could support productivity improvement of firms to help a country diversify its exports in a manner that would best promote economic development over the longer term. Specifically, while traditional export promotion might focus on short-term sales of existing products, the Product Space analysis informs industrial policy by highlighting what we term “Blue Sky” opportunities - products that require investment to mature but offer long-term diversification benefits.

All of the above suggestions for export promotion through trade facilitation highlights the important role of informational gaps or asymmetries, and the need to obtain and use information - including information on export opportunities in terms of products and destinations (Balls and Bins). Surveys of exporters globally consistently rank "identifying potential markets and buyers" as one of the top obstacles to trade (OECD/WTO, 2015). Distance acts not only as a physical barrier but as an informational one; deeper internationalisation requires market knowledge that non-exporting firms simply do not possess. Unlike

established exporters who can leverage existing foreign networks to find new opportunities, new entrants face high fixed costs in acquiring this intelligence.

In sum, the argument to which this paper has been building up is that a significant barrier to entry for potential exporters, particularly new exporters, is not merely tariff structures or physical infrastructure, but a lack of knowledge regarding where potential demand for a particular product exists.

Consequently, there is a compelling case to be made for export promotion specifically in the form of providing information on realistic export opportunities as best practice in export promotion. By reducing such informational frictions, governments and trade promotion agencies can facilitate market entry, stimulate productivity through innovation, and build economic resilience against global shocks.

Empirical evidence suggests that information provision is highly effective. Studies indicate that reducing export costs, including informational barriers, by 10 per cent can increase export diversification by significant margins. Information seminars and trade missions have been shown to encourage firms, particularly those with sufficient productivity, to start exporting. By reducing the fixed costs of entry, information provision helps "open more bins" in the global economy - matching domestic products (balls) to foreign destination markets (bins) that were previously invisible to the exporter.

To effectively provide this information, export promotion agencies must move beyond intuition to evidence-based methodologies. The sheer volume of big data on global trade - billions of records from sources like UN Comtrade and CEPII-BACI - can be overwhelming. It is for this reason that various methodologies have been developed to derive actionable insights from this data to inform export promotion.

The most significant theoretical justification for the Decision Support Model (DSM) for identification of export opportunities is the existence of market failures in the form of informational asymmetries. The classical and neoclassical models of trade discussed in section 2 assume perfect information, but in reality, firms - especially Small and Medium

Enterprises (SMEs) – face substantial information frictions. They often lack knowledge about foreign demand, regulatory requirements, and potential partners.

This informational gap creates a rationale for public intervention via Export Promotion Organizations (EPOs). The discovery of a new export market is a form of self-discovery that generates information externalities; a pioneer firm incurs the costs of discovery, but if successful, other firms follow, dissipating the pioneer's rents (Hausmann and Rodrik, 2003). Consequently, firms may underinvest in searching for new markets.

The DSM approach is designed to contribute to correcting this market failure. By systematically processing global trade data to reveal realistic opportunities, it lowers the search costs for firms and governments. It acts as a public good, providing the intelligence required to make informed International Market Selection (IMS) decisions, thereby facilitating export diversification and growth.

In the next section the evolution of the extended Decision Support Model (DSM), will be explained, and where appropriate, compared to the International Trade Centre's (ITC) Export Potential Map.

#### **4. A Decision-Support Model (DSM) Approach to Export Opportunity Information**

##### ***4.1. Origin and Evolution of the DSM Approach***

The DSM approach is a dynamic methodology that has evolved over three decades to accommodate better data, theoretical advances, and specific country contexts. Its development trajectory reveals a continuous refinement of how realistic export opportunities are defined and detected – see for instance the discussion in Cameron and Viviers (2025).

The methodology was conceptualized by Cuyvers et al. (1995) at the University of Antwerp. The initial objective was to provide the Belgian export promotion agency with a scientific instrument to allocate scarce resources. Rather than relying on ad-hoc decisions or reactive

strategies, the model aimed to pinpoint product-market combinations with the highest probability of success (referred to as ‘realistic’ opportunities).

During this nascent phase (1992-1997), the model was applied to Belgium, Thailand, and the Philippines. It utilized the Standard International Trade Classification (SITC) data at the 4-digit level, which was less granular than modern analyses. The early filters focused on macroeconomic variables (GNP per capita) and a rudimentary assessment of trade barriers using the Revealed Absence of Trade Barriers (RATB) approach. The RATB posited that if a country's neighbours could export to a target market, trade barriers were surmountable for the home country as well. This proxy was necessary due to the scarcity of direct tariff and non-tariff barrier data at the time.

As the methodology gained traction, it was adapted for diverse economies, notably South Africa from 2007 onwards - see e.g. Cuyvers and Viviers (2012), Pearson et al. (2010) and Rossouw et al. (2026), leading to significant refinements driven by the specific needs of developing economies that were geographically distant from major markets.

A critical evolution was the shift from SITC data to the Harmonized System (HS) 6-digit level. This transition allowed for much finer product identification (e.g., distinguishing between specific types of machinery rather than broad categories). This required handling vastly larger datasets, moving from thousands to millions of potential product-market combinations.

The RATB approach, while useful for the EU context where neighbours share similar constraints, proved less robust for more isolated economies like South Africa or a landlocked<sup>2</sup> country (like Rwanda). Consequently, the methodology began incorporating explicit transport and logistics cost indicators. Cameron (2020) noted that the existing DSM approaches (and others like the ITC methodology) often relied on simplified "geodesic" (straight line) distances or "nearest port" assumptions to calculate transport costs. For a landlocked country like

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<sup>2</sup> A landlocked country is distinctive in that it has no direct access to the sea and is bordered by one, two or more neighbouring countries that also lack such direct access (United Nations [UN] 1982; World Bank 2017). The term “landlocked” is used to be consistent with the formal UN 1982 definition, but can also be written as “land-locked”.

Rwanda, this approach was critically flawed. It assumed goods were shipped to the nearest port (e.g., Mombasa or Dar es Salaam) without accounting for the significant time and cost penalties of the overland transit leg, multiple border crossings, and modal switches (e.g., between road (trucks) and maritime (ships)). This led to a distortion of reality where markets appeared accessible when, in fact, the logistics costs were prohibitive in relative terms.

As a result, Cameron (2020) proposed integrating World Bank Doing Business data and Logistics Performance Indices (LPI) as proxies for market accessibility with explicit transport route modelling including transit corridors, border crossing, modal switches and associated relative logistics costs, fundamentally altering (extending) the assessment of which markets were realistic for a landlocked nation (but also any other 'home market' – not only those that are landlocked). The refined methodology therefore explicitly acknowledges that especially for developing nations, the relative cost of moving goods was often a higher barrier than e.g. tariffs in isolation.

In the wake of the COVID-19 pandemic, the model was adapted, using the case of Portugal, to identify resilience strategies. It utilized the "balls-and-bins" theoretical framework to identify export bins (markets) that were effectively "empty" (unserved) but viable, providing a roadmap for post-crisis recovery through extensive margin expansion. And most recently, the methodology has been applied in the case of the Netherlands to address geopolitical risks, specifically the recent developments around US tariffs. By creating risk matrices based on comparative advantage, the model was used to identify external substitution opportunities – alternative markets for goods threatened by trade wars, thereby supporting strategic autonomy.

#### ***4.2. The Extended DSM Mechanics: A Filtering Process***

The core mechanism of the extended DSM approach remains a filtering process. It operates on the principle that it is more efficient to filter out unrealistic options (in relative terms) from the universal set of potential options, than to cherry-pick opportunities from scratch. In a

world of big data this is an essential approach towards supporting combinatorial innovation in creating new products<sup>3</sup>. The challenge for the innovator - wanting to create a new product, or in the present case, wanting to innovate in market strategy by finding a new combination of country and product -the number of potential new combinations grows exponentially as more data points become available. This creates a "needle in a haystack" problem where the universe of possible export combinations becomes too vast to find the realistic opportunities in this haystack, without support from analytical tools and software.

In this respect the extended DSM methodology acts as a structured computational filter that narrows the expanding search space into a manageable subset of high-potential "balls and bins" - realistic export opportunities.

It begins with the universal set of all possible product-market combinations (e.g., from the perspective of a selected "home market", say Germany, for a world of roughly 200 possible target countries and more than 5,000 products by HS code, there are approximately 1 million combinations).

The approach also further considers volatility in international trade data by applying a time-weighted smoothing approach (denoted as  $tw$  where relevant). The fundamental premise is that transactions occurring further back in history are less likely to influence current decisions and 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 applied modelling initiative, a near exponential weighting scheme is applied where the most recent value is allocated a weight of 1, and the preceding historical points are each allocated a weight of 0.5 of the previous weight and then normalised. Data for the latest 6 years of annual reported

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<sup>3</sup> For an example of how the filtering process is used to support innovation in new medicine development, see Vamathevan et al. (2019).

trade statistics and other variables are used when calculating parameters like growth rates, shares and time-weighted values.

It then applies four rigorous filters to strip away unrealistic or unattractive options, leaving a residue of high-probability opportunities.

#### **4.2.1. Filter 1: General Market Potential**

The first filter assesses the macroeconomic attractiveness and risk profile of potential target countries. It operates at the country level, eliminating entire markets deemed unsuitable before product-level analysis begins. It has two sub-filters.

The first is *Political and Commercial Risk* (Filter 1.1). Utilizing data from agencies like Credendo (formerly ONDD<sup>4</sup>), the model filters out countries with excessive political or commercial risk. This is crucial for distinguishing between a theoretical opportunity and a realistic business prospect where payment is likely. However, the methodology is flexible; in specific applications like Rwanda, this risk filter is sometimes relaxed to include regional neighbours (e.g., the Democratic Republic of the Congo (DRC) or Burundi) that, while risky, are natural trading partners due to proximity.

The second is *Macroeconomic Size and Growth* (Filter 1.2). The model evaluates countries based on GDP and GDP per capita. It considers both the absolute size (indicating market depth) and growth rates (indicating dynamism). A market must demonstrate either sufficient size or rapid historical growth to pass this filter. This effectively screens out stagnant, economically insignificant economies that would not offer sustainable demand. This filter has further been extended to include the forward looking growth expectations based on the International Monetary Fund's (IMF) World Economic Outlook projections of macroeconomic variables, thereby allowing not only for selecting based on rapid historical growth, but also anticipated future growth.

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<sup>4</sup> Office National du Ducroire (ONDD). Previously [www.delcredere.be](http://www.delcredere.be); now [https://www.credendo.com/country\\_risk](https://www.credendo.com/country_risk) (the ONDD was rebranded the Credendo Group in 2013).

#### ***4.2.2. Filter 2: Import Demand Potential***

The second filter moves from the country level to the specific product level (HS 6-digit). It analyses import data to determine if a target country actually demands the specific product. The rationale being that an exporter requires markets that have proven import demand – not only total demand. While total demand for a product in a market may be either high or very small, due to the market (a) e.g. having sufficient domestic production capacity to meet demand, or the second if e.g. a market does not typically consume a particular product (due to e.g. a prevalence of lactose intolerant consumers or due to certain cultural beliefs of practices) or for religious reasons (e.g. pork related products that are banned in certain markets), the observed import demand may be relatively low or weak as a result.

This filter therefore aims to answer two questions. The first is regarding import size: is the market for Product X in Country Y large enough (in relative terms) to warrant entry? The model checks if the import value exceeds a Pareto threshold. The second is regarding import growth: is the demand for Product X growing? The methodology analyses both short-term (e.g., last 2 years) and long-term (e.g., last 5 years) import growth trends and categorises outcomes based on performance relative to global comparators for each product.

Furthermore, in this filter the AEXI Market Finder has extended the methodology by introducing additional filters for religion and culture., aspects of import demand potential that are omitted in previous DSM applications and also in the ITC's Export Potential Map. For example, it now filters for Halal certification requirements across over 5,000 products, matching them with Muslim-majority (or not) markets. A differentiated classification is then applied for whether a producer-exporter has Halal certified products versus not, hence providing more relevant insights on each product-market combination evaluated.

This filter therefore eliminates "empty bins" where no import demand exists (while other approaches may only consider total demand potential) - markets that simply do not import the product in question, or where demand is collapsing. It ensures that the identified opportunities are specifically import demand-driven rather than purely a supply-push.

### 4.2.3. *Filter 3: Market Accessibility*

This is the most technically complex filter, determining whether a market is accessible from the perspective of a particular “home market” like Germany, despite demand. It addresses the "gravity" components of trade: barriers and costs. It does so through employing two sub-filters.

The first sub-filter is for *Market Concentration* (Filter 3.1). This sub-filter examines the competitive structure of the import market using the Herfindahl-Hirschman Index<sup>5</sup> (HHI). The rationale is that a market might be large and growing, but if it is dominated by a single or few suppliers (e.g., a monopoly or near-monopoly or oligopoly), it is effectively closed to new entrants in the short- to medium-term due to high switching costs or entrenched relationships. The model calculates the HHI for imports of Product X in Country Y. If the concentration is too high, the opportunity is discarded.

The second sub-filter is for *Barriers to Entry* (Filter 3.2). Previous DSM approaches, and the ITC's Export Potential Map, relies on simplified "geodesic" (straight line) distances or "nearest port" assumptions to calculate transport costs. This is unrealistic. Hence following Cameron (2020) the AEXI Market Finder incorporates transit dimensions (explicit modelling of transit legs, including border crossings and the specific costs associated with them), multimodal differentiation<sup>6</sup> (distinguishing between maritime and land-based transport speeds and costs, rather than treating distance as a uniform variable) and the cost of time (incorporating Hummels' ad valorem equivalent estimates to monetize the time spent in transit, (e.g., inventory holding costs, depreciation, calculated as a percentage of the goods' value per day of travel) (Hummels and Schaur, 2013) and route flows based on international shipping lines'

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<sup>5</sup> By making use of an adjusted Herfindahl-Hirschmann Index (HHI) based of Hirschmann (1964). A crucial adjustment is made to exclude the “home market” from the calculation to eliminate ‘false’ concentration readings where the “home market” is the cause of concentration in the HHI outcome. If the “home market” is the dominant supplier causing the concentration, the market should not be filtered out, as it actually represents a stronghold rather than a barrier.

<sup>6</sup> Currently reported trade flows by HS 6-digit product line associated with Air cargo is not yet mature enough on a global scale to be able to include this mode.

routing scheduling on major shipping lanes from a specific ‘home market’ to each potential destination market’s key port and then inland transport to the main economic hub.

Hence, this sub-filter assesses the relative cost of entering the market. It constructs a composite Market Access Index (MAI) or Logistics Market Access Index (LMAI) depending on the sophistication required.

As far as tariffs are concerned, it incorporates Ad Valorem Equivalent (AVE) tariffs<sup>7</sup> faced by the exporter by product and target market. High tariffs can render a theoretically attractive market commercially unviable.

As far as non-tariff barriers and logistics are concerned, this sub-filter has evolved significantly. Early versions used the RATB (neighbours’ success) proxy. Modern versions such as that used in the AEXI Market Finder use explicit transport cost modelling, considering distance, time, and logistics performance.

By calculating a total logistics cost – that summed freight costs and time value across all transit points – Cameron's (2020) refinements provided a significantly more realistic assessment of export opportunities.

The Logistics Market Access Index (LMAI) combines weighted scores for tariffs, international shipping costs, and domestic entry costs. Opportunities with an index score below a Pareto-determined cut-off are retained and weights are assigned to balance the importance of tariffs versus logistics.

#### ***4.2.4. Filter 4: Comparative Advantage and Untapped Potential***

The final filter categorizes the remaining opportunities based on the home country’s supply-side competitiveness combined with the target market’s ‘untapped’ potential import value and demand characteristics for each product. This connects the demand-side analysis with

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<sup>7</sup> Based on latest available AVE estimates from the ITC MacMap platform, supplemented by primary research for markets like e.g. Cuba, Libya, Iraq and Eritria.

supply-side reality. Two critical metrics are calculated in this step : the Revealed Comparative Advantage (RCA) and the Revealed Trade Advantage (RTA) that a country has in a particular product.

As far as the *Revealed Comparative Advantage* (RCA) is concerned, the AEXI market Finder calculates the Balassa Index (RCA) (se Balassa, 1965) for the home country's products, which is

$$RCA = \left(\frac{X_{ic}}{X_{it}}\right) / \left(\frac{X_{wc}}{X_{wt}}\right) \quad (5)$$

Where:

$X_{ic}$  = Value of country i's exports of product c

$X_{it}$  = Total value of country i's exports

$X_{wc}$  = World exports of product c

$X_{wt}$  = Total world exports

If  $RCA \geq 1$  the country is a globally efficient producer. The model typically prioritizes these "Intensive Margin" opportunities. However, it can also identify "Extensive Margin" opportunities (products with RCA between 0.7 and 1 or other similar threshold ranges) for export development (Blue Sky) strategies, flagging sectors that are emerging but not yet dominant.

As far as the *Revealed Trade Advantage* (RTA) is concerned, this is useful to correct for re-exports. This is often a major issue for logistics hubs like the Netherlands, Singapore and Hong Kong. The RTA allow a distinction between genuine productive capacity and mere transshipment. It is calculated as:

$$RTA_{ij} = RCA_{ij} - RMA_{ij} \quad (6)$$

with

$$RMA_{ij} = \left[ \left( M_{ij} / \sum_{t,t \neq j} M_{it} \right) / \left( \sum_{n,n \neq i} M_{nj} / \sum_{n,n \neq i} \sum_{t,t \neq j} M_{nt} \right) \right] \quad (7)$$

and

$$RCA = \left(\frac{X_{ic}}{X_{it}}\right) / \left(\frac{X_{wc}}{X_{wt}}\right) \quad (8)$$

Where:

$X_{ic}$  = Value of country  $i$ 's exports of product  $c$

$X_{it}$  = Total value of country  $i$ 's exports

$X_{wc}$  = World exports of product  $c$

$X_{wt}$  = Total world exports

$M$  = imports,

$i$  is a country,  $j$  is a product,  $t$  is all traded products, and  $n$  represents all countries.

If  $RTA > 0$ , the country exports more than it imports relative to world norms, suggesting a high probability of genuine domestic production capacity. This prevents the model from flagging opportunities for goods the country merely transits, but rather places the focus on sustainable opportunities (from a domestic production capacity perspective – due to the time-weighted smoothing approach applied).

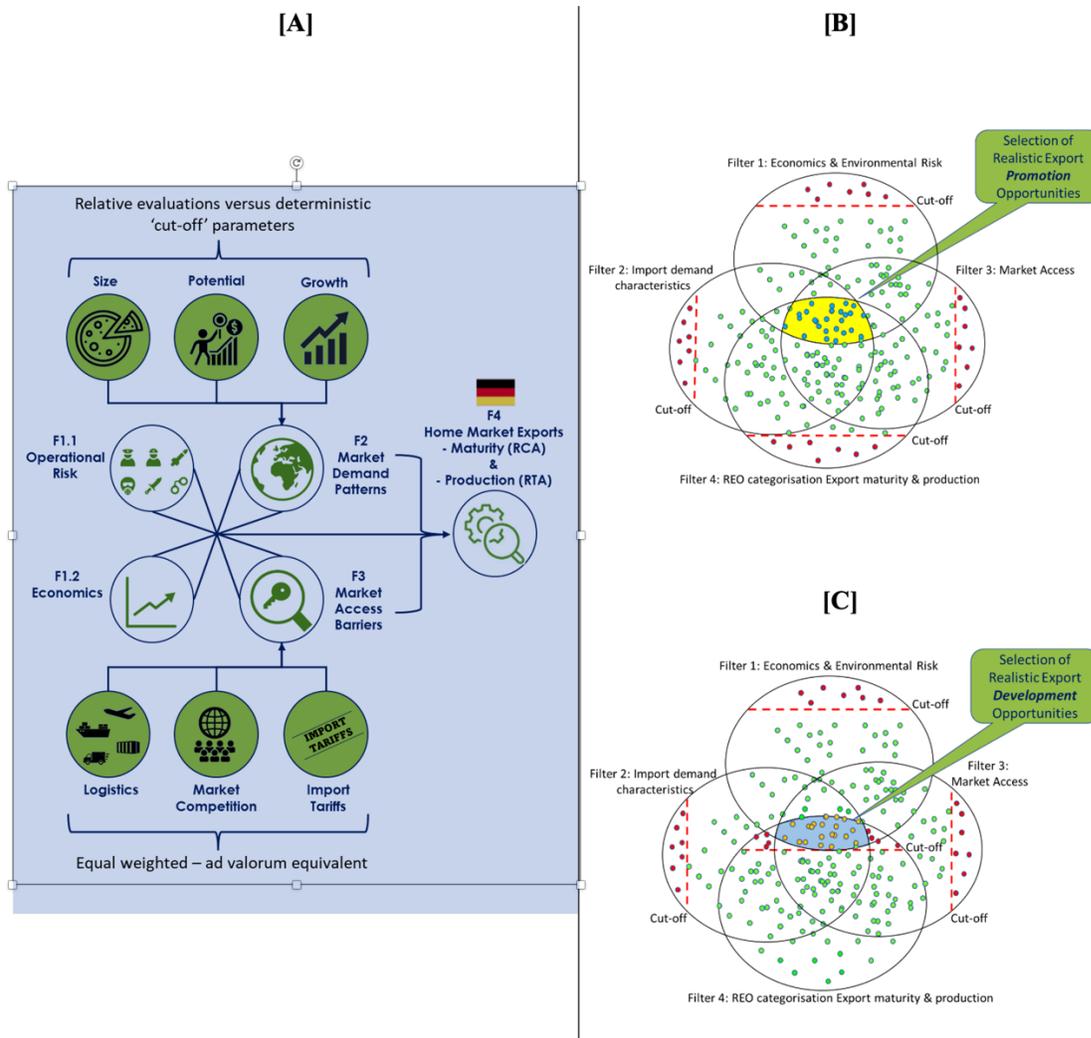
Finally, the model estimates the monetary value (Untapped Potential) of the opportunity. It calculates the "untapped" potential as the average import value from the top six competitors supplying into the target market (excluding what is already sourced from the “home market”). This provides a realistic benchmark of what market share a new entrant (in this context new entrant refers to a country – as opposed to necessarily an individual company) could plausibly capture, rather than assuming they can capture the entire market (which would be unrealistic, especially in the shorter-term).

#### ***4.2.5. Summary of the Filters and Process***

The four filters and their sub-filters as discussed in the preceding sub-sections 4.2.1 to 4.2.4. are summarised in Figure 1 in relation to the extended DSM filtering process applied in the AEXI online platform.

The initial DSM process as described in terms of a 'sequential' filtering process in academic literature in the 1990s was primarily a result of initial computational, memory and storage constraints back then that required a pragmatic 'reduction' of volume of results in order to get to actionable outcomes within a reasonable time and with limited resources. So, initially, Filter 1 would e.g. remove a whole market from the result set, thereby pragmatically eliminating the volume of further information required to be collected, processed and analysed for outcomes for the rest of the filtering process for each of the eliminated markets. The convention of explaining the DSM approach as 'sequential' persisted in the academic environment

**Figure 1: Summary of the AEXI operationalisation of extended DSM filtering process**



(Source: Authors)

However, with the advent of a model platform such as the AEXI Market Finder software tool<sup>8</sup>, which operationalize the extended DSM (see Cameron and Naudé, 2026) these constraints were lifted. Therefore, the actual implementation of all the components of the extended DSM approach in the AEXI Market Finder platform, as depicted in Figure 1 [A], is more accurately described in terms of Venn intersections as depicted in Figure 1 [B].

<sup>8</sup> See: [www.aexi.nl](http://www.aexi.nl)

This more flexible capability also opens up a whole set of alternative potential applications based on the DSM approach, since the initial focus on only ‘pure’ export promotion oriented opportunities eliminated a wealth of information in terms of opportunities that did ‘not pass’ the filters, or various sub-sets of outcomes informed by slightly different combinations of the various filters. This is demonstrated in Figure 1 [C] by changing the Filter 4 selection parameters to ‘less mature’ but traded commodities, therefore resulting in a different set of results requiring *export development* support strategies and interventions as opposed to purely export promotion focused strategies and interventions.

#### **4.3. Data Sources and Technical Specifications**

The robustness of the DSM is contingent upon the quality of its inputs. The methodology has transitioned from utilizing SITC data to the more robust CEPII BACI dataset, used by the AEXI Market Finder reflecting a commitment to data integrity.

The key data sources used by the *AEXI Market Finder* to operationalize the DSM are the following.

- CEPII BACI: This is the primary source for trade flow data. It is a reconciled version of UN Comtrade. While UN Comtrade often has discrepancies (e.g., Country A's reported exports to B do not match B's reported imports from A due to CIF/FOB differences), BACI harmonizes these flows and estimates missing data using mirror statistics. This synthetic dataset therefore provides a more complete picture of global flows than raw Comtrade data, which is crucial for capturing the sparse nature of trade.
- MacMap (ITC): Provides applied tariff data at the HS 6-digit level. This is crucial for the Market Access filter, as it distinguishes between MFN (Most Favoured Nation) rates and preferential tariffs.

- World Bank Doing Business<sup>9</sup> and LPI: Used to parameterize the logistics costs. The Logistics Performance Index (LPI) and data on time-to-import/export provide the empirical basis for modelling border friction and port efficiency.
- UN National Accounts: GDP, Population estimates, Exchange Rates.
- IMF: World Economic Outlook – GDP projections
- Credendo: Formerly ONDD, this agency provides country-level political and commercial risk ratings used in Filter 1. Its data helps distinguish between a theoretically rich market and one where payment is secure.
- Freight Rate Data: The information sources for cost estimates, route options and scheduling, used in the refined logistics market access indicator compilation process, include online sources such as World Freight Rates,<sup>10</sup> Searates.com,<sup>11</sup> the Logistics Cluster<sup>12</sup> and Google Maps.<sup>13</sup> For shipping routing tables, the four largest containership operators (at the time of writing), which handle around 50% of global container cargo, were used, in descending order of annual container tonnage that can be transported by the fleet of vessels owned by the particular containership operator, subject to whether or not a route was serviced by the company. They include Maersk,<sup>14</sup> Mediterranean Shipping Company (MSC),<sup>15</sup> CMA-CGM,<sup>16</sup> and China Ocean Shipping (Group) Company (COSCO).<sup>17</sup> For localised maritime services, various other sources were used, such as Pacific International Lines<sup>18</sup> for East Africa. This data is often manually compiled to

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<sup>9</sup> After data irregularities on Doing Business 2018 and 2020 were reported internally in June 2020, World Bank management paused the next Doing Business Report and initiated a series of reviews and audits of the report and its methodology. Read the full statement released by the World Bank Group in the Doing Business Report: <https://www.worldbank.org/en/news/statement/2021/09/16/world-bank-group-to-discontinue-doing-business-report>

<sup>10</sup> See <http://www.worldfreightrates.com/en/freight>

<sup>11</sup> See <https://www.searates.com/>

<sup>12</sup> See <http://www.logcluster.org/>

<sup>13</sup> See <https://www.google.co.za/maps>

<sup>14</sup> See <https://www.maersk.com/>

<sup>15</sup> See <https://www.msc.com/routefinder>

<sup>16</sup> See <https://www.cma-cgm.com>

<sup>17</sup> See <http://lines.coscoshipping.com/>

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

build accurate routing tables for the Refined LMAI. Annual price escalations for more than 500 sea lanes are based on indices obtained from Container Trades Statistics Ltd (CTS)<sup>19</sup>.

Table 1 provides a summary of the DSM filters and their respective data sources.

**Table 1: Summary of DSM Filters and Data Sources**

Filter Step	Focus Area	Key Variables	Theoretical Basis	Core Data Sources
<b>Filter 1</b>	<b>General Market Potential</b> (Country Level)	GDP <sub>tw</sub> , GDP Growth <sub>tw</sub> , IMF projections (WEO) GDP/Capita <sub>tw</sub> , Political Risk, Commercial Risk	Gravity Model (Economic Mass), Risk Aversion	UN National Accounts, Credendo (Risk Ratings) IMF WEO
<b>Filter 2</b>	<b>Import Demand Potential</b> (Product Level)	Import Value <sub>tw</sub> (Size), Short-term Growth <sub>tw</sub> (2yr), Long-term Growth <sub>tw</sub> (5yr)	Demand-driven Growth, Product Life Cycle	CEPII BACI, UN Comtrade
<b>Filter 3</b>	<b>Market Accessibility</b> (Barriers – Country x Product Level)	Market Concentration <sub>tw</sub> (HHI), Tariffs (AVE), Logistics Costs (LMAI/CMAI), Time Costs	New Economic Geography, Trade Costs, Institutional Friction	ITC MacMap, World Bank LPI, Doing Business, Various shipping lines, CTS
<b>Filter 4</b>	<b>Strategic Categorization</b> (Competitiveness – Country x Product Level)	RCA <sub>tw</sub> (Balassa,1965), RTA <sub>tw</sub> (Vollrath,1991), Untapped Potential Value <sub>tw</sub>	Comparative Advantage, Heterogeneous Firms (Melitz,2003)	CEPII BACI, Calculated Indices

(Source: Authors)

#### 4.4. High-level comparison of AEXI Market Finder with ITC's Export Potential Map

The AEXI Market Finder, a software dashboard which operationalizes and extends the Decision Support Model (DSM) approach can be compared to the widely used approach is of

<sup>19</sup> See <https://containerstatistics.com/>

the International Trade Centre (ITC) who makes available, via its website, an Export Potential Map (EPM)<sup>20</sup>. Both methodologies aim to overcome the informational gaps that may constrain export growth and diversification. However, they operate on fundamentally different logical frameworks: the ITC Export Potential Map uses an economic gravity model (estimation) of expected trade combined with a future demand projection, while the extended DSM on which AEXI is based, uses a filtering process of existing illustrated demand, which can be associated with expected growth markets (at the macro (GDP) level).

Table 2 provides a quick comparison at a glance. The rest of this section will elaborate on some of the key points in this table.

The International Trade Centre (ITC) methodology is based on an econometric model. It assumes that trade between two countries is determined by their economic size (Supply and Demand) and the friction between them (Ease of Trade). It calculates a theoretical value for exports (e.g., "Vietnam *could* export \$5B of coffee to Germany") and compares it to actual recent historical exports. If the model predicts \$5B in potential but actual reported trade is only \$3B, the ITC flags \$2B of "Untapped Potential." This suggests friction (e.g., lack of marketing, non-tariff measures) that can be overcome. The ITC uses an "Ease of Trade" metric to lower the score if competitors are closer or have better tariffs, but it does not explicitly analyse who the competitors are in the main potential calculation.

The ITC method's strengths are that its outputs are quantifiable: it gives a dollar figure - and that it can identify "nearby" products - using the Product Space methodology (see section 2). It should be noted that the ITC's base approach therefore links potential strongly to 'existing' capabilities, propagating patterns of the past.

In contrast, the Decision Support Model (DSM) operationalized by the AEXI Market Finder, is a flexible screening tool. It treats the world as a dataset of ~200 countries and progressively deletes those that do not meet specific criteria until only the fit markets remain. It processes all possible product-country combinations through filters - as discussed in section 4.2. Unlike

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<sup>20</sup> See: <https://exportpotential.intracen.org/en/>

the ITC approach it explicitly calculates the extent of market concentration. For instance, if a market is supplied 90% by China, the AEXI Market Finder might flag it as too concentrated/difficult to enter and filter it out or lower its rank, whereas ITC might still show high potential if demand is high.

**Table 2: Comparison at a Glance – ITC Export Potential Map and AEXI DSM**

Feature	ITC Export Potential Map	DSM (AEXI)
<b>Core Logic</b>	Gravity Model: "How much <i>should</i> we be trading based on economic mass and distance?"	Filtering Funnel: "Start with the world and eliminate markets that are too risky, too small, or too closed."
Supply Logic	Supply Constrained (GDP/Sectoral)	Supply Unconstrained (Relative Competitiveness)
<b>Primary Output</b>	Potential Value (USD): A theoretical dollar value of exports.	Realistic Export Opportunities (REOs): A shortlist of qualified product-market combinations.
<b>Reports</b>	Data output on screen and downloadable	Data output on screen and downloadable plus automated reports in Excel, PDF, Word and PPT
Scope	Global / Standardized	Country-Tailored / Customizable
Risk Filter	Not included	Included (Political & Commercial)
Logistics	Geodesic distance (no cost info)	Maritime & Land logistics route distance, modal switches + Costs
<b>Key Metric</b>	"Untapped Potential": The gap between theoretical potential and actual exports.	"Market Attractiveness": A categorization (e.g., "Offensive" vs. "Defensive" markets), 'additional' untapped potential <sub>tw</sub> irrespective of actual exports.
<b>Risk Handling</b>	Implicitly handled via "Ease of Trade" scores, but does not strictly filter out high-risk countries.	Allows to explicitly filter out countries with high political or commercial risk in Step 1.
Existing Markets	Excludes markets if Actual > Potential	Includes all (categorizes as maintenance/growth)
Data Handling	Standardized, UN-Comtrade	Cleans re-exports using RTA index; Data from reconciled CEPII-BACI
<b>User Customisation</b>	User limited to pre-determined answer based on ITC approach	User has option to reconfigure and apply filters and factors in different combinations, while also having 'preset' outcomes based on standard filter combinations.
<b>Ideal User</b>	Policymakers and SMEs needing a quick, global overview of where gaps exist.	Export councils / promotion agencies and mature exporters building a strict, validated target list. Can also support SMEs, but require support from export councils / promotion agencies

(Source: Authors)

The DSM strengths include that it is both pragmatic and flexible - it explicitly removes "bad" markets (e.g., war zones or closed economies) that a gravity model might mathematically rank

as high potential, and it forces prioritization by narrowing the field to a manageable shortlist. At the same time it has the flexibility to allow a user to fine-tune the particular set of filters in cases where a more nuanced analysis is required (as opposed to the ITC singular ‘fixed’ answer with no immediate accessible explanation for the outcome obtained).

Perhaps the most salient differences between the ITC Export Potential Map and the AEXI Market Finder based on the DSM are that (1) the DSM is built from the perspective of a specific home market, allowing for customized logistics modelling, whereas the ITC model applies a standardized global approach; and (2) that while the ITC model relies on geodesic distances, the AEXI/DSM approach incorporates more realistic transport and logistics, including transit dimensions, multimodal differentiation and the cost of time; (3) the AEXI/DSM approach explicitly filters for country risk and allows for the analysis of markets where the home country is already dominant, distinguishing between opportunities for new versus experienced exporters and (4) the AEXI/DSM approach does not ‘fix’ potential to historical home market performance, but remains open-minded. While the ITC approach does allow consideration for alternatives based on Product Space identification, the base approach grounds the identification of potential constrained by past structural performance of the home market’s economy, thereby contributing to reinforcing historical patterns.

## **5. Concluding Remarks**

The strategic use of large international trade datasets is essential for identifying realistic export opportunities, given that best practice in export promotion involves overcoming information frictions in international trade. This was the fundamental insight which underpinned the proposal in 1995, in the *International Journal of Marketing Research*, by Cuyvers et al. (1995) to propose a decision support model (DSM) that can filter data in order to identify realistic export opportunities.

Back then, however, the application was constrained by lack of data and software. This paper surveyed how the DSM was extended between 1995 and 2025, including being applied to

various countries and industries and being improved from a methodological point from availability of better data and software. The extended DSM, which has been operationalised through a user-friendly online dashboard, was compared to the ITC's export market finder.

It was shown that, unlike the estimation-based gravity models employed by the ITC's Export Potential Map, the extended DSM utilizes a filtering mechanism akin to which is used in innovation processes other sciences (e.g. pharmaceutical) to deal with the "needle in a haystack" challenge in finding realistic new combinations. By processing trade data through four distinct filters the model identifies specific product-market combinations where demand aligns with the exporter's supply capabilities, as well as, unlike the ITC approach, allowing for 'unconstrained' opportunity analysis.

An additional strength of extended DSM approach includes being exhaustive - unlike survey-based approaches or ad-hoc market-research trips, the extended DSM through its operationalization in the AEXI Market finder, scans the entire universe of global trade potential from the perspective of a particular "home market" (all products, all countries). It ensures no stone is left unturned. It also relies on hard data rather than anecdotal evidence or gut feeling, reducing bias in market selection. It forces decision-makers to confront the reality of trade barriers and logistics costs. It is however flexible - as demonstrated by among others the South Africa, Rwanda, Portugal, and Netherlands cases (as published in the scientific literature), the filters can be tuned to address specific policy questions (logistics constraints vs. resilience vs. tariff risks) without breaking the core logic of the model. Furthermore, by distinguishing between intensive and extensive margins, and between domestic production and re-exports, it provides nuanced strategies suitable for different types of firms and policy goals.

The extended DSM approach does have its limitations. These stem from the data-driven and data-dependent nature of the approach, and offers scope for future research to address these. As was discussed in this paper, the DSM approach is not static and has been evolving since the 1990s.

Without being exhaustive, the main limitations in this regard are first that trade data is inherently backward-looking. The BACI dataset typically has a lag of 1-2 years. While time-weighting helps smooth volatility, the model may miss sudden shifts (like the immediate onset of a pandemic or war) until they appear in the annual data (however, one needs to consider that the main aim of the approach is to inform strategic structural questions rather than shorter-term operational questions).

A second limitation is that the data is inherently still sparse and with limited modal maturity (mainly maritime and road). At the HS 6-digit level many potential bilateral links are zeros. While the methodology interprets these as potential "empty bins", estimating the value of a non-existent trade flow relies on proxies (competitor performance), which is an estimation, not a fact.

A third limitation is that variables used to filter out countries with poor access, like the LPI, are aggregates and may not reflect the reality for a specific product. For example, the logistics friction for shipping bulk iron ore is different from that of shipping cold-chain pharmaceuticals, but aggregate LPI scores might not capture this distinction perfectly.

Fourth, the approach identifies opportunities based on current revealed comparative advantage. It does not dynamically model how a country's production capabilities might evolve in the future. However, recent iterations attempt to bridge this by looking at "Blue Sky" (Extensive Margin) opportunities linked to Product Space thinking - and offers scope for further extending the method.

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