

---

Research Article

## An Application of the Decision Support Model to Louisiana's Exports

*Bukola B. Oluwade,*

Southern University and A & M College, Public Policy Dept. Baton Rouge, Louisiana.

---

**Abstract:** Recognizing the relevance of exportation to the development and growth of many nations, government and business entities- mainly in the Louisiana State, the policymakers and other key stakeholders should be devoting more time to expand its export opportunities for more revenue generation. This current study revolved around the Export Decision Support Model (EDSM) propounded by Viviers and Cuyvers (2012). The time series data was sourced from the United States Census Bureau (2016) survey on State exports from Louisiana. The objective of this study was to demonstrate the modification of the EDSM for the development of the Louisiana State Exportation. The EDSM is designed and modified purposely for the State of Louisiana to enable it identifies the various export opportunities. The study used a time-series data across a variety of export commodities and import countries available in the State of Louisiana from 2013 to 2016. Based on the data from the U.S. Census Bureau and the International trade data between 2013 and 2016, it was underscored that the State's gross export accounted for 80.4% , while the net export estimated around 8.8% of the Louisiana's GDP in 2016 with a strong focus across Asia, and Europe. The study recommend that policymakers should pay more attention to the prioritize export commodities outline in the study.

---

**Key Words:** Export, Import, Export Decision Support Model (EDSM), Filtration, GDP, GDP per capita, and Commodities.

### 1.0: Introduction

Expanding exports has become an urgent priority for policymakers in Louisiana State-in order to reduce a growing trade imbalance, ensure non-farm job creation, and improve economic growth and development. It is an undeniable fact that exportation has been sourced by many nations as an economic recovery and development tools. Despite the State's endowed resources, it struggled with funds to finance its developmental projects regarding education and other public utilities. Unpredictably, Louisiana was ranked the second best sugar cane producer in the United States and also well-known in agricultural products. Meanwhile, sugarcane is one of the essential raw material sources of manufactured sugar in the United States. Sugarcane is produced in Florida, Louisiana, Hawaii, and Texas. In Louisiana, the northernmost cane-growing State, sugarcane production has been largely confined to the Delta, where soils are fertile and the climate is warm.

However, the sugar industry in Louisiana has expanded northward and westward into nontraditional sugarcane growing areas. Most of the expansion in sugarcane acreage has occurred when returns for competing crops, such as rice and soybeans, have decreased. Louisiana production has also expanded because of the adoption of high-yielding sugarcane varieties, along with investments in new harvesting combines. Louisiana produced an average 1.50 million STRV of sugar between FY2010-16. In addition, Louisiana is also one of the nation's top three rice-producing states, growing mostly long grain rice. While southwestern Louisiana is the primary center for rice production and milling, rice is also grown in the

northeastern part of the state. Louisiana grows rice on approximately 400,000 acres each year, and the annual crop is valued around \$360 million. Rice production and processing both play important roles in the state, generating annual economic activity of almost \$200 million and accounting for thousands of jobs. Rice is the state's top agricultural export. Again, Louisiana Delta is one of the 17 southern states that produce cotton which generates about 200,000 jobs in the cotton industry, among the various sectors from farm to textile mill and accounts for more than \$25 billion in products and services annually in the United States.

More importantly, Louisiana ranks among the top five state exporters in 10 industries, including first in grain & oilseed milling products (\$3.7 billion) and second in petroleum & coal products (\$25.7 billion), basic chemicals (\$4.1 billion), and resins & synthetic fibers (\$3.5 billion). Louisiana is America's 25th largest exporter of agricultural products. It is the largest exporter of farmed fish and related products, the third largest exporter of rice, the seventh largest exporter of other grains, and the 12th largest exporter of cotton. Indeed, one of the Louisiana's fastest growing export categories is aerospace products & parts, which have increased by 49 percent per year since 2004. In 2014, exports of these products reached \$602 million. Actually, despite this enormous prospect and opportunities as well as the economic advantages available for the states. No current study has delved into the exporting opportunities for the Louisiana State. This current study turns to fill the gap.

In the nut-shell, the paper is structured into five sections as follows: the first section looks at the introduction, the second section, review the building of the EDSM for the Louisiana State and explain the process of prioritizing export markets based on the Index of Export Opportunities. The third section introduces the method and materials (i.e. data used in the model). The fourth section presents the empirical findings and results of the model and compares them to the priority markets from the Louisiana Export Strategy. Finally, the fifth section concludes and summarizes the study.

**2.0: Conceptual Framework of Decision Support Model (DSM) and Export Decision Support Model (EDSM)**

**2.1: The General Decision Support Model (DSM) for Commodities**

Grippingly, the spot of exit of the DSM for commodity is the assumption that all the global markets hold potential export opportunity for a particular country and therefore all possible-country combinations enter the filtering process as argued by Cuyvers in 2004 and also in 2012 publications. The model is extremely rigorous and thorough in its approach. It is the only trade model, which includes all possible commodity-country combinations in the world and at Harmonized System six (HS-6) commodity levels. The World Trade Organization uses the Harmonized System (HS) to define commodities. A code with a low number of digits defines broad categories. The model is flexible enough to make export recommendations at the regional and national level. This recent application includes using the model to identify export opportunities for Louisiana State. The current study standardizes and applies the model to identify suitable export opportunities for Louisiana State. The focus will be on agribusiness, food processing & technology, and forest & wood products industry cluster that have a national comparative advantage and a potential for global export.

Following the filtering process, in all four (4) filters were applied to set a threshold. After each filtration stage, a number of markets are judged to be unrealistic and dropped from further consideration in subsequent filters. Theoretically, all countries in the world are assumed to be at the starting point. So, the filter 1 suddenly get rid of those countries with comparatively low general market potential, enabling the researcher to concentrate in detail on a more limited set of possible export opportunities (Cuyvers, et.al., 2004).

Sequentially, the filter 1 assess Louisiana political and commercial risks of doing business with every possible worldwide importing country; it also investigate macroeconomic indicators which include Gross Domestic Product (GDP) and GDP per capita to assess whether the importing countries have adequate overall market size and growth potential, to constitute the relevant elimination criteria. In fact, the discontinue values (DV) of elimination for GDP and GDP per capita among the countries is calculated as:

$$DV = \bar{X} - \alpha \delta_x \dots\dots\dots (1)$$

Where:

$\bar{X}$  = world average GDP or GDP per capita

$\alpha$  = denoting an alpha value that is increased by increments of 0.001 between 0 and 1.

According to Cuyvers (2004), the alpha value that is chosen for the discontinue value is established at a point where is a clear break in number of countries eliminated. Given, the theoretical threshold, countries are selected when they gratified the condition of  $X_i \geq DV$  for at least two years of the most recent three-year period for which the data can be sourced (Cuyvers, 2004). More importantly, the GDP and GDP per capita growth rates are used as additional criteria for selection at the filtering stage 1. By so doing, enable countries to accommodate other nations that have achieved the world average GDP and GDP per capita growth in each year of the most recent three-year period.

Surprisingly, if a country qualifies on the basis of GDP, GDP per capita or growth in both GDP and GDP per capita, then such country proceed to filtering stage 2. In this filtering stage, a more specific assessment of the various commodity groups in the remaining countries is carried out in order to identify the market potential of each commodity-country combination. The focus of this filtering process or stage is to do away with markets that show insufficient demand potential, with the main criteria being the short- term and long-term import growth rates of a given product by a given (Cuyvers, 2004 and Cuyvers et.al., 1995). Algebraically, Cuyvers theorized that the discontinue values for both the short- term and long-term import growth rates are defined as:

$$g_{ij} \geq G_j \dots\dots\dots (2)$$

Where:  $g_{ij}$  = the import growth rate of commodity category j by country i; and  $G_j = g_{wij} s_j$  if  $g_{wij} > 0$  or  $G_j = g_{wij} / s_j$  if  $g_{wij} < 0$ . According to Cuyvers (2004), the  $g_{wij}$  denoting the total world imports of commodity category j; and  $s_j = 0.8 + \frac{1}{(RCA_j + 0.85) \exp(RCA - 0.01)}$ .

The term RCA was defined by Balassa (1965) as:  $RCA = \left(\frac{X_{ij}}{X_{w,j}}\right) / \left(\frac{X_{i,tot}}{X_{w,tot}}\right)$  where:

- $X_{i,j}$  = country i's exports for commodity j
- $X_{w,j}$  = world's (i.e. all countries) exports for commodity j
- $X_{i,tot}$  = country i's total exports
- $X_{w,tot}$  = world's total exports for commodity j

These discontinue values imply that if the exporting country for which the model is applied is not specialized in exporting commodity j that is;  $RCA < 1$ , then the importing country, let say I, short-term or long-term import growth rate for the commodity must be higher than, and up to two times, the world import growth rate for commodity j. On the other hand, if the exporting country for which DSM is applied specializes in exporting the commodity (i.e.  $RCA > 1$ ), then the importing country i import growth rate of commodity j is allowed to be slightly lower than the world import growth rate of commodity j.

In view of the above axioms, Cuyvers (2004) transformed and redefined the discontinue value (i.e. cut-off value) base on the axiomatic –theorems above as:

$$M_{i,j} \geq S_j \dots\dots\dots(3)$$

Where:

$M_{i,j}$  = the import market size of country i for commodity category j

$S_j = 0.02M_{i,j}$  , if  $RCA_j \geq 1$ ; or  $S_j = [(3-RCA_j) / 100]M_{w,j}$  , if  $RCA < 1$ , with  $M_{w,j}$  denoting the total world imports for commodity category j. The above discontinue values threshold imply that if the importing country for which the model is applied is not specialized in exporting commodity j (thus,  $RCA < 1$ ), then the importing country i imports of commodity j must be above 2% and up to 3% (i.e.  $RCA=0$ ) of the total world imports of product j. Additionally, if the exporting country for which the DSM is applied specializes in exporting the product (i.e.  $RCA > 1$ ), then the importing country i imports of commodity j are permitted to be 2% of the total world imports of the commodity. It is finally underscored in filtering stage 2 that only markets that are well thought-out relatively large, growing in both the short-term and long-terms, or large and growing in the short-term and/or long-term are selected o enter filter 3.

In addition, the filter 3 will examine the accessibility of each market by assessing the degree of market concentration and the barriers to entry. In filter 3 the lingering commodity-country combinations are further screened against the criteria of prevailing trade barriers and restrictions to entry. Meanwhile, under this stage of filtering, two basic categories of barriers are considered for analysis. These include the (1) the degree of market concentration and (2) trade restrictions/ market accessibility. The degree of market concentration in each country is measured by the Herfindahl-Hirshmann index (HHI) propounded by Hirshmann in 1964. That is,

$$HHI_j = \sum \left[ \frac{X_{k,j}}{M_{tot,j}} \right]^2 \dots\dots\dots(4)$$

Where:

$X_{k,j}$  = exports of a competitor country k to importing country I for commodity category j.

$HHI_j = 1$ : denoting that there is a monopolistic country supplier to the market (i.e. comparative advantage).

Cuyvers (2004) transform the discontinue point of Herfindahl-Hirshmann index (HHI) as given below as:  $h_k \geq HHI_j$  .

Where:

$h_k = \bar{x} - 0.05\alpha\delta_h$ , for large import markets. Again,  $h_k = \bar{x} - 0.05\alpha\delta_h$ , for markets growing in short-term and long-term, as well as markets that are large and growing in the short or long term. By considering,  $\bar{x}_h$  as the average of the HHI-values of all commodity-country combinations under investigation. Very startling, an alpha value is selected where there is a clear break in the number of commodity-country combinations

eliminated by the processes of filter 1 stage (Cuyvers, 2004; Grater et.al., 2014; and Cuyvers, 1997).

Interestingly, Cuyvers (2004: 1997) underscored that for a larger growing markets, a higher degree of concentration is permitted. In addition, Cuyvers et.al., (1995) argued that concentration poses a problem in markets that are not growing due to an exporting country has to win over the market share of those that are already established in the market in order to gain market share. They further argued that the concentration is less of a problem in growing and large markets. The discontinue value therefore depends on how the markets were categorized in filter 2.

Deductively, in filter 3, the barriers to trade in each market were determined. Apparently, in the application of the DSM for Belgium, South Africa, Rwanda and Thailand, an index for 'revealed absence of barriers to trade' was used as a proxy for trade barriers. Surprisingly, it was argued by Cuyvers et. al. (1995) that if Belgium's (or any other country) neighbors could successfully export a particular commodity to a country, it would not be too difficult for Belgium's (or any other country) to also overcome the trade barriers presented by such country.

However, in case of Louisiana, the application of DSM adopts the market accessibility strategy of elimination. This is because the neighboring countries in Louisiana, United States do not share a sufficient number of characteristics with Louisiana States but rather with other states in United States (i.e. New York, Chicago, Washington DC e.tc.). The borrowed market accessibility index include-the time and cost of international shipment; the time and cost associated with domestic transportation, handling, customs clearance and inspections; logistics performance; and ad valorem equivalent tariffs and non-tariff barriers (Cuyvers et. al., 1995).

In the final analysis of the filtering process (stage 4) as argued by Cuyvers et. al. (1995), the export opportunities that were identified in filter 1 to 3 are categorized according to their import market size and growth (i.e. in filter 2) and their relative market importance (Cuyvers et. al. 2012, Cuyvers, 1997, and Cuyvers, 2004). In the nut-shell, in order to prioritize between the export opportunities identified, the potential export value of each of the selected export opportunities is estimated as 80% of imports of country i of commodity divided by the number of countries that contribute to the imports (Cuyvers et. al, 2012). To conclude, the filter 4 will categorize the identified potential export opportunities based on the strength of the exporting countries relative market share. Also, the identification of new markets for export promotion and domestic market recapturing may assist in the forthcoming review of a number of strategic plans by the Ministry of Industry and Trade, including the National Industrial Policy and the Small and Medium Enterprise (SME) Development policy.

**2.2: Deriving the Export Decision Support Model (EDSM) from Decision Support Model (DSM) for the State of Louisiana**

**Table 1: Categorization of Export Opportunities Based on Importing Markets**

Filter	Category	Short-term	Long-term	Market Size
0	0	0	0	0
0	1	1	0	0
0	2	0	1	0
1	3	0	0	1
2	4	1	1	0
2	5	1	0	1
2	6	0	1	1
3	7	1	1	1

**Source:** Following Cuyvers (2004) and Matej et. al. (2014) Analysis

Table 1 summarizes the potential export opportunities that have been into categories based on the condition whether the import growth of the commodity j to the country i and the import volume of the commodity j to the country i was larger than or equal to the critical value (0 if not fulfilled, 1 if fulfilled). Within the first step of the filtering process, the elimination or removal of export opportunities takes place at a point where Filter 1 equals 0 (see Table 1).

By bearing in mind the second step of the elimination process (i.e. filter 2), the study detached opportunities with large trade barriers and difficult market penetration. For the purpose of this analysis at this stage two procedures were used. That is, filter 2(a) uses the Herfindahl--Hirschmann Index (HHI) to measure market concentration (Hirschmann, 1964). The study assumed that it was usually easier to penetrate less concentrated markets and thus take decision to eliminate export opportunities where the HHI is higher than the critical values. The critical values for Filter 2(a) are the result of the calibration process and depend on:

**Filter 1 as follows:**

- 0.085 if Filter 1=1,
- 0.529 if Filter 1=2,
- 0.973 if Filter 1=3.

Alternatively, the Filter 2(b) uses the assumption of Cuyvers (2004) that if countries with similar export structures and geographical locations are able to penetrate a specific market, then also the country of interest can penetrate the market. The assumed the economy Mexico to measure the revealed absence of trade for the Louisiana, because Mexico is a neighboring country and it has a similar structure of export, measured by the Export Similarity Index (Finger et al., 1979). Meanwhile, Mexico has the highest value (0.507) of the Export Similarity Index for the Louisiana of United States of America. Thus, Mexico has a supply structure of commodity for export similar to that the United States (i.e. Louisiana), but is more successful in penetrating foreign markets. In addition, Filter 2(b) is determined as follows:

$$\text{Filter 2 (b)} = \{ 1 \text{ if } M_{i,j} > 0.95 \text{ and } 0 \text{ if } M_{i,j} < 0.95 \} \dots\dots\dots(5)$$

Where:

$$M_{i,j} = \frac{X_{Ci,j}}{\frac{X_{C,j}}{X_{Wi,j}}} \times \frac{X_{Ci,j}}{X_{W,j}}$$

- $X_{Ci,j}$  = Mexico's export of the commodity j to the country i
- $X_{G,j}$  = Mexico's export of the commodity j
- $X_{Wi,j}$  = World export of the commodity j to the country i
- $X_{W,j}$  = Total World export of the commodity j

In perusing the Louisiana and Mexico exportation systems, an interesting barrier of trade was identified: transportation costs, which usually increase with the transport distance. This section of the analysis that is filter 2 (c) encapsulate with the distance ( $d_i$ ) of the country's capital to Prague. Therefore, the critical value for this section becomes:

$$\text{Filter 2 (c)} = \begin{cases} 2 \text{ if } d_i \leq 2,500\text{km} \\ 1 \text{ if } 2,500\text{km} < d_i \leq 8,500\text{km} \\ 0 \text{ if } d_i > 8,500\text{km} \end{cases} \dots\dots\dots(6)$$

This stage of the filtering process (filter 2) combines both filter 2(b) and 2 (c) for the purpose of eliminating the export opportunities where both parts were assumed to be equal to zero.

By considering the filter 3 analysis for the EDSM, both the supply side and the demand side of the export opportunities are incorporated into the model by means of Filter 3. In fact, the filter 3 compares the value of the Lafay index (valuing the comparative advantage of the Louisiana) with that of a potential trade partner and chooses the opportunities where the Louisiana has a relative comparative advantage. The export opportunities are divided into 4 categories and then eliminated if Filter 3 equals zero.

$$\text{Filter 3} = \begin{cases} 0 \text{ if } LFI_{L,j} - LFI_{i,j} < 0 \\ 1 \text{ if } 0 \leq LFI_{L,j} - LFI_{i,j} < 0.025 \\ 2 \text{ if } 0.025 \leq LFI_{L,j} - LFI_{i,j} < 0.2 \\ 3 \text{ if } LFI_{L,j} - LFI_{i,j} \geq 0.2 \end{cases} \dots\dots\dots(7)$$

Where:

$$LFI_{i,jt} = \left[ \frac{X_{i,jt} - M_{i,jt}}{X_{i,jt} + M_{i,jt}} - \frac{\sum_{j=1}^k (X_{i,jt} - M_{i,jt})}{\sum_{j=1}^k (X_{i,jt} + M_{i,jt})} \right] \times \frac{(X_{i,jt} + M_{i,jt})}{\sum_{j=1}^k (X_{i,jt} + M_{i,jt})}$$

For i stands for the country in question, let say China or Mexico, j stands for the commodity, t stands for the year or time, M stands for import and X stands for export.

The filter 4 assists the researcher in this study to sort the export opportunities based on market importance as argued earlier by Cuyvers et. al. (1997). Here, the study used filter 4 together with the other filters to determine whether Louisiana has a relatively large or small market share for a specific commodity group and country. In this section the study compared the degree of market importance of the Louisiana State with the top six (6) exporting countries in the commodity group j to country i. In view of the above theorems, the review critical value for the EDSM calibration process of filter 4 is given as below:

$$\text{Filter 4} = \left\{ \begin{array}{l} 0 \text{ if } MI_{top6,i,j} - MI_{Li,j} < 2.35 \\ 1 \text{ if } 1.6 \leq MI_{top6,i,j} - MI_{Li,j} < 2.35 \\ 2 \text{ if } 0.9 \leq MI_{top6,i,j} - MI_{Li,j} < 1.6 \\ 3 \text{ if } MI_{top6,i,j} - MI_{Li,j} \geq 0.9 \end{array} \right\}, \dots (8)$$

Thus where;

$$MI_{n,i,j} = \frac{\frac{X_{n,i,j}}{X_{w,i,j}}}{\frac{X_{n,j}}{X_{w,j}}}$$

$X_{n,i,j}$  = export of the commodity j by the country n to the country i

$X_{w,i,j}$  = total world export of the commodity j to country i

$X_{n,j}$  = export of the commodity j to the country n

$X_{w,j}$  = total world export of the commodity j

$MI_{top6,i,j}$  = the market importance of the top 6 exporters in the commodity group j to the country i

$MI_{Li,j}$  = the market importance of exporting the commodity group j to the country I for the Louisiana.

So far, if we recall, the study has used the first - four (4) stages of filters for selecting appropriate markets for every commodity, taking into account the supply side of the export opportunities. Nevertheless, the study has not prioritized among the commodities with regard to the potential to increase the competitiveness of the Louisiana economy. Therefore, the study wanted to incorporate the export sophistication in order to favor those opportunities that are worth being supported in export promoting activities. This led to the adoption of Filter 5. The filter 5 uses the PRODY index as argued by Anand et al. (2011) aid in classifying the export opportunities according to the perspective of the commodity for the Louisiana State. The use of filter 5 for further elimination is only possible when it is used in combination with other filters. The estimation of the critical values is derived from the formula below:

$$\text{Filter 5} = \left\{ \begin{array}{l} 0 \text{ if } PRODY_j < 10,000 \\ 1 \text{ if } 10,000 \leq PRODY_j < 18,000 \\ 2 \text{ if } 18,000 \leq PRODY_j < 26,000 \\ 3 \text{ if } PRODY_j \geq 26,000 \end{array} \right\}, \dots (9)$$

Where:

$$PRODY_j = \sum \frac{\frac{X_{i,j}}{X_i}}{\sum \frac{X_i}{Y_i}} Y_i \text{ for } Y_i = \text{GDP per capita of the country}$$

I in international dollars.

Finally, in last stage of elimination, the study combined the following filters 1, 3, 4 and 5 in order to make the final sluice of less interesting export opportunities. Given the specific threshold resulting from the model testing, export opportunities are eliminated, when

$$\text{Filter 1} + \text{Filter 3} + \text{Filter 4} + \text{Filter 5} < 8 \text{ (Final Decision rule for elimination)} \dots (10)$$

Very importantly, the study incorporated additional factors that are industries friendly after the elimination processes. In fact, throughout the analysis, the EDSM does not mirror the

country risk and expected growth when selecting desired export opportunities. To allow exogenous factor into the EDSM model, the study adopted the Index of Export Opportunity (IEO) to enable combinations of the results of the universal EDSM with additional criteria. The IEO criteria are structured as the weighted average of normalized export opportunities determined by the EDSM. This process normalized rank of the country in the Ease of Doing Business (EDB), normalized Economic Complexity Index (ECI) and normalized expected economic growth until 2018 (EEG). The IEO takes the extreme values between 0 and 1. The country with the highest number of export opportunities reaches the value one (1), while the IEO of countries with no opportunities equals zero (0). That is,

$$IEO_i = w_{EDSM} EDSM_i + w_{EDB} EDB_i + w_{ECI} ECI_i + w_{EEG} EEG_i \dots (11)$$

Where:

$$EDSM_i = \frac{O_i - \min_{1 \leq n \leq N} \{O_n\}}{\max_{1 \leq n \leq N} \{O_n\} - \min_{1 \leq n \leq N} \{O_n\}}$$

$$EDB_i = 1 - \frac{DB_i}{N}$$

$$ECI_i = \frac{EC_i - \min_{1 \leq n \leq N} \{EC_n\}}{\max_{1 \leq n \leq N} \{EC_n\} - \min_{1 \leq n \leq N} \{EC_n\}}$$

$$EEG_i = \frac{EG_i - \min_{1 \leq n \leq N} \{EG_n\}}{\max_{1 \leq n \leq N} \{EG_n\} - \min_{1 \leq n \leq N} \{EG_n\}}$$

$$w_{EDSM}, w_{EDB}, w_{ECI}, w_{EEG} \geq 0,$$

N= the number of countries with at least one export opportunity,

$O_i$  = the number of export opportunities to the country i,

$DB_i$  = the rank of the country i in Ease of Doing Business,

$EC_i$  = the value of the index of Economic Complexity of the country i,

$EG_i$  = the expected cumulative GDP growth of the country i until 2020

### 3.0: Methods and Materials

The study pivots around EDSM model developed by Cuyvers (1995). This current research uses annual values of exports and imports among countries that are classified in accordance with the Harmonized System of tariff nomenclature (to the 6-digit level, HS6) for 2006-2010. The Comtrade database as a data source, which provides volumes of imports and exports in USD for many different countries. Furthermore, the model uses GDP and GDP per capita, including their forecast by the IMF and World Bank, 2016. The import content of exports is estimated based on approximated data of OECD and WTO that assign each sector with an import content of exports.

The study developed a model for selecting export opportunities in a wider version, where the users can combine the main results of the EDSM with other factors such as: country risk - OECD (2013), the Ease of Doing Business indicator - World Bank (2013) and the Economic Complexity Index - Observatory of Economic Complexity (2008). The sample covers 25 countries and 25 top ranks commodities categorized with HS6 classification. All the combinations of commodities and countries are considered as potential export

opportunities. The data analysis make use of the back-testing of the critical values in the calibration process-which is made on the basis of a comparison between the results and the real demand for Louisiana commodities based on information from United States embassies and trade promotion organizations.

**4.0: Empirical Discussion**

Export Opportunities for the Louisiana by Commodity Category (CC) between 2013 and 2016 Annual Data. This category contains 2 or more HS2 categories which range from zero (0) to 100%.

**Table 1: Export Opportunities for the Louisiana by Commodity Category (CC) between 2013 and 2016 Annual Data.**

Category	Covered HS2 Groups	Opportunities as at 2016
SOYBEANS, NESOI	90-97	10, 930
PETROL OIL, BITUM MINERAL (NT CRUD)	84-85	10,243
CORN (MAIZE), OTHER THAN SEED CORN	72-83	4,494
LT OILS, PREPS GT=70% PETROLEUM /BITUM NT BIOD	71-69	2,491
SOYBEAN OILCAKE & OTH SOLID RESIDUE, WH/NOT G	68-71	1,666
CRUDE OIL FROM PETROLEUM AND BITUMINOUS MINER	50-63	989

**Source of Data:** United States Census Bureau (2016) and U. S. International Trade (2016) and Louisiana State Exports – HS6-Commodity-Country Combination.

The table 1 shows the top six commodities which emerges as the export opportunities after the filtering process one and two. This analysis was done based on the harmonized system 2 categories of exporting commodities for the HS 6-country combination.

**Table 2: Export Opportunities for the Louisiana States by HS2 Commodity Based on 2016 Dollar value**

HS2 Category	Description	Opportunities
85	NATURAL GAS, LIQUEFIELD	942
84	POLYVINYL CHLORIDE, NOT MIXED WITH OTHER SUBS	677
73	ORGANO-INORGANIC COMPOUNDS, NESOI	487
70	RICE IN THE HUSK (PADDY OR ROUGH)	444
90	CIVILIAN CRAFT, ENGINES, AND PARTS	443
70	BREWING OR DISTILLING DREGS AND WASTE, W/NT P	423
87	WHEAT AND MESLIN, NESOI	413
82	SOYBEAN OIL & FRACTIONS, CRUDE, WHETH/NOT DEG	389
40	ETHYLENE-PROPYLENE-NONCONJUGATED DIENE RUBBER	384
29	POLYMERS OF ETHYLENE NESOI, IN PRIMARY FORMS	346

**Source of Data:** United States Census Bureau (2016) and U. S. International Trade (2016) and Louisiana State Exports –

HS6-Country Combination.

Market Ranking for Leading Commodities By Countries Using the Simulation Procedure

**Table 3: Total U. S. Exports by Origin State (Origin Movement) from Louisiana**

Ranks	WEIGHTS	Simulation 1	Simulation 2	Simulation 3	Simulation 4
		EDSM: 100% EGG: 0% ECI: 0% EDB: 0%	EDSM: 70% EGG: 0% ECI: 0% EDB: 30%	EDSM: 70% EGG: 30% ECI: 0% EDB: 0%	EDSM: 40% EGG: 20% ECI: 20% EDB: 20%
		Max. country risk:7	Max. country risk:4	Max. country risk:4	Max. country risk:1
1	China	5	8	6	5
2	Mexico	2	9	3	7
3	Canada	3	X	X	X
4	Netherland	4	2	4	1
5	Japan	5	7	5	X
6	Colombia	6	X	2	X
7	Brazil	7	16	X	X
8	Belgium	8	X	4	X
9	Peru	9	4	X	5
10	France	10	3	10	2
11	Korea, South	11	8	6	6
12	Chile	12	5	8	X
13	Singapore	13	4	2	9
14	United	15	6	9	4

**Source of Data:** United States Census Bureau (2016) and U. S. International Trade (2016) and Louisiana State Exports – HS6-Country Combination.

Following the simulation analysis, the data shows that putting more weight on the EDB factor favors countries with well-developed institutions while putting more weight on the EEG improves the score of fast-growing developing countries. Meanwhile, the increasing in the weight of the ECI leads to a better score for countries with high knowledge intensity and export sophistication. The results of the model (for the entire portfolio of product categories) were used for verification of the correct setting of the priority and interest countries in the Louisiana Export data recorded by U.S Census Bureau in 2016, which identifies priority and interest countries outside the United States. More importantly, it was underscored that the EDSM assigns the most export opportunities to China (1,216), followed by Mexico (964), Canada (752), Netherland (637) and Japan (634). Nonetheless, many of these opportunities, especially outside the United States of America, have already been discovered by Louisiana exporters.

**5.0: Conclusion**

The EDSM model analysis prioritized all the export opportunities available in the Louisiana State. The model served as a very helpful tool for optimizing export activities and competitiveness of the Louisiana export policy by utilizing the U.S. Census Bureau Data from 2013 to 2016. It identifies suitable export opportunities based on the Cuyvers filtering procedures. The model is lithe and mirrors the needs of individual production sectors. This application of EDSM

model is calibrated for the specific case of the Louisiana State export. However, it can also serve as guidance for building similar models for other states in the United States algebraically. The study recommends that policymakers should pay much more attention to the prioritize export commodities. Based on the final stage of the analysis, there were many unused opportunities outside the United States of America such as Asia, Africa and Europe- in view of the gap the study strongly recommends that policymakers should target those continents for the growth in export.

UN Comtrade. (2006-2010). *Comtrade Database*. United Nations Commodity Trade Statistics Database. World Bank. 2013. *Ease of doing business indicator*. World Bank. [www.doingbusiness.org/rankings](http://www.doingbusiness.org/rankings).

### **References**

Anand, R.; Mishra, S.; Lundstrom, S. (2011). Sophistication in Service Exports and Economic Growth. *World Bank-Economic Premise*. 2011, no. 55, pp. 1-4.

Balassa, B. (1965). Trade Liberalisation and "Revealed" Comparative Advantage. *The Manchester School*. 1965, vol. 33, no. 2, pp. 99-123.

Cuyvers, L.; De Pelsmacker, P.; Rayp, G.; Roozen, I.T.M. (1995). A decision support model for the planning and assessment of export promotion activities by government export promotion institutions- the Belgian case. *International Journal of Research in Marketing*. 1995, vol. 12, no. 2, pp. 173-186.

Cuyvers, L. (1996). Export opportunities of Thailand: Export Decision support model approach. *Journal of Euro-Asian management*. 1996, vol. 12, no. 2, pp. 71-96.

Cuyvers, L. (2004). Identifying export opportunities: the case of Thailand. *International Marketing Review*. 2004, vol. 21 no. 3, pp. 255-278.

Cuyvers, L.; Rossouw, R.; Steenkamp, E.; Viviers, W. (2009). Export Market Selection Methods and the Identification of Realistic Export Opportunities for South Africa Using a Export Decision Support Model [Working Paper Series 2009-03]. Trade & Industrial Policy Strategies, 2009.

Hirshmann, A.O. (1964). The paternity of an index. *American Economic Review*. 1964, vol. 54, pp. 761. IMF. 2006-2013. *Data and Statistics*. International Monetary Fund.

Lafay, G. (1992). The Measurement of Revealed Comparative Advantages in MG Dagenais and P. A. Muet (eds.). *International Trade Modelling*, London: Chapman & Hall, 1992.

Matej, U., Michal, M., and Jana, G. C. (2014). Application of the Decision Support Model to Czech Exports. *ACTA OECONOMICA PRAGENSIA 2/2014-ISSN 0572-3043*

OECD. (2008). *Economic Complexity Index*. The Observatory of Economic Complexity.

OECD. (2013). *Country Risk Classification*. Organization for Economic Co-operation and Development.

Pearson, J.; Viviers, W.; Cuyvers, L. (2010). Identifying export opportunities: The case of South Africa. *International Business Review*. 2010, vol. 19, no. 4, pp. 345-359.