Reverse logistics as value added service for Jamaica's transhipment

Kahuina Hassan Miller

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Reverse Logistics as value added service for Jamaica’s transhipment

By

Kahuina Hassan Miller

Jamaica

A dissertation submitted to the World Maritime University in partial fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE

In

Maritime Affair

(Shipping Management and Logistics)

2014
DECLARATION

I certify that all material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my personal views, and are not necessarily endorsed by the University.

Kahuina Hassan Miller
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Acknowledgements

I would like to take the opportunity to thank the following persons for the invaluable contributions they have made in one way or another towards the completion of this research as there are very few things that are done in this life by one person’s effort.

First and foremost, I would like to thank God for granting me the mental capacity to successfully participate in a course of study at this level of academia. Professor Aref Fakry, my supervisor whose guidance resulted in my completion of this study.

The company that sponsored my studies at this noble institution, World Nuclear Transport Institute located in London, England. My wife, Mrs. Shermaine Miller and daughter Mia Miller who allowed me to pursue this programme of study many miles from home.

I would like to thank my place of employment, the Caribbean Maritime Institute located in Kingston, Jamaica for granting me the leave to pursue this programme.
Finally, I am indebted to my extended family, church family and friends, for their prayers, tolerance, understanding and support while I tried to complete this paper

THANKS!!!
This paper seeks to determine the benefits of using reverse logistics as a value added service for Jamaica to re-gain competitiveness within Latin American and the Caribbean region. Globalization has enabled countries to benefit from transhipment and logistics. The rapid growth in containerization has enabled countries such as Singapore, Holland and United Arab Emirates to benefit economically by using logistics as an integral part of trade. Panama has benefited from transhipment and maritime services by the canal and accounts for 70% of all transhipment in Latin America and the Caribbean.

Reverse logistics is a concept that is not fully utilized by the port industry globally. It is an emerging trend where companies seek to create a sustainability working environment and cost saving initiatives while reducing environmental impact.

Research design used was qualitative research methodology and the instrument used was content analysis whereby sources such as books, articles, documents and newspaper clippings were analysed. The findings indicated that there is a strong correlation between transhipment
Reverse logistics as a value added service for Jamaica’s transhipment

Volume and GDP growth; improving the logistics performance can greatly enhance economic growth, the logistics performance index can be effectively used as a guideline for improving a country’s competitiveness. Application of the reverse logistics can improve Jamaica’s transhipment competitiveness.

**Keywords:** Reverse logistics, GDP, Logistics performance index, Foreign direct index, Logistics hub,
# TABLE OF CONTENTS

DECLARATION ........................................................................................................................................ i

ABSTRACT ........................................................................................................................................ iv

LIST OF TABLES .................................................................................................................................. ix

LIST OF ABBREVIATION ................................................................................................................... xiii

1. Introduction ....................................................................................................................................... 1
   1.1 Background information ................................................................................................................ 1
   1.2 Background on Kingston Container Terminal (KCT) ................................................................. 2
       1.2.1 Location ................................................................................................................................ 2
       1.2.2 Port Structure ....................................................................................................................... 3
   1.3 Significance of study .................................................................................................................... 5
   1.4 Problem Statement ....................................................................................................................... 5
   1.5 Research Objectives .................................................................................................................... 6
   1.6 Scope of the study ....................................................................................................................... 6
   1.7 Limitations of Study .................................................................................................................... 7

2.0 Literature Review .............................................................................................................................. 8
   2.1 Introduction ................................................................................................................................ 8
   2.2 Globalization contribution to GDP growth ............................................................................... 9
   2.3 Economic growth by improving logistics performance ............................................................ 11
   2.4 Logistics correlation to economic growth ................................................................................. 12
   2.5 Global container growth ............................................................................................................. 14
   2.6 Current global trade routes and Panama Canal expansion ....................................................... 14
   2.7 Transhipment and port competitiveness within the Latin America and Caribbean ............... 16
       Regions ............................................................................................................................................ 16
   2.8 Transhipment growth within Latin America and the Caribbean ............................................. 16
   2.9 Transhipment value added service ............................................................................................ 18

3.0 Reverse logistics ............................................................................................................................. 19
## 3.0.1 Reverse logistics as an added value service

Reverse logistics as a value added service for Jamaica’s transhipment

---

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0.1 Reverse logistics as an added value service</td>
<td>21</td>
</tr>
<tr>
<td>3.0.2 Opportunities in using Reverse Logistics</td>
<td>22</td>
</tr>
<tr>
<td>3.0.3 Jamaica a strategic location for reverse logistics</td>
<td>23</td>
</tr>
<tr>
<td>3.0.4 Commercial applications of reverse logistics services</td>
<td>24</td>
</tr>
<tr>
<td>Pallet Management</td>
<td>24</td>
</tr>
<tr>
<td>Removal of used discarded products for disposal/recycling</td>
<td>24</td>
</tr>
<tr>
<td>3.0.5 Value-added logistics (VAL)</td>
<td>25</td>
</tr>
<tr>
<td>Completing, packaging, repackaging and wrapping</td>
<td>25</td>
</tr>
<tr>
<td>Consolidation and Deconsolidation</td>
<td>25</td>
</tr>
<tr>
<td>Sticking, marking and labelling</td>
<td>25</td>
</tr>
<tr>
<td>Quality Control</td>
<td>25</td>
</tr>
<tr>
<td>Completion and pre-assembly</td>
<td>26</td>
</tr>
<tr>
<td>Assembly and disassembly</td>
<td>26</td>
</tr>
<tr>
<td>3.0.6 Reverse logistics in the Tire shredding Industry</td>
<td>26</td>
</tr>
<tr>
<td>3.0.7 Recycling Processes</td>
<td>27</td>
</tr>
<tr>
<td>3.0.8 Applications</td>
<td>27</td>
</tr>
<tr>
<td>3.0.9 Scrap metal industry</td>
<td>28</td>
</tr>
<tr>
<td>3.10 Analysing Ratification Laws for logistics firms in Jamaica</td>
<td>29</td>
</tr>
<tr>
<td>3.0.6 Reverse logistics in the Tire shredding Industry</td>
<td>26</td>
</tr>
<tr>
<td>3.0.7 Recycling Processes</td>
<td>27</td>
</tr>
<tr>
<td>3.0.8 Applications</td>
<td>27</td>
</tr>
<tr>
<td>3.0.9 Scrap metal industry</td>
<td>28</td>
</tr>
<tr>
<td>3.10 Analysing Ratification Laws for logistics firms in Jamaica</td>
<td>29</td>
</tr>
<tr>
<td>3.10 Analysing Ratification Laws for logistics firms in Jamaica</td>
<td>29</td>
</tr>
<tr>
<td>3.0 Design and Methodology</td>
<td>31</td>
</tr>
<tr>
<td>4.0 Analysis of data and presentation of findings</td>
<td>34</td>
</tr>
<tr>
<td>4.1 Introduction</td>
<td>34</td>
</tr>
<tr>
<td>4.2 To analyse the competitiveness of transhipment within the Caribbean region</td>
<td>35</td>
</tr>
<tr>
<td>4.2.1 Transhipment volume</td>
<td>35</td>
</tr>
<tr>
<td>4.2 Major Shipping lines to the KCT</td>
<td>36</td>
</tr>
<tr>
<td>4.3 Current shipping line to the KCT</td>
<td>38</td>
</tr>
<tr>
<td>4.4 Container traffic and shipping lines’ market share</td>
<td>38</td>
</tr>
<tr>
<td>4.5 Jamaica’s Trans-shipment Market</td>
<td>40</td>
</tr>
<tr>
<td>4.6 Top ten trans-shipment competitive ports</td>
<td>41</td>
</tr>
<tr>
<td>4.6.2 Characteristics of competing ports and SWOT Analysis</td>
<td>44</td>
</tr>
<tr>
<td>4.6. 11 Logistics performance index of Latin America and the Caribbean</td>
<td>54</td>
</tr>
</tbody>
</table>
Reverse logistics as a value added service for Jamaica’s transhipment

4.6.12 Jamaica Logistics Performance Index Benchmark......................................................... 55
4.6.15 Intermodal logistics infrastructure for competing ports ....................................................... 58
Road network infrastructural ratings ................................................................................. 58
4.6.16 Quality of port infrastructure ......................................................................................... 59
4.6.18 Trade Tariff ...................................................................................................................... 60
4.6.19 Quality of air transport (intermodal) .............................................................................. 61
4.6.20 Rail Transportation ......................................................................................................... 62
4.6.21 Cost to export (US$ per Container) ................................................................................ 62
4.6.23 Economic growth correlation to logistics................................................................. 64
4.6.23 Container throughput and economic growth .......................................................... 64
4.6.24 Case Study of Singapore ................................................................................................. 65
4.6.27 Case study on the Port of Rotterdam .............................................................................. 67
4.6.29 Case Study of the Ports of Dubai .................................................................................... 68
4.6.31 Gross domestic performance and transhipment ..................................................... 69
4.6.32 Panama volume leader in transhipment ....................................................................... 70
4.6.33 Economic analysis and logistics development of the competing ports ................ 71
4.6.34 Correlation results for Jamaica’s transhipment and GDP ........................................... 73
4.6.35 Correlation results for Jamaica’s transhipment and GDP ........................................... 75
4.6.36 Correlation results for Dominica Republic transhipment and GDP ......................... 77
4.6.37 Correlation results for Dominica Republic transhipment and GDP ......................... 79
4.6.38 Correlation results for Columbia transhipment and GDP ........................................... 80
4.6.40 Jamaica’s application of Reverse logistics as an added value service for transhipment 82
4.6.40 Scrap metal industry for transhipment ........................................................................... 83
4.6.42 Transhipment and global distribution of scrapped tyres ........................................... 86
4.6.43 Opportunities for Jamaica’s reverse logistics network .............................................. 87

5.1 Conclusion and Recommendations .............................................................................. 89
Reverse logistics as a value added service for Jamaica’s transhipment

LIST OF TABLES

Table 1: World Merchandise exports and imports..........................................................10

Table 2: Top Global shipping routes of Containers in TEUs.................................15

Table 3: Transshipment container volume for each country share regional.............17

Table 4: Shifts in rankings for port container traffic in Latin America and the Caribbean, ….37

Table 5: Shipping line share of market.....................................................................38

Table 6: Container throughput for each port variance 2012/2013..............................40

Table 7: Shifts in rankings for port container traffic in Latin America and the Caribbean.....41

Table 8: the container volume growth rate Latin America and the Caribbean ports.........42

Table 9: Caribbean Container Port throughput, Ranking 2013..................................44

Table 10: LPI Segment and Rankings......................................................................56

Table 12: LPI ranking for competing Ports in the Caribbean..................................58

Table 13: LPI Ranking for Industrial Countries..........................................................59
LISTS OF FIGURES

Figure 1a: Global Shipping Routes .................................................................3

Figure 1b: Globalization growth influencing GDP ........................................10

Figure 2: World LPI ..................................................................................13

Figure 3: LPI score of top ten industrialized countries ..............................13

Figure 4: World Container Export Million TEUs .....................................14

Figure 5: Global Shipping Routes in 2007 ................................................15

Figure 6: Caribbean Transshipment Triangle .........................................18

Figure 7: Flow of goods in forward and reverse logistics ....................20

Figure 8: Jamaica centricity to major markets .......................................24

Figure 9: Scrap tires for shipment .........................................................28

Figure 10a: Electronic waste export .......................................................35

Figure 10b: Transshipment Cargo Kingston Container Terminal ..............36

Figure 11: Container ships visit to the port ...........................................36

Figure 12: Global Throughput .................................................................39
Reverse logistics as a value added service for Jamaica’s transhipment

Figure 13: Container Throughput Percentage and trend (2009 to 2012)……………………43
Figure 14: LPI ranking for Latin America and the Caribbean……………………………..55
Figure 15: logistic Performance Index Benchmark…………………………………………59
Figure 16: Road Network Infrastructure…………………………………………………….60
Figure 17: Quality of Port Infrastructure……………………………………………………60
Figure 18: Trade Tariff…………………………………………………………………………61
Figure 19: Quality of Air Transport…………………………………………………………….61
Figure 20: Rail Road Infrastructure…………………………………………………………….62
Figure 21: Cost to export (US$ per container)………………………………………………63
Figure 22: Cost to Import (US$ per container)………………………………………………63
Figure 23: Container throughput correlation to GDP growth……………………………66
Figure 24: Container throughput correlation to GDP growth……………………………68
Figure 25: Container throughput correlation to GDP growth……………………………69
Figure 26: Container Throughput of transshipment ports in the Caribbean region …….71
Figure 27: Annual GDP Growth 1993 to 2013………………………………………………72
Figure 28: GDP Growth for competing country………………………………………………73
Figure 29: The correlation of Throughput volume and GDP growth (Jamaica)…………74
Figure 30: relation between GDP, value of import, export and FDI (Jamaica)…………75
Figures 31: The correlation of Throughput volume and GDP growth (Bahamas)………76
Figures 32: relation between GDP, value of import, export and FDI (Bahamas)………..77
Figure 33: The correlation of Throughput volume and GDP growth (Dominican R.)……78
Figure 34: relation between GDP, value of import, export and FDI (Dominican R.)……78
Figure 35: The correlation of Throughput volume and GDP growth……………………80
Figure 36: relation between GDP, value of import, export and FDI (T&T)………………81
Figure 37: The correlation of Throughput volume and GDP growth……………………81
Figure 37b: relation between GDP, value of import, export and FDI…………………..82
Figure 38: Main Steel Scrap Exporter (Million Tonnes)……………………………………84
Figure 39: Percentage growth of the Main Steel Scrap Exporter (Million Tonnes)…………84
Figure 40: Main Steel Scrap Exporter (Million Tonnes)……………………………………85
Figure 41: percentage growth of the main Steel Scrap Exporter (Million Tonnes)………85
Figure 42: Scrap tire import volume…………………………………………………………86
Figure 43: Share of major exporters of scrap metal………………………………………..87
Reverse logistics as a value added service for Jamaica’s transhipment

**LIST OF ABBREVIATION**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
</tr>
<tr>
<td>ACP</td>
<td>Panama Canal Authority</td>
</tr>
<tr>
<td>LPI</td>
<td>Logistic Performance Index</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nation Conference on Trade and Development</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Order</td>
</tr>
<tr>
<td>RL</td>
<td>Reverse Logistics</td>
</tr>
<tr>
<td>PAJ</td>
<td>Port Authority of Jamaica</td>
</tr>
<tr>
<td>KCT</td>
<td>Kingston Container Terminal</td>
</tr>
<tr>
<td>CSAV</td>
<td>Compania Sud Americana De Vapores</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Development Investment</td>
</tr>
<tr>
<td>CFTZ</td>
<td>Colon Free Trade Zone</td>
</tr>
<tr>
<td>PSA</td>
<td>Port of Singapore Authority</td>
</tr>
<tr>
<td>RPPC</td>
<td>Rotterdam Port Promotion Council</td>
</tr>
<tr>
<td>BIA</td>
<td>Bahamas Investment Agent</td>
</tr>
<tr>
<td>UNESCAP</td>
<td>United Nations Economic and Social Commission for Asia and Pacific</td>
</tr>
<tr>
<td>JIS</td>
<td>Jamaica Information Service</td>
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<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
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<tr>
<td>CAFTA</td>
<td>Central America Free Trade Agreement</td>
</tr>
<tr>
<td>EEIG</td>
<td>European Economic Interest Grouping</td>
</tr>
</tbody>
</table>
Reverse logistics as a value added service for Jamaica’s transhipment

PAC Port Authority of Cartagena
CHAPTER 1

1. Introduction

1.1 Background information

Jamaica has been the leading transhipment country for both the Caribbean and Latin American regions (McCalla, 2008). The country’s strategic location has enabled Jamaica to be a favourable choice for transhipment due to the geographical distance to developed and emerging markets in the North America, Central and South America. The expansion of the Panama Canal seeks to create new horizon in terms of economic developments that the country is seeking to obtain through port expansion and developments in the logistics network, however, this new venture will be highly competitive due to other competitive ports that are using the same initiative to attract shipping companies and investor to their ports (Jessop, 2014).

Jamaica has faced diminishing share of market and negative growth rate in transhipment in recent years losing container throughput volume to competitive ports within the regions such as Panama, Columbia, Bahamas, Dominican Republic and Puerto Rico (Isik, 2012). This is of great concern for the country that seeks to initiate infrastructural developments through port expansion and establishing logistics centres to create better added value service to shipping fleets in anticipation of the opening of Panama expansion. The reduction in container throughput for the country may arguably be proven as result of the global recession and recent natural disasters within the period 2010 to 2012; however, other competitive ports reported significant growth in the transhipment and logistics segment (UNCTAD, 2013).

According to the World Bank, global logistics index shows the country ranking at 70th in the world which means that Jamaica needs to improve on its logistics infrastructure in order to be competitive globally (Pinnock and Ajagunna, 2013). Global logistics is estimated to be US$3.5 trillion dollar industry; it is a profitable venture for all segments of the intermodal system that includes transshipment (Bhagwati 2012). Jamaica is faced with the initiative of improving its
Reverse logistics as a value added service for Jamaica’s transhipment

infrastructural logistics in the supply chain by using transhipment as the pipeline for meeting global demands (Brown, 2014). However, these same initiatives are also pursued by other competitive ports through added value services in logistics (Flankel, 2012). Jamaica needs to distinguish itself through new value added services in reverse logistics in transhipment. Reverse logistics has become an area of high priority for companies looking to reduce costs, add efficiencies and improve their customer experience. As a result, manufacturers are uncovering the hidden value of returned assets and streamlining return, repair and product reallocation processes (Sensing, 2012). Reverse logistics comprises of market returns, repackaged branded goods at reduced prices, parts and materials reclamation or salvaging, particularly metals and plastics, manufacture of packaging for goods to be resold, and large-scale repair centres, which manage the refurbishing and repair of goods distributed throughout the region (The Gleaner, 2013). This type of logistical services is not fully explored by ports within the region that is the reason why I choose this research topic.

1.2 Background on Kingston Container Terminal (KCT)

1.2.1 Location

Kingston Container terminal is a port that is strategically located to meet transhipment needs for both the North and South American Markets (PAJ, 2013). The port’s strategic location has enabled the delivery of cargo at shortest transit time which therefore improves just-time delivery and reduces in transit inventory (Frankel, 2002). The Port is located at the front of the Kingston harbour, which is the seventh largest natural harbour in the world and consist of an almost land lock area of water, roughly ten miles long and two miles wide. The port is deep enough to accommodate Post-Panamax ships and large enough to accommodate several ships at a time for transhipment (PAJ, 2014). Figure 1a shows, the global shipping routes, Yellow (>5000) indicating that Jamaica’s location has enabled its growth in transhipment.
1.2.2 Port Structure

The Ports of Kingston is the hub for most imports into the island, especially agricultural and vehicular imports. The Port of Kingston is actually comprised of three ports: Kingston Container Terminal, Kingston Wharves and Kingston Sufferance Wharves (PAJ, 2013). The Kingston Container Terminal (KCT) is designated for transhipment, Kingston Wharves for domestic market and Kingston Sufferance is a private port. Over the years the port has undergone four phases of development related to handling containers (McCalla, 2005). Kingston Container Terminal (KCT) is one of the region’s leading container transhipment ports for both the Caribbean and Latin American, rated respectfully 1st and 2nd in 2006 (See table 3, for regional ranking) by the Containerization International (2008). The port consist of three terminals; The North terminal, The South Terminal (Gordon Cay) and the West Terminal. The site has three operating terminals, each of them dredged to a depth of 13 metres and equipped with the latest materials handling gear as well as a computer-aided management system for both operations and maintenance (PAJ, 2013).
Reverse logistics as a value added service for Jamaica’s transhipment

The North Terminal

- 535 metres of berth
- 47 hectares of yard space for stacking containers;
- 4 super-Post Panamax ship-to-shore gantry cranes

The South Terminal (Gordon Cay)

- 1,300 metres of berth
- 5 post-Panamax gantry cranes
- 6 super post-Panamax ship-to-shore gantry cranes
- 82 hectares (25 unpaved) of container storage space

The West Terminal

- 475 metres of berth
- Extension of 65 hectares of container yard
- 4 Super-Post-Panamax ship-to-shore gantry cranes (delivered, and commissioned into service)

KCT has gone through a number of expansions and improvements, the last of which was completed in 2009. With a current capacity of 2.8 million TEUs (twenty foot equivalent container units) the port is ready for expansion up to 3.2 million TEUs in its current configuration by converting available land into further container storage space. The site has three operating terminals, each of them dredged to a depth of 13 metres and equipped with the latest materials handling gear as well as a computer-aided management system for both operations and maintenance (Observer, 2013). Development of these ports are strategically planned for Jamaica to become a global logistical hub through port planning and logistics improvements to facilitate the accommodation of the post-Panamax ships start carrying a growing share of cargo, much of it from China (Bichou, 2009, p 61). So far, construction hasn't started, but blueprints call for the port to improve its nodal systems and interchange points by expanding the island’s existing container terminals, airports and roads (Bichou, 2009, p 225). A Chinese engineering
Reverse logistics as a value added service for Jamaica’s transhipment

Company is planning to develop a $1.5 billion transshipment port on a couple of mangrove-fringed islands just off Old Harbour (Gleaner, 2013).

1.3 Significance of study

This research seeks to analyse the economic benefits of using reverse logistics to improve Jamaica’s transhipment productive within the Caribbean and Latin American regions. Reverse logistics stands for all operation that related to the reuse of products and material. This involves application of waste consolidation and remanufacturing activities as an added value service for the transhipment.

The economic benefits of Jamaica becoming a global logistics hub will integrate other markets in the supply chain network that is, the ability to increase revenue for the country. The competitive environment within the region creates many constraints in establishing a logistics infrastructure that will effectively compete as a value added service due to market similarities, therefore using reverse logistics will be a unique service within the transhipment sector for Jamaica.

1.4. Problem Statement

Jamaica has a poor logistics performance in the Logistics Index; in 2014 the country was ranked 78 out of 160 countries. This ranking shows that the country needs to improve on its logistics performance in order to be competitive globally; in addition countries in Latin American and the Caribbean such as Panama, Colombia, Dominica Republic and the Bahamas are competing hubs thus are taking away some of the revenues Jamaica should be earning from transhipment.

In light of the above mentioned issues, the implementation of reverse logistics will regain competitiveness by capturing niche markets and will create employment and economic growth.
1.5 Research Objectives

Reverse logistics is an emerging business opportunity that has proved to be an integral part of the logistics system. Its’ contribution to national development has been vaguely analysed as it relates to transhipment. This research is on the use of reverse logistics with a proposed plan of developing global logistics hub which will greatly enhance Jamaica’s competitive advantages in the transhipment industry. The objectives are:

- To analyse the competitiveness of transhipment within the Caribbean region.
- To determine and evaluate the economic impact of transhipment within the Latin America and Caribbean Region.
- To examine how the Logistics Performance Index can be used as a guide line for economic development for Jamaica.
- To show the application of reverse logistics as a part of the Port and Logistic Centre added value services.

1.6 Scope of the study

This study examines the competitiveness of transhipment within countries in Latin America and the Caribbean and how Jamaica which is losing revenue in transhipment to these countries can become more competitive by implementing the process of reverse logistics. The research will provide rationalize Jamaica becoming a global logistics hub for consolidating recycled products from Caribbean countries for transhipment to manufacturing companies (reverse logistics) that will recycle these by-products into reusable items. The research will also analyse the development of logistics infrastructure as it relates to Gross Domestic Product (GDP) by assessing the economic development of major global ports such as Singapore, Rotterdam and Dubai. Highlighting the success of these ports will enable the researcher to recommend port management strategies for developing proper logistics performance in order for Jamaica to regain competitiveness with countries in Latin American and the Caribbean region.
1.7 Limitations of Study

The data collected were on the transhipment and container throughput volume for both global and regional ports. One of the major constraints for this research is limited data that is available; logistic performance index from the World Bank has a limited sample for four years, 2014, 2012, 2010 and 2007. Secondly, the databases for transhipment and container throughput are constraint for yearly cycle from the period of 1990 to 2013. Thirdly, the limited data available makes it difficult to use Eviews (Econometric Views), to create a regression model for GDP and Transhipment throughput using the time series data from 1990 to 2013. Fourthly, there is currently no database available for reverse logistics, therefore concept on the economic benefits is difficult to quantify.

The data collected were mainly based on the transhipment throughput for both regional and global ports. This will enable this research to truly evaluate Jamaica’s competitiveness in logistics and infrastructural intermodal networks. Reverse logistics is a segment of logistics that is an emerging industry that many manufactures are capitalizing in customer service, product recalls and recycling, however, limited data is available as it relates to the Caribbean and Latin American regions. These constraints will cause the research not to fully calculate the direct economic benefits of using reverse logistics within the transhipment shipping industry for Jamaica.
Chapter 2

2.0 Literature Review

2.1 Introduction

Jamaica was once rated the top transhipment port within the Latin America and Caribbean regions, however, in recent years, Kingston Container Terminal (KCT) has experienced diminishing world ranking and reduction in transhipment volume to major competing transhipment ports within the regions. These ports include Freeport, Bahamas; Port of Spain, Trinidad and Tobago; Caucedo, Dominica Republic; Colon, Panama and Cartagena Colombia. The contributory factor affecting this ranking and reduction in transhipment volume was related to the poor ranking of Jamaica on the Logistic performance Index. This is of growing concern for the country that has been faced with several economic challenges that have hindered GDP growth for several years. The government has embarked on a new initiative towards economic growth by conceptualizing a logistics hub that will facilitate transhipment of Post Panamax ships transiting the expansion of the Panama Canal that is slated for completion in 2015. This same venture (logistics hub) is being developed by other competing ports therefore the country needs to use added value services to attract niche markets in order to be competitive.

This review of literature discusses the contribution of globalization to GDP growth, economic growth by improving logistics performance, logistics correlation to economic growth, global container growth, current global trade routes and Panama canal expansion, transhipment and port competitiveness within the Latin America and Caribbean, transhipment growth within Latin America and the Caribbean, reverse logistics, reverse Logistics as an added value service and transhipment value added service.

An important trend in the literature is that growth of containerization increases yearly due to the economic growth in South East Asia. The growth of GDP is correlated to container throughput and there is a high correlation between GDP growth and logistics performance.
Reverse logistics as a value added service for Jamaica’s transshipment

Majority of the literature consulted were articles emanating from developed countries, just a few were written from the Caribbean perspective.

2.2 Globalization contribution to GDP growth

Globalization has influenced the growth of developed and developing economies globally (Ravenhill, 2014). Globalization is defined as “the process of interaction and integration among people, company and governments that is driven by international trade and investment with aid of informational technology” (Bhagwati, 2007, p.3). Branch (2009) stated that globalization and logistics have played an influential role in GDP growth as it relates to the influence of globalization on GDP. In the 21st century the process of globalisation has accelerated trade, increased labour and improved technology (Christopher, 2011). Figure 1b shows that globalization as influenced the GDP growth of Western Europe in 1000-1500 and China, 1990-2005. This has enabled these countries to surpass the world GDP per capita growth rate. The World Trade Organization (WTO) (2013) report, shown in Table 1 reveals that globalization has enabled an increased for the world merchandise exports and imports through the years 2010 to 2012. The trend decreases due to the 2008 world recession that has reduced the demand whereby, world merchandise exports fell by 46 percent from 2011 to 2012, whilst merchandise production recorded a 20 percent fall in demand resulting in a 20 percent reduction in world GDP.

Brand (2009), alluded that globalization has contributed to negative growth of both developed and developing countries due to the outsourcing of businesses to countries in South East Asia. European countries are facing high unemployment due to cheap imports from developing countries that are forcing manufacturing sectors to outsource or close production. Brand further stated that the industrialized sector in developing countries suffers due to the inability to compete with cheap products from countries in the South East Asia. Pinnock and Ajagunna (2009) have identified one of the negative effects of globalization on the Latin America and Caribbean regions by stating that globalization has created trade imbalance therefore, contributing to high freight rates in the Caribbean region.
Reverse logistics as a value added service for Jamaica’s transhipment

Figure 1b: Globalization growth influencing GDP


Table 1: World Merchandise exports and imports

<table>
<thead>
<tr>
<th></th>
<th>2005-12</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>World merchandise exports</td>
<td>3.5</td>
<td>14.0</td>
<td>5.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Agricultural products</td>
<td>4.0</td>
<td>7.5</td>
<td>6.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Fuels and mining products</td>
<td>2.0</td>
<td>5.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Manufactures</td>
<td>4.0</td>
<td>18.0</td>
<td>7.0</td>
<td>2.5</td>
</tr>
<tr>
<td>World merchandise production</td>
<td>2.0</td>
<td>6.5</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Agriculture</td>
<td>2.0</td>
<td>0.0</td>
<td>2.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Mining</td>
<td>1.0</td>
<td>2.0</td>
<td>1.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2.5</td>
<td>9.0</td>
<td>3.0</td>
<td>2.0</td>
</tr>
<tr>
<td>World GDP</td>
<td>2.0</td>
<td>4.0</td>
<td>2.5</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Source: World Trade Organization (WTO) 2013
2.3 Economic growth by improving logistics performance

Logistics is defined as a collection of functional activities that are repeated many times throughout the channel through which raw materials are converted into finished products and value is added in the eyes of consumers (Ballou, 1999). Christopher (2011) further supported this definition by stating that it is an essentially a planning orientation and framework that seeks to create a single plan for the flow of products and information through a business. Global logistics in the supply chain accounts for over USD 3.5 trillion annually (Mitra, 2008). The writer conducted a case study on the rapid development of India as it relates to the government investment in creating an effective logistics structure to boost economic growth, which generated employment for approximately 45 million people. The writer highlighted how the lack of infrastructural development in logistics can increase unemployment therefore affecting GDP growth by referring to Indonesia, which has been hampered by low logistical infrastructural development.

Similarly, container terminal has become an essential trade and logistics platform whose level of activity reflects not only the intensity of the use of its infrastructure, but also the logistical capabilities set in place to support its operations (Rodrique, 2012). The writer further stated that it is in containerized cargo that most of the development in logistics is taking place, mainly because it involves a wide range of goods and many of high added values.

Peters (2011) alluded that improving logistics performance is at the core of economic growth and competitiveness, however, the efficiency of a port’s throughput depends on the effectiveness of the logistics and supply chain network. Christopher (2011) stated that logistics and supply chain management can provide a multitude of ways to increase efficiency and productivity and hence contribute significantly to reduced unit costs. The efficiency of logistics as it relates to the shipping industries has a major influence on investment decisions of companies large and small, and thus affects the extent and location of job creation around the world (Hoekman, 2013). Maritime trade plays an integral part of logistics supply chain whereby
over 90 percent of world trade are seaborne. The shipping industry trades of import and export of goods plays a major role in globalization in which Liner Ships transports approximately 60 percent of the value of seaborne trade or more than US $4 trillion worth of goods annually (UNCTAD, 2013).

2.4 Logistics correlation to economic growth

Globalization has made demand for logistics services that are sophisticated and as created diversification of services to help operate uninterrupted supply chains (Arvis and Shepherd, 2010). Globalization will not benefit developing countries due to several constraints such as brain drain, trade imbalance and lack of competitiveness. Due to these constraints the World Bank created the logistics performance index (LPI) to help countries to identify the challenges and opportunities they faced in their performance on trade logistics and what they can do to improve their performance (World Bank, 2014).

According to Shepherd (2010), the index measures the key elements that foster economic growth. These key elements are:

- Infrastructure: ports, terminals, railways and roads
- Operations: warehousing, storage, local distribution, trucking and cabotage.
- Services: freight forwarders, customs brokers

Trade powerhouses in Europe like the Netherlands and developing countries such as Republic of Korea see sustainability in logistics as an engine of economic growth and integration within the global value chains (World Bank, 2013). Figure 2 shows the LPI index for countries that have advance logistics infrastructure; these are depicted by darker colour intensity while lighter colours represent the least intensity. Shepherd (2010) mentioned that LPI indicates that developed nations have both higher LPI and GDP ranking than developing economies. Pinnock and Ajagunna (2009), GDP ranking also depends on the economic activity of that nation.

Figure 3 indicates the LPI score of top ten (10) industrialized countries, its shows Germany ranking 1st at 4.12 and Netherland at 4.05 (2nd). These countries are global leaders in trade and
Reverse logistics as a value added service for Jamaica’s transhipment economic growth (World, 2013). According to Rodrigue (2013), some Latin America and Caribbean countries are facing slow growth and economic challenges because of poor logistics performance and infrastructural development that exist within the regions. It can be argued that only developed countries can really benefit from globalization due to strong logistics performance Index (Pettinger, 2007).

Figure 2: World LPI

![World LPI Map](image)

Source: World Bank 2014

Figure 3: LPI score of top ten industrialized countries

<table>
<thead>
<tr>
<th>LPI Score</th>
<th>4.12</th>
<th>4.05</th>
<th>4.04</th>
<th>4.01</th>
<th>4.01</th>
<th>3.96</th>
<th>3.96</th>
<th>3.95</th>
<th>3.92</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luxembourg</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.5 Global container growth

Growth in the container trade is ultimately driven by economic growth (Notteboom and Rodrigue, 2009). For the next decade at least, the structural relationships between the growth in container trade and economic growth will remain basically unchanged according to UNESCAP (2012). The starting point for this analysis was expectations of future economic growth. Figure 4 shows that the world container throughput increased from 69 Million TEUs (2001) to 160 Million TEUs in 2013 representing approximately a 5 percent increase in global container trade (Clarkson, 2013).

Figure 4: World Container Export Million TEUs

Source: Clarkson 2014.

2.6 Current global trade routes and Panama Canal expansion

In recent years, the growth in the amount of cargo shipped worldwide continues to increase, partly due to rapid expanding economies in Asia (Rodrigue, 2008). The Panama Canal transit accounts for over 20 percent of worldwide shipping traffic; this is over 70 percent of all cargo to and from the United States (Pinnock & Ajagunna, 2012). In 2012, the Asia – North America route accounts for over 39 percent of total global container shipping volume for both east and west bound as shown in Table 2, followed by the Asia – North Europe route that
Reverse logistics as a value added service for Jamaica’s transhipment

accounts for 23 percent and Asia – East Coast South America accounts for approximate 4 percent (WSC, 2014). The Panama Canal plays an important role in the shipping routes figure 5, shows a visual route map of Panama Canal. The route traffic shows that Jamaica strategically lies along the major shipping routes that will increase transhipment volume upon the completion of the Panama Canal slated for 2015. Bichou (2009) stated that the strategic location of a port is not the only factor that improves competitiveness for transhipment but it is the ability of the port to facilitate the needs of the supply chain.

Table 2: Top Global shipping routes of Containers in TEUs

<table>
<thead>
<tr>
<th>Route</th>
<th>West Bound</th>
<th>East Bound</th>
<th>North Bound</th>
<th>South Bound</th>
<th>Total</th>
<th>Share(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia- North America</td>
<td>7,529,000</td>
<td>14,421,000</td>
<td></td>
<td></td>
<td>21,950,000</td>
<td>38%</td>
</tr>
<tr>
<td>Asia- North Europe</td>
<td>8,959,000</td>
<td>4,406,000</td>
<td></td>
<td></td>
<td>13,365,000</td>
<td>23%</td>
</tr>
<tr>
<td>Asia- Mediterranean</td>
<td>4,371,000</td>
<td>1,875,000</td>
<td></td>
<td></td>
<td>6,246,000</td>
<td>11%</td>
</tr>
<tr>
<td>North Europe-North America</td>
<td>2,632,000</td>
<td>1,250,446</td>
<td></td>
<td></td>
<td>4,637,000</td>
<td>8%</td>
</tr>
<tr>
<td>Asia-Middle East</td>
<td>2,802,151</td>
<td>1,250,446</td>
<td></td>
<td></td>
<td>4,052,597</td>
<td>7%</td>
</tr>
<tr>
<td>Australia-Far-East</td>
<td></td>
<td></td>
<td>1,072,016</td>
<td>1,851,263</td>
<td>2,923,279</td>
<td>5%</td>
</tr>
<tr>
<td>Asia-East Coast South America</td>
<td></td>
<td></td>
<td>550,000</td>
<td>1,399,000</td>
<td>1,949,000</td>
<td>3%</td>
</tr>
<tr>
<td>North Europe/Mediterranean-East Coast</td>
<td></td>
<td></td>
<td>824,000</td>
<td>841,000</td>
<td>1,665,000</td>
<td>3%</td>
</tr>
<tr>
<td>South America</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America -East Coast South America</td>
<td>667,000</td>
<td>574,000</td>
<td></td>
<td></td>
<td>1,241,000</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>58,028,876</strong></td>
<td></td>
</tr>
</tbody>
</table>


Figure 5: Global Shipping Routes in 2007
2.7 Transhipment and port competitiveness within the Latin America and Caribbean Regions

According to McCalla (2008), transhipment of containers is the fastest growing segments of global trade, therefore, competition among ports to attract large vessels for transhipment is one of the attributes that port compete for in order to gain greater market share. In-order to determine the competitiveness of ports within the Caribbean region, it is necessary to do a SWOT analysis. This model is widely used according to Bichou to assess the competitive intensity and attractiveness of ports. SWOT analysis is used for auditing the overall strategic position of a business and its environment (Kachru, 2005). The major transhipment ports within the Caribbean region are Jamaica, Panama, Colombia, Dominican Republic and Bahamas. These ports compete for transhipment volume (Gleaner, 2010).

2.8 Transhipment growth within Latin America and the Caribbean

Rodrigue (2013) stated that at the global level, 16 percent of commercial relations involve direct connections between ports, thus transhipment is a fundamental aspect of maritime shipping networks. The container throughput in the Latin American and Caribbean port system grew from 10.4 million twenty-foot equivalent units (TEUs) in 1997 to 41.3 million (TEUs) in 2011. The movement in 2011 was equivalent to 7 per cent of all global port movements. Twenty percent (20%) of all containers in Latin America and the Caribbean (LAC) are shipped to Brazil followed by Panama (16 percent), Mexico (10.23 percent), Chile (8.21 percent), Colombia (6.89 percent), Argentina (5.16 percent) and Jamaica (4.58 percent) (ECLAC, 2012). Table 3 shows the share of total container throughput volume.

In the Caribbean the transhipment volume, route and destination form a triangle that currently consists of six ports - Freeport, Kingston, Colon, Cartagena and Port of Spain. Most of the transhipment occurs at Colon in Panama, Kingston Container Terminal (KCT) in Jamaica and Freeport Container Terminal in Bahamas. Together these terminals handled an estimated 66 percent of transhipment in the Caribbean (Isik, 2012). In figure 6 shows, the port traffic within the Caribbean region.
Reverse logistics as a value added service for Jamaica’s transhipment

Table 3: Transshipment container volume for each country share regional

<table>
<thead>
<tr>
<th>Country</th>
<th>TEUs</th>
<th>Share of Regional Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>7909</td>
<td>19.14%</td>
</tr>
<tr>
<td>Panama</td>
<td>6630</td>
<td>16.05%</td>
</tr>
<tr>
<td>Mexico</td>
<td>4226</td>
<td>10.23%</td>
</tr>
<tr>
<td>Chile</td>
<td>3393</td>
<td>8.21%</td>
</tr>
<tr>
<td>Colombia</td>
<td>2845</td>
<td>6.89%</td>
</tr>
<tr>
<td>Argentina</td>
<td>2131</td>
<td>5.16%</td>
</tr>
<tr>
<td>Jamaica</td>
<td>1892</td>
<td>4.58%</td>
</tr>
<tr>
<td>Peru</td>
<td>1805</td>
<td>4.37%</td>
</tr>
<tr>
<td>Ecuador</td>
<td>1527</td>
<td>3.70%</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>1382</td>
<td>3.34%</td>
</tr>
<tr>
<td>Venezuela</td>
<td>1335</td>
<td>3.23%</td>
</tr>
<tr>
<td>Guatemala</td>
<td>1176</td>
<td>2.85%</td>
</tr>
<tr>
<td>Bahamas</td>
<td>1116</td>
<td>2.70%</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>1069</td>
<td>2.59%</td>
</tr>
<tr>
<td>Uruguay</td>
<td>861</td>
<td>2.08%</td>
</tr>
<tr>
<td>Honduras</td>
<td>663</td>
<td>1.60%</td>
</tr>
<tr>
<td>Cuba</td>
<td>247</td>
<td>0.60%</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>171</td>
<td>0.41%</td>
</tr>
<tr>
<td>El Salvador</td>
<td>160</td>
<td>0.39%</td>
</tr>
<tr>
<td>Guadeloupe</td>
<td>151</td>
<td>0.36%</td>
</tr>
<tr>
<td>Curacao</td>
<td>94</td>
<td>0.23%</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>84</td>
<td>0.20%</td>
</tr>
<tr>
<td>Barbados</td>
<td>77</td>
<td>0.19%</td>
</tr>
<tr>
<td>Saint Maarten</td>
<td>77</td>
<td>0.19%</td>
</tr>
<tr>
<td>Saint Lucia</td>
<td>60</td>
<td>0.15%</td>
</tr>
<tr>
<td>Guyana</td>
<td>60</td>
<td>0.14%</td>
</tr>
<tr>
<td>Aruba</td>
<td>54</td>
<td>0.13%</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>45</td>
<td>0.11%</td>
</tr>
<tr>
<td>Belize</td>
<td>34</td>
<td>0.08%</td>
</tr>
<tr>
<td>Antigua and Barbuda</td>
<td>22</td>
<td>0.05%</td>
</tr>
<tr>
<td>Saint Kitts and Nevis</td>
<td>3</td>
<td>0.01%</td>
</tr>
<tr>
<td>Anguilla</td>
<td>3</td>
<td>0.01%</td>
</tr>
</tbody>
</table>

Source: CEPAL, 2009
Reverse logistics as a value added service for Jamaica’s transhipment

Figure 6: Caribbean Transhipment Triangle

Source: Gozde, 2012

2.9 Transhipment value added service

In logistics the term value added service is related to customer satisfaction (Bichou, 2009). The level of customer satisfaction will ultimately determine how competitive a port will be within transhipment. However, according to McCalla (2005) the level of customer satisfaction will ultimately determine how competitive a port will be in transhipment. The rapid growth in world trade through containerization is creating intermodalism in trade patterns that challenges ports to improve operational efficiency and turnaround time. (Bichou, 2009).

McCalla further stated that the purpose of transhipment not only serves to reduce the total cost of collecting and distributing containers by mega-mainline container vessels from and to numerous origins and port destinations it also serves to do the following:

- improve just-in time delivery of cargo
- reduces in transit inventory
- create seamless movements of containerized cargo
Reverse logistics as a value added service for Jamaica’s transhipment

Transhipment also offers opportunities for cargo consolidation or deconsolidation and value added activities such as assembly, calibration and customizing to meet specific local or time varying demands (Mingu & Chew, 2011). According to Flankel (2009) these value added services of transhipment influence economic and operational benefits that tend to outweigh port operational charges. While it may be argued that transhipment is an added value service to ports. The competitive environment makes it difficult for ports to compete on only one aspect of value added services; therefore the reverse logistics concept would be important to increase niche markets (Mattfield, 2006).

3.0 Reverse logistics

According to Reeves (2008), the term forward logistics refers to goods from supplier to customer while reverse logistics deals with the flows of goods and information that are necessary to collect used products, packaging materials, production scrap and other residues and bring them to places where they can be reused, remanufactured, recycled or disposed of properly. It is sometimes referred to as “logistics backwards” because it flows opposite of the supply chain (Dyckhoff, 2008). Figure 7 shows the relation between the actors in the forward and reverse supply chain. The waste materials from the forward supply chain can be used as secondary materials by both suppliers and manufacturers or as a substitute new product for the retailers and customers.
According to Dyckhoff (2008), reverse logistics is comprised of different processes, some of which are relevant in the supply and distribution logistics, whereas others are specific for backwards logistics relating to the following:

- Collection that comprises of all activities gathering waste from it various places of origin which are typically widely distributed in an area.
- Sorting that serves to split the waste volume into fractions which will undergo different measures of treatment.
- Transportation and transhipment are necessary to span the physical distance between consecutive processes of reverse logistics.
- Warehousing takes place before transportation, transhipment or processing activities. It is necessary in order to receive lot sizes that fully utilize transportation or processes facilities.
- Processing activities that result in the transformation of waste into reusable products or into a condition in which it is harmless to the environment.
3.0.1 Reverse logistics as an added value service

Reverse logistics is a growing business that has opportunity for cost saving and economic development. In 2001, reverse logistics cost was estimated to be 4 per cent of the total logistics cost which amount to approximate US$35 billion in the United States alone (Schatterman, 2002). Product returns can affect every channel member from consumers, retailers and wholesalers to manufacturers. Greve and Davis (2010) stated that China had a 3.4 percent return of products from all industries; this amounted to 5.6 percent of return expense of the total logistics. However, companies can reduce the costs associated with returns considerably through a number of different ways and even use their capabilities as a competitive weapon (Schatterman, 2002). Ports can capitalize on this opportunity by creating an added value services to facilitate product returns with in the supply chain especially as it relates to consolidation and deconsolidation of transhipment (Bichou, 2009).

The global transportation cost can be very volatile due to freight cost. Companies are finding unexpectedly having low product margin due this unpredictability of freight cost that can cause the products to have a higher unit cost when source from low-cost country (Pinnock and Ajagunna, 2012). A business’s success is increasingly linked to effectively managing international logistics (Christopher, 2011). Growing low-cost country sourcing and rising sales to international customers are triggering companies to seek new ways to manage the costs, complexities, and uncertainties of moving goods across borders (Dahlman, 2009). A logistics centre seeks to resolve this issue by creating a consolidative centre where all the activities relating to transport, logistics and goods distribution both for national and international transit are carried out, on a commercial basis, by various operators (EEIG, 2004).

The logistics centre seeks not only to reduces transportation cost through distribution of goods but it also along with reverse logistic serves as a competitive advantage among other competing ports that will be developing or improving logistic infrastructure in anticipation of the completion of the Panama canal (Bichou, 2009, pp239).
3.0.2 Opportunities in using Reverse Logistics

The Logistics Centre (LC) represents an innovation posing challenges and opportunities for many operators involved in freight transport, logistics, manufacturing and trade, while particularly offering to the local productive systems the best solutions in terms of transportation, warehousing and logistics activities (Iannone et al, 2007).

The key function in LC’s identified to facilitate the Reverse Logistic chain are: (1) Coordination and Co-operation, (2) Centralization, (3) Consolidation, (4) 3rd Party Collaboration and (5) Integration.

- Coordination and Cooperation: It is an underlying assumption in distribution, logistics and supply chain management that a higher level of coordination between the actors is superior to a lower, and will in turn lead to increased performance. The empirical results indicate that well-functioning coordination and cooperation mechanisms across flows decrease costs and increase the level of service.
- Centralization: the presence of LCs in the RL network creates a frame work which allows firms to operate within a wide variety of geography, economic and political context and turn into an effective network for multimodal transport services operating as the main leg of an international flow of goods.
- Consolidation: LCs are one the urban freight infrastructures designed to promote consolidated delivery, in harmony with the facilitation of logistics activities (Button & Vega, 2012)
- 3rd Party Reverse Logistics Collaboration: The 3 PLs providers have expertise and a broader view of how RL works because they work with multiple firms and industries. They can leverage their knowledge and software to benefit everyone. Typical services outsourced to 3PLs providers are transportation, warehousing, inventory; value added service, information services and reengineering of the supply chain (Du and Evan, 2008).
- Integration: Dowlatshahi (2000) argues that “from design through manufacture to consumer, firms should explore and integrate RL as a viable business option in the product life cycle.” The integration of transport and logistics activities in a single facility is more economic and efficient than several smaller intermodal terminals.
Reverse logistics as a value added service for Jamaica’s transhipment

3.0.3 Jamaica a strategic location for reverse logistics

Jamaica’s strategic location to the United State market and global shipping lanes can create greater opportunities for local investors (Gleaner, 2013). These opportunities will be to establish operation (3 PL and 4PL); in reclaiming, refurbishing, repackaging, reselling and recycling goods expected to be shipped through the nation’s ports (EEIG, 2004). However, according to Adwin (2011), the lack of clear strategy in reverse logistics will be a challenge because most 3PL and 4PL providers are new to this industry and the services may not be well established professionally.

According to Pinnock and Ajagunna (2012), Reverse logistics within Jamaica’s supply chain could create add value services for outlet retailers stores through repackaged branded goods at reduced prices, parts and materials reclamation or salvaging, particularly metals and plastics, manufacture of packaging for goods to be resold, and large-scale repairs centres, which manage the refurbishing and repair of goods distributed throughout the region. This in effect will create job opportunities through these established operators in the fields of customer services and support, electronic, engineering, computer technology, marketing and sales (Observer, 2014).

According to Reeves (2008), the added value services offered through reverse logistic to clients such as outsourcing repairs and warranty services, returns management, transportation and material procurement in order to reduce delays to customers and allow their employees to focus their efforts on production and sales. On the contrary, Adwin argued that most logistic providers lack of expertise will provide inconsistent services that can create frustration among customer because lack of clear goals and objectives.

Jamaica logistical hub can service these initiatives through the logistic centre and the growing transhipment market as shown in figure 8, Jamaica centric location has given it a competitive advantage in reaching to major markets such as Central America, South America, and Europe and US East coast.
3.0.4 Commercial applications of reverse logistics services

Reverse logistics as an added value for ports is nothing new. It has been used by several shipping companies such as Rhenus Logistics Company as an added value service for the company for several years (Rhenus, 2014). Their reverse logistics services cover the following:

Pallet Management

- Pallet management, whereby, pallet management services include returning of empty pallets for loading new products or returning all outstanding pallets when the maximum is reached.

Removal of used discarded products for disposal/recycling.

- Disposal of old equipment for ecological destruction, upon delivery of new equipment.
Reverse logistics as a value added service for Jamaica’s transhipment

Reverse logistics for automotive sector

- Reverse logistics in automotive sector mainly includes deliveries of empty containers and pallets back to the supplier.

Returning of Claimed Equipment

- They not only offer deliveries of new equipment to retail chains, but also transportation of claimed equipment or recycling of discarded items.

3.0.5 Value-added logistics (VAL)

In ports the term VAL can be interchange with value added services and general logistics services, however in logistic management, added value is pursued in post-production and pre-distribution process which includes the following:

Completing, packaging, repackaging and wrapping

- This is the most provided value added services. They provide warehousing in the logistic hub for shipment and packaging for transportation and delivery to customer. They provide deconsolidation, completion of new shipments, packaging for transport and delivery to customer (Rhenus, 2014).

Consolidation and Deconsolidation

- Consolidation and deconsolidation is closely linked with cross-dock and hub-and-spoke technology. Shipment will be transported to nearest HUB centre, where by the shipment are sent to nearest HUB centre and delivered to the customer location at shortest transit time whereby, national shipment will be delivered within 24 hrs.

Sticking, marking and labelling

- Shipments will be equipped by logo, tag, label, price tag, according to customer specifications.

Quality Control

- Using visual and mechanical inspection of functionality and quality of products for the detection of possible defects or malfunctions.
Reverse logistics as a value added service for Jamaica’s transhipment

Completion and pre-assembly

- Ensure pre-assembly for product manufacturers or arrangement for Just-in-sequence production mode directly to production line. Second option is final assembly of product for maximal displacement of point of disconnection of supply chain to reduce stocks and cost of storage.

Assembly and disassembly

- Assembly of products for retailers and export. Disassembly for product recall and recycled or disposal.

3.0.6 Reverse logistics in the Tire shredding Industry

The Tyre Shredding Industry in the United States was estimated at US$1 billion dollars in 2012 that has an annual growth of 1.7 percent each year (BIR, 2012). This in effect means that it is growing market in reverse logistic whereby companies are finding cost effective ways of going green (Christopher, 2011). The environmental effects on the growing trend of scrap tire are shocking and needs to be controlled; it estimated that there are 2 to 3 billion scrap tyres stockpiled in the US which is a situation that mirrored globally (Reschner, 2013).

According to the Bureau of International Recycling (2012) there are an estimated 800 million cars and commercial vehicles in use worldwide, with almost 70 million units being added to that number every year. This exponential growth in the automobile sector has been accompanied by a substantial increase in volume of end-of-life tyres.

Disposing of tyres in landfills or stockpiles can cause severe environmental and health concerns:

- In many cases, tyre stockpiles end up being burned, releasing toxins and pollutants into the air, water and soil.
- Stockpiled tyres hold water very efficiently, creating an ideal breeding environment for insects, rodents and other parasites that can transfer diseases to humans.
3.0.7 Recycling Processes

The recycling of tires undergoes three processes.

1. **Shredding**: When producing tyres, the vulcanisation process makes the rubber more durable and flexible. Unfortunately, this makes the melting process difficult, so tyres must be broken down and shredded into strips.

2. **Steel removal**: Shredding machines use rotors to further shred the material and to remove steel fibres from tyres. Magnets are used to separate the steel from the rubber.

3. **Grinding**: Once the steel is removed, the strips are placed into granulators. Different applications are employed to determine the desired consistency of the recycled rubber, which can be grounded into granules, shreds, chips, crumbs or powder.

3.0.8 Applications

Tyres are one of the most versatile recycled materials and are used as fuel or for numerous innovative applications, such as construction and civil engineering. Figure 9, shows the shredded tyres load for transshipment.

- Granulated scrap tyres are used in cement kilns, pulp and paper factories, as well as in power plants.
- In civil engineering works, shredded tyres are used as filling to stabilise weak soil and also as insulation for roads, walls and bridge abutments.
- Rubber powder and granulates are extensively used in asphalt applications. They improve road performance by adding extra traction, reducing noise levels and lowering maintenance costs.
- Granulated rubber is employed in building sports facilities. Its shock-absorbing properties are ideal for surfaces of running tracks and playgrounds.
- Rubber improves drainage when used underneath grass playing fields.
3.0.9 Scrap metal industry

Global scrap metal industry is rapid growing market according to the Bureau of International Recycling (2014), the global scrap metal industry is estimated at value of over US$90 Billion dollars, the US ferrous and non-ferrous scrap metal recycling industry continues to grow, driven by a recovering US economy, a growing Asian economy, and the growing demand for products manufactured with recycled materials. The industry processes more than 145 million tons of recyclable materials each year into raw materials. This industry has generated over 15,000 jobs and support 463,000 workers in the United States (BIR, 2014). According to Usifer (2012) the Scrap Metal Recycling Industry has been exposed to the full force of the global economy over the past five years. China, now the world’s largest steel producer, has contributed to the reduction in the global percentage of scrap steel used to produce steel from 43.9% in 2000 to 37.5% in 2010 (Usifer, 2012).

Jamaica can capitalize on this opportunity by using transhipment as a value added service for scrap metal consolidation from Latin America and Caribbean region. This
consolidation will enable trade imbalance to be reduce and create sustainable economic sustain
economic benefits

3.10 Analysing Ratification Laws for logistics firms in Jamaica

3.10.1 Basel Law

The Basel Law was established internationally to prevent movements of electronic and hazardous wastes from OECD to non OECD countries. Jamaica is a signatory to the law. The Law also establishes guidelines as it relates to reverse logistics. The Basel Convention was accepted by Jamaica in January 23, 2003 but it was not ratified (NEPA, 2014). The central objective of the Basel agreement was to establish limits on the migration of waste from developed countries to developing countries which however still occurs today. Countries in Africa and Asia are the main destinations of waste of electrical and electronic equipment as illustrated in figure 10 below (Correa, 2013).

Figure 10a: Electronic waste export

Source: Basel convention, 2013
Jamaica is not faced with the problems of electronic dumping, however, within the boundaries of reverse logistics the recall of electronic items is eminent due to the structure of the reverse logistics framework that facilitate amendments to customer related issues, which is crucial to virtually every business. Most successful organizations leverage their RL capacity by addressing the wants, and expectations of customers, while also creating and maintaining a competitive advantage (Pollack, 2007). The Basel Law will have to be ratified and enforced in Jamaica to protect the country’s logistics framework and to prevent operators from breaching environmental laws.
Chapter 3

3.0 Design and Methodology

Qualitative research methodology was used to fulfil the stated objectives of the research. This methodology was used as it seeks answers to questions, systematically uses a predefined set of procedures to answer questions, collects evidence, produces findings that were not determined in advance, and produces findings that are applicable beyond the immediate boundaries of the study (Mack, 2005). The writer further stated that qualitative research methods are more flexible, they allow greater spontaneity and adaption of the interaction between the researcher and the participants. In addition, the relationship between the researcher and the participants is often less formal than elaborately and in greater detail than is typically the case with quantitative method.

3.1 Method of Data Collection / Instruments

Content analysis is a method of analysing written, verbal or visual communication messages. As a research method it is a systematic and objective means of describing and quantifying phenomena. It is also known as a method of analysing documents. Content analysis allows the researcher to test theoretical issues to enhance understanding of the data (Elo and Kyngas, 2007, p. 107). In content analysis the relationship between the researcher and the participants is often less formal than elaborately and in greater detail than is typically the case with quantitative method.

Through content analysis, it is possible to distil words into fewer content-related categories. It is assumed that when classified into the same categories, words, phrases and the like share the same meaning. Elo and Kyngas further stated it is a research method for making replicable and valid inferences from data to their content with the purpose of providing knowledge, new insights, a representation of facts and a practical guide to action. The aim is to attain a condensed and description of the phenomenon and the outcome of the analysis its concepts or categories describing the phenomenon. Usually the purpose of those concepts is to build up a model, conceptual system, conceptual map or categories.
Reverse logistics as a value added service for Jamaica’s transhipment

Sources used are books (e-books and printed), journal and magazine articles, newspaper articles, documents and theses. The researcher analysed the above mentioned sources in obtaining data that related to the economic impact of reverse logistics as a value added service for Jamaica’s transhipment. Data was analysed on gross domestic product (GDP), global shipping industry, econometric, global and regional container throughput, Logistics Performance Index (LPI), competitive analysis and market research.

A case study was conducted on the world’s leading trans-shipment ports such as Rotterdam, Singapore and Dubai. This allowed the researcher to analyse port management concepts and strategies that are successfully used by these ports and also to examine their added value services that enabled them to be highly competitive within their geographical regions.

3.2 Reliability and Validity

According to Patton (2001), validity and reliability are two factors which any qualitative researcher should be concerned about when conducting a research.

3.2.1 Reliability

Joppe (2000) defines reliability as “the extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable”. (p. 1). To ensure reliability in qualitative research, examination of trustworthiness is crucial and this is important to research. For this research, the instrument used, content analysis was reliable as information and data were retrieved from authentic sources such as books (prints and e-books), journal and magazine articles and documents were retrieved from online databases and Google scholar and newspaper articles. It can be deduced that the findings analysed from these sources are factual and can be used by government, academia, organizations and persons interested in the research topic.
3.2.2 Validity

Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, does the research instrument allow you to hit "the bull’s eye" of your research object? Researchers generally determine validity by asking a series of questions, and will often look for the answers in the research of others. Some qualitative researchers have argued that the term validity is not applicable to qualitative research, but at the same time, they have realised the need for some kind of qualifying check or measure for their research (Joppe, 2000).

The instrument used that is content analysis was valid as it measured and answered the stated research objectives thus recommendations were provided from the sources used.

3.2.3 SWOT Analysis

SWOT Analysis was used to assess the competitive advantages on each competing port in the Latin America and Caribbean regions. According to Bichou (2009), SWOT analysis is a widely used approach for auditing the overall strategic position of a port and its environment.
4.0 Analysis of data and presentation of findings

4.1 Introduction

The objectives of this study are to:

- To analyse the competitiveness of transhipment within the Caribbean region.
- To determine and evaluate the economic impact of transhipment within the Latin America and Caribbean Region.
- To examine how the Logistics Performance Index can be used as a guide line for economic development for Jamaica.
- To show the application of reverse logistics as a part of the Port and Logistic Centre added value services.

This chapter describes and analyses the data collected from printed and electronic sources such as books, journal and magazine articles (online databases and the Internet), documents and newspaper articles. For this matter, excerpts of actual quotes were included to validate assumptions made. The findings of the study are discussed in relation to the objectives; listing the more significant outcomes resulting from the data therefore regulated discussion and logical interpretations were provided.
Objective # 1

4.2 To analyse the competitiveness of transhipment within the Caribbean region.

4.2.1 Transhipment volume

In 2011 Kingston Container Terminal saw record volumes of transhipment cargo passing through its port. According to the most recent data released by the Port Authority of Jamaica (PAJ) for 2014, over 13.4 million metric tonnes of cargo was discharged and loaded at the port, which was 14.2 per cent higher than the year 2010 as shown in figure 10.

Figure 10: Transshipment Cargo Kingston Container Terminal

The number of cargo vessels visiting Kingston Container Terminal (KCT) increased yearly by 10.4 per cent in 2010, although a number of those ships were new generation mega vessels that have a capacity of 10,062 TEU (20-foot equivalent units), which meant more volumes could be moved with fewer ships; economy of scale. For instance as shown figure 11, the PAJ reported that 1,485 cargo vessels visited KCT in 2010 compared to 1,749 in 2006. This increase in transshipment volume was due to the move of the Chilean shipping line Compañía Sud Americana de Vapores (CSAV) to the Kingston Port (Gleaner, 2011). This increase in trend did not continue for the years 2012 and 2013 which shows a decrease of 37 per cent and 45 percent respective in comparison to 2011(PAJ, 2014). Transshipment cargo actually didn't
Reverse logistics as a value added service for Jamaica’s transhipment

decline in 2009, when the world was going through economic recession, but was actually up by 3.5 per cent (Donaldson, 2013). In 2007 volumes peaked by 2.7 per cent then dropped to 8.8 per cent in 2008. The fall in volume was a result of Maersk’s Shipping Line decision to stop using Kingston as its regional transshipment hub in late 2007 (PAJ, 2012) as shown in figure 11.

Figure 11: Container ships visit to the port.

![Graph showing container ships visit to the port from 2004 to 2013](image)

Source: Kingston terminal 2013

4.2 Major Shipping lines to the KCT

Jamaica has been the leading transhipment port within both the Caribbean and Latin America regions throughout the years 2001 to 2008 (McCalla, 2005). Please see table 4, for further details.
Reverse logistics as a value added service for Jamaica’s transhipment

Table 4: Shifts in rankings for port container traffic in Latin America and the Caribbean, (2005-2013)

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Santos</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Colon</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Kingston</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Buenos Aires</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Freeport</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Puerto Cabello</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>12</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>Cartagena</td>
<td>10</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Rio Grande</td>
<td>13</td>
<td>18</td>
<td>18</td>
<td>21</td>
<td>18</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Balboa</td>
<td>14</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Caucedo</td>
<td>33</td>
<td>35</td>
<td>21</td>
<td>15</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>


Jamaica’s success in the transhipment is due to the world’s major shipping line that saw the port favourable for transshipment (PAJ, 2012). In July 2006, Kingston Container Terminal (KCT) was connected by different container shipping lines directly to the continents of Asia, North America, South America and Europe. There were hemispheric connections between the coasts of North, Central and South America likewise several regional connections throughout the Caribbean Basin from Florida to Venezuela and Mexico to the Eastern Caribbean Islands (Rodriquez, 2008). In 2006, there were a total of 37 distinct shipping services to and from Kingston many of them being shared among different shipping lines as shown Table 5.
Reverse logistics as a value added service for Jamaica’s transhipment

Table 5: Shipping line share of market

<table>
<thead>
<tr>
<th>MARKET</th>
<th>Rank</th>
<th>Global Market Growth (%)</th>
<th>Relative Market Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZIM</td>
<td>17</td>
<td>-0.70%</td>
<td>58%</td>
</tr>
<tr>
<td>CAM-CGM</td>
<td>3</td>
<td>-0.07%</td>
<td>27%</td>
</tr>
<tr>
<td>CSAV</td>
<td>19</td>
<td>-25.50%</td>
<td>9%</td>
</tr>
<tr>
<td>OOCC</td>
<td>4</td>
<td>14.6%</td>
<td>7%</td>
</tr>
<tr>
<td>SEABOARD</td>
<td>39</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>NYK</td>
<td>12</td>
<td>29%</td>
<td>4%</td>
</tr>
<tr>
<td>SEAFRIEGHT</td>
<td>95</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>MAERSK</td>
<td>1</td>
<td>2.10%</td>
<td>1%</td>
</tr>
<tr>
<td>HAPAQ LLYOD</td>
<td>6</td>
<td>-1.50%</td>
<td>3%</td>
</tr>
<tr>
<td>HAMBURGE</td>
<td>11</td>
<td>4.10%</td>
<td>1%</td>
</tr>
<tr>
<td>EVERGREEN</td>
<td>4</td>
<td>24.30%</td>
<td>1%</td>
</tr>
<tr>
<td>COSCO</td>
<td>5</td>
<td>14.60%</td>
<td>1%</td>
</tr>
<tr>
<td>HMM</td>
<td>15</td>
<td>15.90%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Source: UNCTAD 2012

4.3 Current shipping line to the KCT

Currently, Jamaica’s transhipment is supplied by several shipping lines such as ZIM, CMA-CGM, CSAV, MAERSK, SEAFRIEGHT and others. In 2012 ZIM shipping line accounts for 58 percent of Jamaica transhipment followed by CMA –CGM at 24 percent and thirdly, CSAV at 9 percent. The share of market in table 5 shows that Jamaica has a low share of market with the other major shipping lines such as Maersk Hamburge, Evergreen, COSCO and HMM. These shipping line are showing positive global growth however, Jamaica’s share of market is relative low (UNCTAD, 2013)

4.4 Container traffic and shipping lines’ market share

In 2011, ports in Latin America and the Caribbean handled over 41.3 million TEUs, representing an increase of 11.1 percent in comparison to the previous year; this represents 7 percent of the world’s total TEU (UNECLAC, 2012). Asia was the global leader in terms of cargo volume handled in 2011 accounting for 60 percent of total traffic, followed by North Europe with 62 million TEUs comprising 11 percent of global cargo traffic. China alone handled almost 30 percent of global cargo traffic. Figure 12 shows that the Caribbean accounted for a small share of the global traffic with 5.1 million TEUs that made up only 1 percent of total cargo movement in 2011.
Reverse logistics as a value added service for Jamaica’s transhipment

In 2013, data from UNECLAC revealed that Latin America and Caribbean ports had a growth rate of 1 percent which was slow in comparison to the previous years of 2011 and 2012 that had 7 to 14 percent growth rate (UNECLAC, 2013). The decline in transhipment for these ports is shown in table 6, which revealed that Colombia and Jamaica had annual decline of -6.9 percent and -8.2 percent, respectively, Panama and Dominican Republic recorded during the same period -4.3 percent and -21.7 percent in contrast, to four countries in South America and one from Central America maintained a steady momentum of growth in its ports, despite the declining rate in the global context. This is the case for Argentina (9.8%), Brazil (6.2%), Uruguay (9.7%), Chile (6.0%) and Ecuador (3.9%).
Reverse logistics as a value added service for Jamaica’s transhipment

Table 6: Container throughput for each port variance 2012/2013

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Puerto/Port</th>
<th>País/Country</th>
<th>2011 (TEU)</th>
<th>2012 (TEU)</th>
<th>2013 (TEU)</th>
<th>Variación/change % 2013/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colón</td>
<td>Panamá</td>
<td>3,371,714</td>
<td>3,518,672</td>
<td>3,336,060</td>
<td>-4.6%</td>
</tr>
<tr>
<td>2</td>
<td>Santos</td>
<td>Brasil</td>
<td>2,985,922</td>
<td>2,961,426</td>
<td>3,221,348</td>
<td>8.8%</td>
</tr>
<tr>
<td>3</td>
<td>Balboa</td>
<td>Panamá</td>
<td>3,232,265</td>
<td>3,304,599</td>
<td>3,187,387</td>
<td>-3.5%</td>
</tr>
<tr>
<td>4</td>
<td>Manzanillo</td>
<td>México</td>
<td>1,762,508</td>
<td>1,992,176</td>
<td>2,136,157</td>
<td>7.2%</td>
</tr>
<tr>
<td>5</td>
<td>Cartagena</td>
<td>Colombia</td>
<td>1,853,342</td>
<td>2,205,948</td>
<td>1,987,864</td>
<td>-9.5%</td>
</tr>
<tr>
<td>6</td>
<td>Callao</td>
<td>Perú</td>
<td>1,615,165</td>
<td>1,817,663</td>
<td>1,856,020</td>
<td>2.1%</td>
</tr>
<tr>
<td>7</td>
<td>Buenos Aires</td>
<td>Argentina</td>
<td>1,851,687</td>
<td>1,656,428</td>
<td>1,784,800</td>
<td>7.7%</td>
</tr>
<tr>
<td>8</td>
<td>Kingston</td>
<td>Jamaica</td>
<td>1,755,832</td>
<td>1,855,425</td>
<td>1,703,949</td>
<td>-8.2%</td>
</tr>
<tr>
<td>9</td>
<td>Guayaquil</td>
<td>Ecuador</td>
<td>1,405,752</td>
<td>1,448,887</td>
<td>1,517,910</td>
<td>4.8%</td>
</tr>
<tr>
<td>10</td>
<td>Freeport</td>
<td>Bahamas</td>
<td>1,116,000</td>
<td>1,202,000</td>
<td>1,500,000</td>
<td>24.8%</td>
</tr>
<tr>
<td>11</td>
<td>San Juan</td>
<td>Puerto Rico</td>
<td>1,484,595</td>
<td>1,423,192</td>
<td>1,425,192</td>
<td>0.0%</td>
</tr>
<tr>
<td>12</td>
<td>San Antonio</td>
<td>Chile</td>
<td>928,432</td>
<td>1,069,271</td>
<td>1,196,844</td>
<td>11.9%</td>
</tr>
<tr>
<td>13</td>
<td>Caucedo</td>
<td>Republica Dominicana</td>
<td>993,561</td>
<td>1,153,787</td>
<td>1,083,208</td>
<td>-6.1%</td>
</tr>
</tbody>
</table>

Source: UNECLAC, 2013

4.5 Jamaica’s Trans-shipment Market

In 2005, the port of Kingston climbed 11 places from 2004 to rank 56th in the world’s top 300 ports in port container traffic according to Containerization International and 3rd place in the Latin American and Caribbean Region (ECLAC,2012). This ranking resulted in the port becoming one of the top choices for transhipment. Table 7 revealed that the country’s ranking reduced significantly from 2006 to 2012, this resulted in the port moving from 2th to 8th place due to increase competition from other regional ports. This affected Jamaica’s world containerization ranking from 56th in 2005 to 82th place in 2012.
Reverse logistics as a value added service for Jamaica’s transshipment

Table 7: Shifts in rankings for port container traffic in Latin America and the Caribbean, (2005-2013)

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</tr>
<tr>
<td>Colon</td>
<td>2</td>
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<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Kingston</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Buenos Aires</td>
<td>4</td>
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<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Freeport</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Puerto Cabello</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>12</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>Cartagena</td>
<td>10</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Rio Grande</td>
<td>13</td>
<td>18</td>
<td>18</td>
<td>21</td>
<td>18</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Balboa</td>
<td>14</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Caucedo</td>
<td>33</td>
<td>35</td>
<td>21</td>
<td>15</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>


4.6 Top ten trans-shipment competitive ports

Jamaica’s diminishing share of market and negative growth rates in transhipment for 2012 is cause for concern, though the reduction of container throughput was affected by global factors such as world recession in 2008 and the 2011 Japan tsunami, however ports such as Panama, Colombia and Dominica Republic as shown significant growth rates from 2006 to 2012 (Rodrigue, 2013).

Table 5 shows that the Port Balboa, Panama, had a growth rate of 229 percent and Cartagena, Colombia 160 percent. The table also shows that the Dominican Republic had a growth rate of 86 percent whilst top transhipment ports such as Kingston and Freeport showed negative growth of -28 percent and -18 percent respectively.

The reduction in Container Traffic has also affected Jamaica’s share of market growth as shown in table 8. Ports in Panama have managed to maintain constant growth through the period 2009
Reverse logistics as a value added service for Jamaica’s transhipment
to 2012. These increased in container volume for these ports contributed to the diminishing share of market that affected Jamaica.

Table 8: Latin America and Caribbean port, growth rate.

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Balboa</td>
<td>Panama</td>
<td>989</td>
<td>1834</td>
<td>2167</td>
<td>2011</td>
<td>2758</td>
<td>3232</td>
<td>3251</td>
<td>229%</td>
</tr>
<tr>
<td>2</td>
<td>Santos</td>
<td>Brazil</td>
<td>2446</td>
<td>2533</td>
<td>2674</td>
<td>2252</td>
<td>2722</td>
<td>2985</td>
<td>3171</td>
<td>30%</td>
</tr>
<tr>
<td>3</td>
<td>Cartagena</td>
<td>Colombia</td>
<td>712</td>
<td>950</td>
<td>1064</td>
<td>1237</td>
<td>1581</td>
<td>1853</td>
<td>2201</td>
<td>209%</td>
</tr>
<tr>
<td>4</td>
<td>Puerto Manzanillo</td>
<td>Panama</td>
<td>1331</td>
<td>1280</td>
<td>1600</td>
<td>1406</td>
<td>1600</td>
<td>1899</td>
<td>2059</td>
<td>55%</td>
</tr>
<tr>
<td>5</td>
<td>Callao</td>
<td>Peru</td>
<td>938</td>
<td>1022</td>
<td>1203</td>
<td>1089</td>
<td>1346</td>
<td>1616</td>
<td>1817</td>
<td>94%</td>
</tr>
<tr>
<td>6</td>
<td>Buenos Aires</td>
<td>Argentina</td>
<td>1624</td>
<td>1711</td>
<td>1781</td>
<td>1412</td>
<td>1730</td>
<td>1851</td>
<td>1686</td>
<td>2%</td>
</tr>
<tr>
<td>7</td>
<td>Kingston</td>
<td>Jamaica</td>
<td>2150</td>
<td>2017</td>
<td>1915</td>
<td>1689</td>
<td>1891</td>
<td>1756</td>
<td>1546</td>
<td>-28%</td>
</tr>
<tr>
<td>8</td>
<td>Guayaquil</td>
<td>Equador</td>
<td>400</td>
<td>450</td>
<td>566</td>
<td>884</td>
<td>1093</td>
<td>1405</td>
<td>1448</td>
<td>262%</td>
</tr>
<tr>
<td>9</td>
<td>San Juan</td>
<td>Puerto Rico</td>
<td>1750</td>
<td>1695</td>
<td>1684</td>
<td>1673</td>
<td>1525</td>
<td>1485</td>
<td>1423</td>
<td>-19%</td>
</tr>
<tr>
<td>10</td>
<td>Freeport</td>
<td>Bahamas</td>
<td>1463</td>
<td>1634</td>
<td>1702</td>
<td>1297</td>
<td>1125</td>
<td>1155</td>
<td>1202</td>
<td>-18%</td>
</tr>
<tr>
<td>11</td>
<td>Caucedo</td>
<td>Dominican Republic</td>
<td>800</td>
<td>883</td>
<td>736</td>
<td>906</td>
<td>1004</td>
<td>1382</td>
<td>1461</td>
<td>83%</td>
</tr>
<tr>
<td>S.Total</td>
<td></td>
<td></td>
<td>14603</td>
<td>16009</td>
<td>13,448</td>
<td>12,388</td>
<td>14,196</td>
<td>15,735</td>
<td>16,586</td>
<td>14%</td>
</tr>
</tbody>
</table>

Source: Containerization International Yearbook (2004-2012)

Transhipment within the Latin America and Caribbean regions is highly competitive. Ports within these regions are trying to attract major shipping lines in order be the port of choice (Pinnock and Ajagunna, 2011). Panama is the volume leader within the Caribbean region and has been maintaining this dominance for many years due to the ports efficiency and logistics framework through the logistics centre.

Figure 13 shows the growing trend of market share that these regional ports gained or lost through the years 2009 to 2012. The result shows that Panama growth trend of transhipment volume increased from 39 percent to 47 percent for the same period. Colombia’s share of market decreased from 18 percent in 2010 to 16 percent in 2012. The market share for Jamaica decreased from 14 percent in 2009 to 13 percent in 2012. Bahamas market share decreased from 11 percent in 2009 to 8 percent in 2012 whilst Trinidad & Tobago and Cuba recorded no growth in share of market.
Reverse logistics as a value added service for Jamaica’s transhipment

Figure 13: Container Throughput Percentage and trend (2009 to 2012)

Source: Containerization International Yearbook (2012).

4.6.1 Competitive analysis

The major competing ports within the Caribbean are Kingston, Jamaica; Freeport, Bahamas; Port of Spain, Trinidad and Tobago; Caucedo, Dominican Republic; Colon, Panama; Cartagena, Colombia and San Juan, Puerto Rico. In this segment we will analyse the SWOT of each port in the transshipment market. The port rankings are shown in table 8.

In this period (2012-2013), the decline was mainly determined by five countries in the Caribbean Basin, where transhipment operations represented a significant volume of activities the ports. In table 9, shows that in 2013, Colombia and Jamaica revealed an annual decline of -6.9 percent and -8.2 percent, respectively, and Venezuela, Panama and Dominican Republic, contractions recorded during the same period -8.2 percent, -4.3 percent and -21.7 percent,
Reverse logistics as a value added service for Jamaica’s transhipment

respectively. As seen in previous years, the growth, slowdown or decline in activities differs depending on the country, ports and terminals, which can be explained by various causes. Freeport (24.8%) and Havana (10%) are the only container ports which exhibited growth in the Caribbean region (CEPAL, 2014).

Table 9: Caribbean Container Port throughput, Ranking 2013

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Puerto/Port</th>
<th>País/Country</th>
<th>2011 (TEU)</th>
<th>2012 (TEU)</th>
<th>2013 (TEU)</th>
<th>Variación/change % 2013/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colón</td>
<td>Panamá</td>
<td>3,371,714</td>
<td>3,518,672</td>
<td>3,356,060</td>
<td>-4.60%</td>
</tr>
<tr>
<td>2</td>
<td>Cartagena</td>
<td>Colombia</td>
<td>1,853,342</td>
<td>2,205,948</td>
<td>1,987,864</td>
<td>-9.90%</td>
</tr>
<tr>
<td>3</td>
<td>Kingston</td>
<td>Jamaica</td>
<td>1,756,832</td>
<td>1,855,425</td>
<td>1,703,949</td>
<td>-8.20%</td>
</tr>
<tr>
<td>4</td>
<td>Freeport</td>
<td>Bahamas</td>
<td>1,116,000</td>
<td>1,202,000</td>
<td>1,500,000</td>
<td>24.80%</td>
</tr>
<tr>
<td>5</td>
<td>San Juan</td>
<td>Puerto Rico</td>
<td>1,484,595</td>
<td>1,423,192</td>
<td>1,423,192</td>
<td>0.00%</td>
</tr>
<tr>
<td>6</td>
<td>Caucedo</td>
<td>Republica</td>
<td>993,561</td>
<td>1,153,787</td>
<td>1,083,208</td>
<td>-6.10%</td>
</tr>
<tr>
<td>7</td>
<td>Port of Spain</td>
<td>Trinidad y Tobago</td>
<td>379,837</td>
<td>365,895</td>
<td>381,232</td>
<td>4.20%</td>
</tr>
<tr>
<td>8</td>
<td>La Habana</td>
<td>Cuba</td>
<td>246,773</td>
<td>240,000</td>
<td>263,886</td>
<td>10.00%</td>
</tr>
</tbody>
</table>

Source: CEPAL, 2014

4.6.2 Characteristics of competing ports and SWOT Analysis

The competitive nature of ports within the region is closely linked to several factors such as geographical location, the available infrastructure, the degree of industrialization, government policy and the standard of performance of the port (such as measure of the number and frequency of liner services and the cost of transhipment, storage and hinterland transportation) (Bichou, 2009). A SWOT analysis was done for these competing ports within Caribbean and Latin American regions.
4.6.3 Cartagena Colombia (Rank 62)

The Port of Cartagena is ranked at 62th in world according to world containerization (2013). In 2012 the port had a surge of 18.8 percent in container volume to reach a record of 2.2 million TEUs. This resulted in the port becoming the third most busiest port in Latin America behind the Panama’s ports of Balboa 3.2 million TEUs and Brazil Santos at 3.1 TEUs (CEPAL, 2014). The country’s Port Authority stated that they have plans become the 30 most important ports in the world by 2017 by forecasting to handle a capacity of over 5 million TEUs. To achieve this objective the port will be investing heavily in machinery and equipment including the acquisition of 17 Reach Sackers, while consolidating 1440 reefer slots and expanding two marginal piers to 700m each (PAC, 2013).

Terminal Spec: Eight container berths and one Ro-Ro berth. Operator: Port Authority

SWOT Analysis: Cartagena, Colombia

Strengths

- Strategic location to the Panama Canal.
- Strong economic growth.
- Geographic advantage for certain transhipment routes
- Strong existing tenant base, constituted of large carriers
- Good storage space and terminal efficiency.

Weaknesses

- Port-centric logistics.
- Road connection to port.
- Port capacity and centricity
- Dredging needed to accommodate Post Panamax ships.

Opportunities

- Port expansion.
- Transshipment centre for major shipping lines.
Reverse logistics as a value added service for Jamaica’s transhipment

Threats

- Competition from other shipping hubs,
- Traffic competition increasing for shipping lanes between Colon, Caucedo, Freeport and Kingston.

4.6.4 San Juan, Puerto Rico (Rank 89)

The Puerto Rican Port is a key Caribbean transhipment hub for the United States. Ranked at 89 it is known to be the most efficient port in the Caribbean, however, it has been losing container volumes through to growth in Jamaica’s transhipment (Containerization International, 2013).

SWOT Analysis: San Juan, Puerto Rico

Strengths

- The economy of San Juan, one of the strongest in the Caribbean.
- Developed road network
- Geographic advantage for certain transhipment routes.
- Strong existing tenant base, constituted of large carriers
- Good storage space and terminal Efficiency.

Weaknesses

- Low transhipment volume due to competitive location.
- Port congestion

Opportunities

- Transhipment port for the East coast

Threats

- Competition from other shipping hubs,
Reverse logistics as a value added service for Jamaica’s transhipment

- Traffic competition increasing for shipping lanes between Colon, Caucedo, Freeport and Kingston.

4.6.5 Caucedo, Dominican Republic (Rank 104)

Port of Caucedo is ranked at 104 and is operated by Portuaria Dominicana and is looking to play an important regional role with the opening of the expanded Panama Canal in 2015. This private port, which commenced operations in 2003, is located 25 km from Santo Domingo, the commercial and political capital of the country. Construction started this summer on the Dominican Republic’s first logistics centre, which is a joint venture between DP world and the Caucedo Development Corporate (Containerization International, 2013)

SWOT Analysis: Caucedo Dominican Republic

Strengths

- Fastest growing economy in Latin America.
- Development of Free Zone

Weaknesses

- Not a major shipping route
- Low transhipment volume due competitive location.

Opportunities

- Zona Franca Multimodal Caucedo
- Development of world class transshipment hub
- Regional hub for Central and South America

Threats

- Competition from other shipping hubs
Reverse logistics as a value added service for Jamaica’s transhipment

- Traffic competition increasing for shipping lanes between San Juan, Freeport and Kingston.

4.6.6 La habanna Havana, Cuba (Rank 150)

The Port of Havana will be expanding and will be creating an economic zone in anticipation of the expansion of Panama Canal which is slated for early 2015. This expansion seeks to create revenue for the island in terms of economic development. This port will create more competition for Jamaica (Macquire, 2013). The port La habanna recorded the highest growth in the TEU’s for 2013, having a 263, 886 TEU’s having a 10 percent increase from the previous year of 2012 (CEPAL, 2014).

SWOT Analysis: La Habana Havana, Cuba

Strengths:

- Deep water port, no dredging needed.
- Low- tax and environment regulation.

Opportunities:

- Development of Free-Trade Zone

Weaknesses:

- Not a major shipping route port.
- Low LPI ranking.
- Poor intermodal network.

Threats:

- Competition from other shipping hubs.
- New development in area airports such as San Jose’ Salvador, Bogota or in ports such Caucedo, Cartagena, Kingston, Port of Spain and Freeport
4.6.7 Kingston, Jamaica (Rank 82)

World ranked at 82 in 2013. A major dredging programmed at Kingston harbour is due to start in 2014, part of an investment to position the Port as a key container hub for larger vessels transiting the widened Panama Canal from 2015. This is another step in developing Jamaica as a global logistics hub. The World Bank is committed to providing technical and other assistance. In late 2011, CMA CGM announced plans to invest US$100 million in Kingston Container Terminal as part of a 35 year lease concession with the Jamaican government, with the Marseille- based box line using KCT as a hub for vessels passing through the Panama Canal. The Port Authority of Jamaica projected that in 2012/2013, container moves are likely to grow by 7.4 percent (Containerization International, 2013)

SWOT Analysis: Port of Kingston, Jamaica

Strengths

- Jamaica’s strategic location - closed to major shipping lanes
- Kingston Harbour- the 7th largest natural harbour in the world
- Caribbean’s major transshipment hub.
- Hinterland expansion
- Good highway connection between the north and south coast.
- Storage Capacity due to expansion of hinterland and developments of new berths.
- Only hub that can consolidate freight for both canals, as well as tranship freight from either of these canals.

Weaknesses

- Poor logistics infrastructure, ranked 70th global logistic Index.
- The hinterland connections require huge improvement in efficiency.
- No railway network for intermodal connection between the north and south coast
Reverse logistics as a value added service for Jamaica’s transhipment

- Storage capacity of port
- Port pricing and efficiency
- Road congestion
- Dredging needed

**Opportunities**

- Global logistic hub
- Increase transhipment of containers with North America as the destination.
- Reverse logistics network to niche market
- Increase economic through logistics infrastructural developments.

**Threats**

- Competition from other shipping subs
- Ships switching to other competitive ports
- Ports offering the same logistics added value services (Price issue)
- Un-amended environmental land regulations
- Sustainability of industry and logistics failing to keep pace with laws and regulations

### 4.6.8 Freeport, Bahamas

The “self-proclaimed” transhipment hub of the Americas a 7.7 percent rise in volume to just over 1.2 million TEU at Freeport Container Port, operated by Hong Kong’s Hutchinson Port Holdings. It is located on Grand Bahamas Island – one of the largest islands in the Bahamas – and situated about 100 miles from the Port of Miami Florida. It is currently the deepest container terminal in the region and serves as a major container transhipment hub for the eastern seaboard of the US and the principal east-west line haul routes through the region. Geneva based MSC is the main customer. The Bahamas hub is locking to leverage Panama Canal expansion opportunities by investing US$250 million in the fifth phrase of the development which is 1.536m that is able to accommodate nine post Panamax cranes and one super post Panamax quay crane (Containerization International, 2013).
SWOT Analysis: Freeport Bahamas

Strengths:

- One of largest man made harbour in the world
- Deepest harbour in the region
- Dry docking and ship repair
- Major transhipment hub between Americas; North, Central and South America and Caribbean.
- Free trade zone
- Privately owned.
- Economic advantage in transhipment due to close proximity to the United States.

Opportunities:

- Increase transshipment volume due to Panama Canal expansion.
- Accommodating Post Panamax vessels among six berths.

Threats:

- Competition from other shipping hubs.
- New development in area airports such as San Jose’ Salvador, Bogota or in ports such Caucedo, Cartagena, Kingston and Port of Spain.
Reverse logistics as a value added service for Jamaica’s transhipment

4.6.9 Colon (56) and Balboa (40), Panama

Panama Ports Balboa and Colon are ranked as the top producing ports in the Caribbean and Latin America region. In 2011, the both the Ports of Colon and Balboa handle 3.3 Million TEUs and 3.2 Million TEUs respectively. The Ports continued to grow in 2012 at a rate of 13.4 percent and 7.9 percent respectively. The Port of Colon is the port of choice for MIT, Evergreen and Cristobal. Panama is also currently the leader in terms of the number of machines installed in ports, with 60 Gantry Cranes: 22 in the Port of Balboa, 14 in the Manzanillo International Terminal, 11 in Cristobel, 10 in the Colon Container Terminal (Evergreen) and 3 in the Rodman area operated by the Singapore Authority. This number of port cranes in Panama is larger than that of the entire region. Port of Balboa is ranked at 40 of the top ports in the world. This port is the largest port on the Pacific coast of Panama. It acts as a hub for cargo from the west coast of South America and Caribbean, as well as the centre for the repositioning of empty containers (Containerization International, 2013).

SWOT Analysis: Colon and Balboa, Panama

Strengths:

- Leading transhipment port in both the Latin America and Caribbean regions.
- Unique geographical location in the middle of the continent.
- Inter-oceanic railways with the capacity to move 500,000 containers.
- A must for the world’s main shipping routes.
- One of the most efficient ports in the world.
- Second largest customs-free area in the world
- Strong intermodal network
- Panama canal traffic accessibility
- Strong Logistics Performance Index
- Having the top global ports along the Panama Canal.
- Logistics industry comprising of over 157 companies in established logistics park (CFTZ).
Reverse logistics as a value added service for Jamaica’s transhipment

- Comprises three major ports and an airport, all linked by highway and railway.
- Regional air hub
- Panama Canal provides immediate access to Atlantic and Pacific markets
- Finest intermodal transport capacity in the region.

**Weaknesses:**

- Limited air freight for intra-regional imports.
- Few airlines in the region specializing in freight.
- Restriction in freight management by customs
- High cost of handling/ internal transfer both in Panama and in the Free trade zone.
- Security issues
- No land connectivity to South America.
- Communication

**Opportunities**

- Development of Panama Canal expansion plan
- Mega port in the Pacific, Port Balboa.
- Development of Panama-Pacific Special Economic Area
- Trans-systemic expressway
- Development of the International Cargo Airport for the free trade zone.
- Regional refinery project.

**Threats**

- Adaptation of restrictions in U.S. airports.
- Improvement of multimodal transportation supply between the east and west coasts of the U.S.
- New developments in area airports such as San Jose’ Salvador, Bogota or in ports such Caucedo, Cartagena, Kingston, Port of Spain, Freeport and Mariel
- Greater customs restrictions on neighbouring markets (Colombia)
Reverse logistics as a value added service for Jamaica’s transhipment

- Freight loss due to traffic restrictions in non-member countries through free trade agreement with markets in the region.

4.6.10 Objective # 2

To examine how the Logistics Performance Index can be used as a guide line for economic development for Jamaica.

4.6. 11 Logistics performance index of Latin America and the Caribbean

Logistics encompasses an array of essential activities for trade including transport, warehousing, cargo consolidation, border clearance, distribution, and payment systems. Competitive trade logistics is a fundamental building block of trade and economic development, and more so in a global economy that has become increasingly interconnected and interdependent. An improved logistics have a greater effect on trade promotion than tariff cuts. They lower prices for consumers and support diversification into higher value-added exports (World Bank, 2013).

Global production chains also depend on a robust logistics sector. Coordinating the various stages of product development, component production, and final assembly requires the ability to move goods across borders quickly, reliably, and at low cost. In 2010 in terms of individual countries, Brazil and Argentina are the best performers within the region ranked 41st and 48th respectively out of 155 countries, while Guyana (140th) and Cuba (150rd) are last in the overall LPI ranking. Currently, for 2014, Panama and Mexico are top performers with index of 45 and 50th. Haiti and Cuba had shown the lowest at ranking of 144 and 152 respectively as shown in figure 14.
Reverse logistics as a value added service for Jamaica’s transhipment

Figure 14: LPI ranking for Latin America and the Caribbean

Source: World Bank, 2014

4.6.12 Jamaica Logistics Performance Index Benchmark

Jamaica is currently ranked 70th on the Logistic Performance Index (LPI) for 2014. This improvement is of significant importance as the country falls below the triple digit ratings for the first time. It comes as the government aims to attract investors to construct a multi-billion-dollar logistics hub (Jackson, 2014). The island received its highest indicator sub rank for customs at 54 out of 160 nations. Other key sub rank scores included infrastructure at 61 out of 160; international shipments at 71; timeliness at 83; logistics quality and competence, at 84; and tracking & tracing at 89. All these sub rank categories scored higher than 119 (World Bank, 2013) as shown in table 10.
Reverse logistics as a value added service for Jamaica’s transhipment

Table 10: LPI Segment and Rankings

<table>
<thead>
<tr>
<th>Country</th>
<th>Customs</th>
<th>Infrastructure</th>
<th>International shipments</th>
<th>Logistics quality and competence</th>
<th>Tracking and tracing</th>
<th>Timeliness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>score</td>
<td>rank</td>
<td>score</td>
<td>rank</td>
<td>score</td>
<td>rank</td>
</tr>
<tr>
<td>Panama</td>
<td>3.15</td>
<td>40</td>
<td>3.00</td>
<td>52</td>
<td>2.87</td>
<td>68</td>
</tr>
<tr>
<td>Colombia</td>
<td>2.59</td>
<td>79</td>
<td>2.44</td>
<td>98</td>
<td>2.64</td>
<td>91</td>
</tr>
<tr>
<td>Bahamas</td>
<td>3.00</td>
<td>45</td>
<td>2.74</td>
<td>65</td>
<td>2.92</td>
<td>64</td>
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<tr>
<td>Dominica Republic</td>
<td>2.58</td>
<td>80</td>
<td>2.61</td>
<td>73</td>
<td>2.91</td>
<td>65</td>
</tr>
<tr>
<td>Jamaica</td>
<td>2.88</td>
<td>54</td>
<td>2.84</td>
<td>61</td>
<td>2.72</td>
<td>84</td>
</tr>
</tbody>
</table>

Source: LPI 2014

4.6.13 Logistics Performance Index (LPI) for competing ports in the Caribbean region.

In 2013, Jamaica was ranked fourth among the five top transhipment ports in the Caribbean as shown in table 9. Panama is the overall leader in transhipment with a LPI index of 45th in the world. Jamaica ranked third below Panama and Bahamas in terms of customs, but lost score in terms of infrastructure, international shipments, logistics quality and competence, tracking and tracing and timeliness.

Figure 15, as display the logistics performance index benchmark as it relates to the sub ranking for each port. Where Panama leads all sub ranking except for logistics quality and competence. In customs ranking Jamaica lags Panama and Bahamas in customs. Panama leads the index in Port Infrastructure followed by Jamaica. Tracking and Tracing, Panama and Dominica Republic lead Jamaica. For international shipping and timeliness, Panama, Dominican Republic and Bahamas lead Jamaica in both indexes.
4.6.14 Growth trend of the Logistics performance Index for competing ports

Table 12 shows that Panama improved its LPI ranking from 61th in 2012 to 45th in 2014 in contrast to Colombia that in 2007 was ranked 82th now rank 97th in 2014. Dominican Republic improved 96th in 2007 to 69th in 2014. Jamaica ranking as stated before showed improvement from 118th in 2007 to 70th for 2014. This shows that overall trend for the LPI for the competing ports are improving.
Reverse logistics as a value added service for Jamaica’s transhipment

Table 12: LPI ranking for competing Ports in the Caribbean

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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<td>Ranking</td>
<td>LPI</td>
<td>Ranking</td>
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<td>LPI</td>
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<tr>
<td>Panama</td>
<td>45</td>
<td>3.19</td>
<td>61</td>
<td>2.93</td>
<td>51</td>
<td>3.02</td>
<td>54</td>
<td>2.89</td>
</tr>
<tr>
<td>Colombia</td>
<td>97</td>
<td>2.64</td>
<td>64</td>
<td>2.87</td>
<td>92</td>
<td>2.77</td>
<td>82</td>
<td>2.5</td>
</tr>
<tr>
<td>Bahamas</td>
<td>66</td>
<td>2.91</td>
<td>80</td>
<td>2.75</td>
<td>78</td>
<td>2.75</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Dominica Republic</td>
<td>69</td>
<td>2.86</td>
<td>85</td>
<td>2.7</td>
<td>65</td>
<td>2.82</td>
<td>96</td>
<td>2.38</td>
</tr>
<tr>
<td>Jamaica</td>
<td>70</td>
<td>2.84</td>
<td>124</td>
<td>2.42</td>
<td>108</td>
<td>2.53</td>
<td>118</td>
<td>2.25</td>
</tr>
</tbody>
</table>


4.6.15 Intermodal logistics infrastructure for competing ports

The logistics infrastructure of a country will determine its competitiveness within the global market. The comparative advantage of the leading transhipment ports within the Caribbean are based on the Logistics Index Indicator framework as listed below:

- Road network infrastructure.
- Quality of port infrastructure.
- Trade tariff.
- Quality of air transport.
- Rail road infrastructure.

Road network infrastructural ratings

As revealed in figure 7, Jamaica’s road network is ranked 86th which is the second lowest among the transhipment countries. Panama leads this segment with ranking of 48th followed by Dominican Republic at 62th in the world. The intermodal link of road is very important facet of the logistics framework (World Bank, 2014).
4.6.16 Quality of port infrastructure

The quality of port infrastructure measures business executives’ perception of their country’s port facilities (World Bank, 2014). The quality of port infrastructure will determine the competitiveness of the port and the added value services that it has to offer (Ballou, 2009). Figure 17 revealed that Panama is ranked 6th in the world followed by Jamaica at second place within the Caribbean region at a ranking of 39th.
Reverse logistics as a value added service for Jamaica’s transshipment

4.6.18 Trade Tariff

This indicator is calculated as a weighted average of all the applied tariff rates, including preferential rates that a country applies to the rest of the world. The weights are the trade patterns of the importing country’s reference group (2010 data). An applied tariff is a customs duty that is levied on imports of merchandise goods (World Bank, 2013). Panama currently has lowest tariff rates in the Latin America and Caribbean region followed by Colombia at ranking 82th. Jamaica is currently second highest at 90th ranked followed by Trinidad and Tobago as shown in figure 18.

Source: World Bank, 2014
Reverse logistics as a value added service for Jamaica’s transshipment

Figure 18: Trade Tariff

![Trade Tariff Diagram]

Source: World Bank, 2014

4.6.19 Quality of air transport (intermodal)

The quality of air transport speaks to the connectivity of a country’s airline as it relates to domestic, international and freight transportations on regional and global basis. Figure 19 reveals that Panama lead the Latin American and Caribbean regions as relates to quality of air transport with ranking of 5th in the world whilst Jamaica is ranked at 45th in the world.

Figure 19: Quality of Air Transport

![Quality of Air Transport Diagram]

Source: World Bank, 2014
Reverse logistics as a value added service for Jamaica’s transshipment

4.6.20 Rail Transportation

The rail transport is an important part of intermodal links. The connectivity of the rail infrastructure is becoming a crucial segment of logistics performance to improve performance of sea-rail-road-air links (World Bank, 2013). As shown in Figure 20, Panama is ranked 30th in the world where container railway link has been an integral part of the country’s container logistical transport from the Pacific coast to the Atlantic coast (CEPAL, 2013). Jamaica on the other hand has a low score of 1.3 with a ranking of 116th, this shows that Jamaica’s logistics performance for logistics connectivity for south to north coast is non-existence (World Bank, 2014).

Figure 20: Rail Road Infrastructure

![Rail Road Infrastructure](Image)

Source: World Bank, 2014

4.6.21 Cost to export (US$ per Container)

The data represents a comparative analysis of the cost measures of the competing ports levied on 20-foot container in U.S. dollars. All the fees associated with completing the procedures to export or import the goods are included. These include cost for customs clearance and technical control; customs broker fees, terminal handling charges and inland transport (World Bank, 2014).
Reverse logistics as a value added service for Jamaica’s transhipment

These data enable one to determine Jamaica’s overall cost structure for exportation in comparison to other ports that shows that Jamaica overall cost for exporting 20 ft. container is the second highest among the transshipment ports as shown in figure 21. Panama is currently the lowest at a US$625 per container. For imports as shown in figure 22, the cost for Jamaica is the second highest among the competitive ports at cost of US$2130 per container and Panama is at lowest in the region at US$965 per container.

Figure 21: Cost to export (US$ per container)

<table>
<thead>
<tr>
<th>Country</th>
<th>Cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trinidad and Tobago</td>
<td>843</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>1300</td>
</tr>
<tr>
<td>Panama</td>
<td>1530</td>
</tr>
<tr>
<td>Jamaica</td>
<td>1040</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>1005</td>
</tr>
<tr>
<td>Colombia</td>
<td>2355</td>
</tr>
<tr>
<td>Bahamas, The</td>
<td>1350</td>
</tr>
</tbody>
</table>

Source: World Bank, 2014

Figure 22: Cost to Import (US$ per container)

<table>
<thead>
<tr>
<th>Country</th>
<th>Cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trinidad and Tobago</td>
<td>1260</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>1350</td>
</tr>
<tr>
<td>Panama</td>
<td>2130</td>
</tr>
<tr>
<td>Jamaica</td>
<td>1145</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>1770</td>
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<tr>
<td>Colombia</td>
<td>2470</td>
</tr>
<tr>
<td>Bahamas, The</td>
<td>965</td>
</tr>
</tbody>
</table>

Source: World Bank, 2014
4.6.22 Objective # 3

To determine and evaluate the economic impact of transhipment within the Latin America and Caribbean Region.

4.6.23 Economic growth correlation to logistics

According to the 2014 LPI results shows that Germany is now the world leader in this index. The GDP growth of a country is closely correlated to its logistics performance as it relates to economic performance of that country. Germany is the largest national economy in Europe and having the fourth largest nominal GDP in the world whereby export accounts for one-third of national output. Among business sectors, the logistics market in Germany ranks third, behind the automotive industry and health care. In 2006, revenue totalled €170 billion. A total of 2.5 million people were employed by logistics service providers as well as industrial and trade companies.

Logistics sectors of transport, storage and transhipping generated the largest share of overall logistics revenue (Grant, Lambert, Stock and Ellram, 2005). Container throughput growth within a region or country is an indication of its logistical performance which highly correlates to GDP growth and economic development. Gross Domestic Product can only be influenced by export volume and therefore if there is more import volume than export there will be trade imbalance (Pinnock and Ajagunna, 2012). This trade imbalance will affect freight and port charges that will eventually affect competition within the transshipment industry (Rodrigue, 2011). A case study on the three major global transhipment ports of Singapore, Rotterdam and Dubai enabled the researcher to analyse the economic benefits of added value services within the logistics centre and how these services can contribute to GDP growth.

4.6.23 Container throughput and economic growth

A case study was conducted on the following global ports, Singapore, Dubai and Rotterdam to find the correlation between container throughput and economic growth.
Reverse logistics as a value added service for Jamaica’s transhipment

4.6.24 Case Study of Singapore

Singapore’s port is the leading Global port for transshipment. Strategically located at the door of East Asia, the port materially revolves around connecting Oil and Cargo markets to West and East Asia (PSA, 2014). A large share of Singapore’s GDP is derived from oil, port and Shipping activities. The port is the largest transhipment port whereby one –fifth of the world’s containers are connected there (PSA, 2014).

The transhipment system in Singapore exists in three forms:

- Overseas cargoes transiting at the ports or free trade zone for a short period of time before exporting to another country.
- Overseas cargoes are stored in free trade zone, while waiting for customer order and later exported to the overseas customers.
- Re-exports is another form of transshipment where overseas cargoes undergo value adding (such as repackaging bulk breaking, sorting or grading, marking and labelling) that do not change their country of origin and are later exported to other countries.

According to Singapore’s national statistics, the transhipment or re-export accounts for 48 percent of Singapore’s total export in 2008 (Year Statistic Singapore, 2009). This concept of transshipment as added value service has contributed to Singapore’s sustainable growth economic growth in GDP which an integral component of customer service for logistics and supply chain management (Bichou, 2009).

In 2012, the Logistics and Transport Industry contributed approximately 8 percent to Singapore’s GDP by the employment of approximately 93, 000 workers (World Bank, 2014). The growth of transhipment industry is largely influenced by their world class infrastructure and connectivity which rated at currently 5th in the LPI ranking after having consistent number one rankings in 2007 and 2012 as shown in table 13 below (World Bank, 2014).
Reverse logistics as a value added service for Jamaica’s transhipment

Table 13: LPI Ranking for Industrial Countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>Code</th>
<th>score</th>
<th>rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>DEU</td>
<td>4.12</td>
<td>1</td>
</tr>
<tr>
<td>Netherlands</td>
<td>NLD</td>
<td>4.05</td>
<td>2</td>
</tr>
<tr>
<td>Singapore</td>
<td>SGP</td>
<td>4.00</td>
<td>5</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>ARE</td>
<td>3.54</td>
<td>27</td>
</tr>
</tbody>
</table>

Source: World Bank, 2014

4.6.26 Correlation of GPD growth to container throughput in Singapore

Figure 14 shows that the correlation between container throughput and GDP growth is approximately 63 percent and the regression is 40 percent which shows high correlation using sample data from 1994 - 2014.

Figure 23: Container throughput correlation to GDP growth

\[ y = 0.3997x + 3.2323 \]
\[ R^2 = 0.4029 \]

Source: Clarkson and Trading Economics, 2014
4.6.27 Case study on the Port of Rotterdam

The Port of Rotterdam is the largest port in Europe accounting for transhipment of 441.5 million tons and 11,621,249 TEUs for 2013. The port is an essential part of European import and export whereby a large proportion of goods shipped and processed by the port. It also an important trade of import and export links to intercontinental destinations (RPPC, 2014). In 2012 the port recorded the highest container throughput of approximately 11.9 million TEU (Containerization International, 2014). From 1962 until 2004 it was the busiest port, until it was displaced by ports such as Shanghai and Singapore; the port is now rated at 11th of the world’s top 50 port ranking (WSC, 2013). The port strategic location has enabled it to be favourable for many businesses because of its depth, port facilities and excellent intermodal links to hinterland (Wang, 2007). The port accounts for 5 percent of Holland GDP and employs approximately 90,000 persons directly (RPPC, 2014). The logistics performance index of the port is ranked 2nd in the world for 2014 behind leaders, Germany with a LPI ranking score of 4.05 as shown in table 10.

From the beginning of early 1960s, the Port of Rotterdam as grasped the opportunities of investing in new transportation systems, heavy handling facilities and equipment for efficient mode of transhipment of containers to inland modes of transport. They also have the ability to accommodate the largest bulk ships to port without difficulties. The ports infrastructural development not only enabled establishment of transhipment points and storage facilities but also facilitates a chemical cluster around the port (UNESCAP, 2012). This a lead to the development of the Distripark Maasvlakte, a logistics centre which is a logistics park that was designed for companies as a centralized distribution to meet the following objectives:

- Companies wishing to set up their own European Distribution Centre
- Mega-carriers wishing to further penetrate the logistics chain;
- Mega-distributors wishing to set up a maritime hub for their European operations;
- Other (global) logistics service providers and European exporters wishing to create a maritime export hub.
4.6.28 Correlation of GPD growth to container throughput

The correlation as shown in figure 24 as it relates to the Port of Rotterdam container throughput is approximately 50 percent with R-square value of accuracy of 24 percent, however due to the fact that the Port of Rotterdam does other port services other than transshipment. This means that general container throughput would be smaller than the total segmented services of the port.

Figure 24: Container throughput correlation to GDP growth

![Graph showing correlation between container throughput and GDP growth. The equation is y = 0.1612x + 1.0505 with R² = 0.2458.]

Source: Clarkson and trading economics data

4.6.29 Case Study of the Ports of Dubai.

The Port of Jebel Ali is ranked 10th of the world top 50 ports, handled 13.6 million TEU in 2013. Development of a new 4 million TEU terminal took the total handling capacity of the Port to 19 million TEU in 2014. Container handling is the company's core business and generates around 80% of its revenue. Jebel Ali Port has been voted 'Best Seaport in the Middle East' for 19 consecutive years (Containerization International, 2013). Nearly 30,000 people serve customers in some of the most dynamic economies in the world. DP World aims to enhance customers' supply chain efficiency by effectively managing container, bulk and other terminal operations.
Reverse logistics as a value added service for Jamaica’s transhipment

cargo. Jebel Ali Free Zone, home to the largest port and free zone in the Middle East, contributes a fifth to Dubai’s Dh300.83 billion economy which 20 percent of Dubai GDP (Rahman, 2012).

4.6.30 Correlation of GPD growth to container throughput

Figure 25 reveals the correlation of containers throughput and GDP growth at 49 percent and R-square accuracy at 24 percent. The economy of Dubai is largely influenced by factors such as trading, transport, tourism, industry and finance. These contribute to the economy of the United Emirates. In economic terms, the growth of a country’s GDP is highly correlated to logistics infrastructural development (Wang, 2010).

*Figure 25: Container throughput correlation to GDP growth*

Source: Clarkson and trading economics data

4.6.31 Gross domestic performance and transhipment

This segment will give a brief outline on the growth of the transshipment industry within Latin America and Caribbean. It will also analyse the development of the Panama’s logistics infrastructural growth and future prospects.
Reverse logistics as a value added service for Jamaica’s transhipment

4.6.32 Panama volume leader in transhipment

The transhipment industry has been growing progressively in Latin America and Caribbean since 1994 showing an average growth rate of over 20 to 40 percent (ECLAC, 2013). The Ports of Balboa and Colon account for the largest TEUs volume throughput in the region as shown in figure 17. This growth in transhipment volume is largely accounted for Panama’s strategic position and logistics infrastructural framework (ECLAC, 2013).

The ports are situated in close to the free- zone of Colon, around the Caribbean Sea outlet of the Panama Canal. This growth is explained by its closed proximity to the Canal which accounts for five percent of international commerce. The government in an attempt to improve the Canal’s Zone in order to attract foreign investors initiated a vast programme of privatisation and fiscal incentives. This is how major international consortia were able to acquire port concession that enabled privatized ports such as the Ports of Cristobal (on the Caribbean side), and Balboa (the Pacific side).

The government also promoted the ports by creating a link within the transhipment of containers to a free port for export and established a multimodal platform. Panama Canal Authority (PCA) registered 8580 ships in 2013 by which 3544 were container ships. Nearly 70 percent of the usage of these platforms is accounted for by transhipment traffic destined for the Caribbean and South America. They benefit from the proximity of the free port zone of Colon, the second most important free zone in the world after Hong Kong, and the main centre of redistribution for Central and South America.

In 2006, 1180 firms (essentially import-export) were located in 400 hectares employing a workforce of 20,904 people. In terms of value, 70 percent of imports into the free port zone came from Asia (mainly China and Japan), 9 percent from the USA and 9 percent from the EU. Re-exports were destined largely for Venezuela (20.6%), Colombia (16.5%), Panama (7.5%), and the Dominican Republic (5.3%).
Reverse logistics as a value added service for Jamaica’s transhipment

4.6.33 Economic analysis and logistics development of the competing ports

The economic benefits of transhipment and the logistics centre are quite evident as it relates to the case studies of the world’s top performing hubs, Singapore, Rotterdam and Dubai. The correlation of container throughput to GDP varies depending on the nation’s logistics framework as indicated by the Logistic Performance Index (World Bank, 2014). Top transshipment countries within the Caribbean region are seeing growth in GDP through transhipment and logistics value added services. In Panama, the logistics and maritime services has contributed to three quarters of the nation’s Gross Domestic Product (GDP) which was US$36 billion dollars in 2013 (Forbes, 2014). This segment will analyse the GDP growth for each port and assess the correlation of transhipment and container throughput to Gross Domestic product (GDP). This data for this analysis is a 10 to 20 year sample for the period 1993 to 2013.
Reverse logistics as a value added service for Jamaica’s transhipment

Figure 27 shows the GDP growth for countries of competing ports. Colombia’s GDP grew significantly from US$94.7 billion to 378.15 billion from 2007 to 2013 respectively. Puerto Rico had the second highest GDP growth in the region this increased US$82.6 to US$101 billion in the same period. Dominican Republic growth was the third highest in the region from US$41.32 to US$60.61. Panama recorded a steady growth from US$ 21 to US$42.65 billion and Trinidad & Tobago grow from US$21.83 to 24.64 billion. Jamaica and Bahamas recorded the lowest GDP growth in the region from US$12.82 to US$14.36 billion and US$7.97 to US$8.15 billion respectively. Figure 27, shows that GDP growths for all countries in the region have positive growth; however Jamaica’s growth rate for that period was relatively low at 11.2 percent.

Figure 27: Annual GDP Growth 1993 to 2013

![Annual GDP Growth (US$ Billion) 1993 to 2013](image)


Figure 28 shows that Panama has the highest GDP growth rate in the region for 2013 at 10.2 percent followed by Colombia at 4.0 percent. Thirdly, Dominican Republic at 3.9 percent, Bahamas at 1.83 percent followed by Trinidad and Tobago at 1.5 percent and Jamaica recording the second lowest growth rate in the region at 0.72 percent followed by Puerto Rico at 0.516
Reverse logistics as a value added service for Jamaica’s transhipment

percent. Panama’s GDP growth rate is the highest among the competing ports as a result of its high Logistics Performance Index (LPI) ratings in the region (Rodrique, 2013).

Figure 28: GDP Growth for competing country

![GDP Growth (Annual %)](image)

Source: UNCTAD, 2014

4.6.34 Correlation results for Jamaica’s transhipment and GDP

The Jamaican economy is heavily dependent on services that accounts for 60 percent of GDP which is currently at $US 15 billion at annual growth rate of 1.5 percent as shown in figure 20 and 21 (JIS, 2014). The country continues to derive most of its foreign exchange from tourism, remittances, and bauxite/alumina. Remittances account for nearly 15 percent of GDP and exports of bauxite and alumina approximately 5 percent. Jamaica is one of the leading transhipment countries in the Caribbean and Latin American region accounting for over 2 Million TEUs in 2006 (see table 7) in 2013, revenues from ports account for over $US40 million accounting for 3 percent of GDP (IMF, 2014). The country’s GDP growth rate is quite low due to its high debt to GDP ratio at 130 percent (Forbes, 2013).
Reverse logistics as a value added service for Jamaica’s transhipment

The correlation of transhipment and container contribution to GDP growth was based on data from 1994 to 2013 as shown in figure 29; it reveals that the container throughput volume to Gross Domestic Product regression ($R^2$) was very low at 13 percent and has a correlation of 42 percent which in effect means that Kingston terminal throughput has not contributed significantly to GDP growth of the Jamaican economy. According Chalk (2014), the Port of Jamaica revenues were approximately 2 to 3 percent of GDP.

Figure 30, shows the trend of GDP growth from 2003 to 2013, the value of imports, the value of exports and Foreign Direct Investment. The results show that the value of export, import and FDI are of low percentage to GDP. According to Xing (2013), the value of export and FDI contribute significantly to GDP growth. The values shown in the graph also indicates that the imports out weights export by over 75 percent which is an indication of trade imbalance (Pinnock & Ajagunna, 2012).

Figure 29: The correlation of Throughput volume and GDP growth

Source: World Bank data, 2014
Figure 30: relation between GDP, value of import, export and FDI

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<tr>
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<th>01/01/2011</th>
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<tbody>
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<td>GDP (Billion)</td>
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<td>11.08</td>
<td>11.9</td>
<td>12.82</td>
<td>13.68</td>
<td>12.13</td>
<td>13.23</td>
<td>14.43</td>
<td>14.79</td>
<td>14.36</td>
</tr>
<tr>
<td>Value of Import (Billion)</td>
<td>0.97</td>
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<td>1.24</td>
<td>1.42</td>
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<td>1.80</td>
<td>1.39</td>
<td>1.47</td>
<td>1.57</td>
<td>1.45</td>
<td>1.43</td>
</tr>
<tr>
<td>Value of Export (Billion)</td>
<td>0.32</td>
<td>0.40</td>
<td>0.41</td>
<td>0.52</td>
<td>0.59</td>
<td>0.47</td>
<td>0.31</td>
<td>0.35</td>
<td>0.38</td>
<td>0.46</td>
<td>0.37</td>
</tr>
<tr>
<td>FDI (Billion)</td>
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<td>0.06</td>
<td>0.10</td>
<td>0.09</td>
<td>0.12</td>
<td>0.08</td>
<td>0.06</td>
<td>0.06</td>
<td>0.07</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Source: Economic World Bank data, 2014

4.6.35 Correlation results for Bahamas transhipment and GDP

Bahamas economy is heavily dependent on tourism and off shore banking that accounts for 60 percent of GDP that stands at $US12 billion with average growth rate of 3 percent (Forbes, 2013). The financial sector which accounts for 36 percent of GDP is the second largest revenue sector. Port expansion has already been completed to attract more transhipment businesses along with the development of free zone centre. This expansion will attract an average of 1,000 shipping container per annum (BIA, 2013). In figure 31, the regression R-square and correlation value were approximately 15 percent and 38 percent respectively. The low correlation and regression are an indication that transhipment throughput has low impact on GDP growth.
Figures 31: The correlation of Throughput volume and GDP growth

Source: World Bank data, 2014

Figure 32, shows the trend of the GDP growth from 2003 to 2013, the value of imports, the value of exports and Foreign Direct Investment. The results show that for 2013, the value of import out weights value of export and FDI by 68 percent.
Reverse logistics as a value added service for Jamaica’s transhipment

Figures 32: relation between GDP, value of import, export and FDI

4.6.36 Correlation results for Dominica Republic transhipment and GDP

Dominican Republic was viewed as the primary exporter of sugar, coffee and tobacco but in recent year there has been significant growth in the service sector in telecommunications, tourism and free trade zones (FAO, 2014). The US is the major trading partner accounting for over 60 percent of export. Remittance from the US amounts to one-tenth of GDP which currently is at US$59 billion and growth of 3.9 percent. DR is currently the fastest growing economy in Latin America since the signing of the Central America-Dominican Republic Free Trade Agreement (CAFTA-DR) in 2007.

In Figure 33, the data for Dominican Republic show that there is a negative correlation of -20 percent for GDP growth and container throughput that means that transhipment revenues have no impact on GDP growth.
Reverse logistics as a value added service for Jamaica’s transhipment

Figure 34, shows the trend of GDP growth from 2003 to 2013, the value of imports, the value of exports and Foreign Direct Investment. It shows that for 2013, the value of imports out weights export by 52 percent.

Figure 33: The correlation of Throughput volume and GDP growth (DR)

\[
y = -0.0281x + 1.3828 \\
R^2 = 0.0405
\]

Source: World Bank data, 2014

Figure 34: relation between GDP, value of import, export and FDI

Source: World Bank data, 2014
4.6.37 Correlation results for Dominica Republic transhipment and GDP

Trinidad and Tobago is the leading exporter of oil and gas that accounts for 40 percent of GDP with growth rate of 0.4 percent this accounts for 5 percent of the nation’s employment. T&T earned it reputation of having one of the highest grow rates and per capita incomes in Latin America and Caribbean. Economic growth between 2000 and 2007 averaged slightly over 8 percent, significantly above the regional average of about 3.7 percent for that same period; however, GDP has decreased since then and contracted during 2009-2011 due to depressed natural gas prices and changing markets. In 2014, the government of Trinidad and Tobago informed of the development of a new transhipment port valid at US$1.7 billion and ship maintenance and repair facility valid at US$1.3. The government is expecting a return of US$20 billion in investment arising from this expansion.

The data sample as displayed in figure 35 shows that negative correlation between container throughput and GDP growth; that means revenue from container throughput s a small contribution to GDP growth. Figure 36, shows the trend of GDP growth from 2003 to 2013, the value of imports, the value of exports and Foreign Direct Investment. This reveals that the value of imports out weights the export and FDI by 12.45 percent and 43.4 percent respectively.

Figure 35: The correlation of Throughput volume and GDP growth
Reverse logistics as a value added service for Jamaica’s transhipment

Source: World Bank data, 2014

Figure 36: relation between GDP, value of import, export and FDI (T&T)

Source: The correlation of Throughput volume and GDP growth. World Bank data, 2014

4.6.38 Correlation results for Columbia transhipment and GDP

Colombia has a sound economy with a consistent GDP growth rate of 4 percent annually and GDP of US$366 billion. This economic growth is largely stimulated by the government’s sound economic policies and aggressive promotion of free trade agreements. The country is
Reverse logistics as a value added service for Jamaica’s transhipment

heavily depended on oil exports that accounts for more than 60 percent of GDP. Colombia is currently the third largest exporter of oil to the United States (Forbes, 2013).

The Cartagena Port has now become the fifth-largest container port in Latin America (ECLAC, 2013). Cartagena’s traffic grew 7.7 percent to 2.5 million TEU in 2012. The port is a major line to Hamburg Sud. In anticipation of the Panama Canal expansion the port will be expanding infrastructure and logistics network to facilitate an increase in container throughput (McIntyre, 2013). The data for calculation on the correlation of the container throughput to GDP was not significant to Colombia GDP growth because of the low regression $R^2$ of 4 percent and correlation of 19 percent, however; an increase in transshipment activities is expected when the expansion is completed. In figure 37b shows, that the value of export was 7.5 percent of imports

![Figure 37: The correlation of Throughput volume and GDP growth](image_url)

**Figure 37b: The correlation of Throughput volume and GDP growth**

Source: World Bank data, 2014
Reverse logistics as a value added service for Jamaica’s transhipment

4.6. 39 Objective #4

To show the application of reverse logistics as a part of the port and Logistics Centre added value services.

4.6.40 Jamaica’s application of Reverse logistics as an added value service for transhipment

The application of using reverse logistics as an added value service for Jamaica transhipment will not be likely if the logistics centre is not in placed. The transhipment industry is very volatile due to the competitive nature of the market (Pinnock and Ajagunna, 2014). The competitive advantages for Jamaica can be identifying of niche markets that are focused on green logistics.

The researcher analysed opportunities of converting waste in to useable products through transhipment by accessing the following:

- Scrap metal
- Scrap tire waste.
4.6.40 Scrap metal industry for transhipment

The global scrap metal industry has been growing at a rapid rate over the past decade. The industry processes more than 145 million tons of recyclable material each year into raw material feedstock for industrial manufacturing around the world. According to the Bureau of International Recycling the scrap industry was valued at more than $90 billion of the global GDP in 2012 showing 40 percent increase from $54 billion in 2009. This industry has created more than 15,000 jobs and supports 463,000 workers, both directly and indirectly. In addition, it generates more than $10 billion in revenue for federal, state, and local governments (BIR, 2014).

The use of scrap metal has become an integral part of the modern steelmaking industry, improving the industry’s economic viability and reducing environmental impact. Total steel production in 2008 reached 1.3 billion tonnes, of which over 500 million tonnes were made from scrap metal. The most commonly recycled items are scrapped from industrial processes, end-of-life products such as containers, vehicles, appliances, and both industrial machinery and construction materials.

Figure 38 shows, that the United States was the main exporter of scrap metals accounting for 21.1 million metric tonnes in 2012 which was 12.2 percent reduction from the previous year. The year 2011 that shows a value of 24.373 million metric tonnes. The EU was the second largest exporter of scrap metal accounting for 19.214 million metric tonnes that saw an increase in export by 2.1 percent. In reference to figure 39, all five exporting country recorded positive growth except for Canada and United states that exports declined by -12.1 percent and -12.2 percent respectively.

Figure 40 shows that in 2012, Turkey was the top importer of scrap metal accounting for over 24.415 million metric tonnes which is 4.5 percent increase from the previous year of 2011 that recorded a value of 21.46 million metric tonnes (BIR, 2013). Figure 39 shows that for 2012 Turkey accounts for 38 percent of the global scrap metal followed by Korea Republic had an increase import by 17.4 percent. Figure 41 shows that in 2012, Turkey had 4.5 percent increase in imports whilst China record declined in imports of 26.5 percent.
Reverse logistics as a value added service for Jamaica’s transhipment

Figure 38: Main Steel Scrap Exporter (Million Tonnes)

Source: Official Trade Statistic/WV Stahl

Figure 39: Percentage growth of the Main Steel Scrap Exporter (Million Tonnes)

Source: Official Trade Statistic/WV Stahl

Figure 40: Main Steel Scrap Exporter (Million Tonnes)
Reverse logistics as a value added service for Jamaica’s transhipment

Source: Official Trade Statistic/WV Stahl

Figure 41: percentage growth of the main Steel Scrap Exporter (Million Tonnes)

Source: Official Trade Statistic/WV Stahl
4.6.42 Transhipment and global distribution of scrapped tyres

India, China and Vietnam are the world’s top importers of scrap tires. In 2011, Vietnam imported 20 million scrap tires annually, this mainly used for energy generation (Hendricks, 2013). Data from the India states that in the months of July to August 2014, India imported Scrap tires worth of USD$408,618. United States and Italy exported scrap tyres worth USD$79,483 and USD$64,261 respectively. The average value per shipment of scrap tyres imports in India is USD$102,154 (Infodrive, 2014). Figure 42 shows the value of scrap tire import shipment in India from the months of June to August 2014. This shows that on an average the total monetary value from June to August is approximately USD$344,562.00 per month which would be over USD$4 million annually.

Figure 42: Scrap tire import volume

Source: Infodrive, India, 2014
The findings revealed that the United Kingdom is a major exporter of scrap tires to India accounting for 60.83 percent of total value in USD. Second is the United States at 21.17 percent, Italy at 13.5 percent and the United Arab Emirates at 4.5 percent as shown in figure 43, the market is growing due to Indian’s energy demands, according to Hendricks (2013).

4.6.43 Opportunities for Jamaica’s reverse logistics network

In 2012, the scrap metal industry in Jamaica generated US$ 12.73 million in its first 12 months of operation and continues to attract hard currency earning. This trade now accounts for 80 percent of export activity through the port of Kingston, whereby over 2092 containers were shipped with 110,596 metric tonnes of scrap metal and has provided employment for 2,000 individuals directly and indirectly (Breslin, 2012). The growth of this industry globally has also been reflected within the Jamaican scrap metal industry, according to figures provided by the Jamaica Exporters' Association, scrap metal exports moved from US$13.3 million in 2005 to US$99.58 million in 2006, registering an increase of over 600 percent in one year (Gleaner, 2013).
Jamaica stands to benefit from the scrap metal transhipment industry by becoming a hub and consolidation centre for shipments to the world’s top importers China, India, South Korea and Turkey. Consolidation will enable shipment from the Latin America and Caribbean region to use Jamaica as a transshipment base for mega ships going to China and South East Asia. This will create consistent volume for steel production and create a new supply chain network for scrap metal from the Latin American region which in effect will reduce the imbalance of trade and the freight cost for export (Pinnock and Ajagunna, 2013).
Chapter 5

5.1 Conclusion and Recommendations

This chapter presents the conclusion derived from the analysis of data and presentation of findings. It analysed the content of sources (books, journal and magazine articles, documents and newspaper clippings). The researcher also made recommendations based from the literature read.

5.2. Conclusion

The objectives were evaluated and the following conclusion derived:

**Objective # 1: To analyse the competitiveness of transhipment within the Caribbean region.**

Jamaica has been losing transhipment volumes from 2011 to 2013 to competing ports within the Caribbean and Latin America regions (Panama, Bahamas, Dominica Republic, Columbia, Trinidad and Tobago and Puerto Rico). The country’s ranking in 2006 was rated second top transhipment port in the regions; in 2013 it was ranked eight. In 2013 data from UNECLAC revealed that Jamaica’s transhipment declined

- Jamaica’s transhipment ranking
- In 2013 data from UNECLAC revealed that transhipment volume fell by 8%, 1,855,425 TEUs in 2012 to 1,703,948 TEUs
- Analysing the data of transhipment volumes from 2006 to 2012 shows a negative growth rate of - 28% whilst Panama and Columbia recorded increase of 229% and 160% respectively.
Reverse logistics as a value added service for Jamaica’s transhipment

- The share of market data of 2009 to 2012 shows that Panama and Columbia both increased share of market of 39 to 47 percent for Panama and Columbia decreased from 18 to 16 percent while Jamaica decreased from 14 to 13 percent.

A SWOT analysis was done on the competing ports in the Caribbean and Latin America regions. The following findings show the strengths of the Port of Kingston:

- Jamaica’s strategic location; close to major shipping lanes
- Hinterland expansion
- Seventh’s largest natural harbour in the world

Some of the weaknesses are:

- Poor logistics infrastructure
- Hinterland connection requires improvements
- No railway connection between north and south coast
- High port prices
- Dredging of port is needed

5.3 Objective #2

To examine how the logistics index can be used as guideline for economic development for Jamaica

Jamaica has improved LPI ranking in 2014 moving from 124th place to 7th. All competing ports except Columbia showed improved ranking. Panama having the highest logistics index of 45, Bahamas 66, Dominica Republic 69. The logistics index indicates the framework for global competiveness by accessing the following:

- Road network infrastructure
- Quality of port infrastructure
- Trade tariff
- Quality of air transport and railroad infrastructure
Reverse logistics as a value added service for Jamaica’s transhipment

In terms of road network infrastructure, Jamaica was ranked 86 second lowest to Columbia which was ranked at 130 while Panama was ranked 48. In terms of port infrastructure Jamaica was second at 39 behind Panama 6. As it relates to trade tariff, Jamaica was the second highest at 90 behind Trinidad and Tobago at 111, Panama and Dominica Republic had the lowest tariff at 75 and 82 respectively. In terms of quality air transport, Jamaica was ranked 45 behind Panama which was ranked 50. As it relates to railroad infrastructure, Jamaica had the lowest ranking amongst the competing ports at 116, while Panama was ranked 13.

In terms of cost to export per container, Panama was the lowest at US$625 while Jamaica price was US$1530 making the country the second highest behind Columbia at US$2355. In relation to cost per container, Jamaica was the second highest at US$2130 behind Columbia at US$2470 while Panama was the lowest at US$965.

5.4 Objective # 3

To determine and evaluate the economic impact of transhipment within Latin American and the Caribbean region

Container throughput growth within a region or country is an indication of its logistical performance which is highly correlated to GDP growth. A case study was conducted on three global ports, namely, Singapore, Port of Rotterdam and Dubai. The findings revealed that Singapore is ranked 5\textsuperscript{th} in the LPI rankings. The regression was found to be 40\%, correlations 63\%, therefore there is a positive correlation of 63\% for container throughput and GDP growth.

Port of Rotterdam regression was 25\% and a 50\% correlation between container throughput and GDP growth. The LPI index is ranked at second in the world. Port of Dubai LPI ranking is 27 in the world and has a correlation of 45\% transhipment and GDP growth. The Panama Canal accounts for 70\% of transhipment destined to the Caribbean and South America. Panama GDP is UD$36 billion by which 60\% is maritime related. Panama has the highest GDP growth rate in the region at 10.2\%, followed by Columbia 4\%, Dominica Republic 3.9\%, Bahamas 1.83\%, Trinidad and Tobago 1.5\% and Jamaica the lowest at 0.72\%. The findings for Jamaica’s transhipment correlation to GDP growth was 13\%, correlation 36\%. This shows that
Reverse logistics as a value added service for Jamaica’s transhipment

the revenue for the Kingston Container Terminal is not a significant contributor to GDP. The value of imports outweighs export and FDI by over 75%. Bahamas recorded a regression of 15% and a correlation of 38%. The value of imports outweighs the value of export and FDI by 68%. For Dominica Republic there was a negative correlation between transhipment volumes to GDP growth. The value of imports outweighs the value of exports and FDI by 62%. Trinidad and Tobago also showed negative correlation between transhipment and GDP growth. The value of imports outweighs export and FDI by 43%.

5.5 Objective #4

To show the application of reverse logistics as a part of the port and logistics centre added value services

The global scrap metal industry has been growing at a rapid pace over the past decade. The USA is the main exporter of scrap metal accounted for 21.1 million metric tons in 2013. It was the top importer of this product accounting for over 24.4 million metric ton which recorded a 45% increase from the previous year of 2011. Japan had the highest percentage growth of export at 57.9% while India had a 32.4% increase in imports in scrap metals. Jamaica generated US$12.7 million in 2012 this trade accounts for 80% of export activities through the Port of Kingston whereby over 2000 containers were shipped with 110595 metric tons of scrap metal were exported. It provided employment for over 2000 persons.

India, China and Vietnam are the top importers of scrapped tyres. In 2011 Vietnam imported 20 million scrapped tyres for energy generation. India imports approximately US$4 million annually. The United Kingdom is the major exporter to India accounting for 60.8%, second is the USA at 21% followed by Italy at 13.5%. Scrapped tyre demand is a growing market due to India, and China’s energy demand.
5.6 Recommendations

The following recommendations for the Port of Kingston, Jamaica were drawn from the literature read (literature review) and data analysed.

The transhipment activity within the Caribbean is set to grow when the Panama Canal expansion is complete. This will created several prospect of economic growth for countries competing for traffic; however, not every port is going to gain the same fortune due to volatility of the shipping market, whereby shipping lines can quickly shift to ports that are economically viable to their operation. It all depends on the efficiency of the port and logistics framework to support the needs of supply chain in the growing containerization trade. The findings revealed that there are five areas that the Jamaica must address in order to move forward with the added value service of reverse logistics. These are:

- Creating Logistic Centre
- Improving Intermodal link
- Reducing tariff to attract investors
- Shredded tyre product for transhipment
- Scrap metal consolidation and export
- Ratification of the Basel Law

5.6.1 Logistics Centre

Reverse logistics is not a new concept for the transhipment industry however; it cannot be effective without the port and the logistic centre to support this concept. Therefore, it is recommended that Jamaica establish a logistic centre to support this new aspect of reverse logistics to facilitate the added value service for transhipment. Currently, the logistic centre is still in the planning phase which could be too late for Jamaica if not implemented soon. The competitive analysis revealed all the competing ports are establishing logistics centres away from
Reverse logistics as a value added service for Jamaica’s transhipment

the 3rd generation port system for better value added service, however that mainly facilitate forward logistics. This means that Jamaica will create a niche market towards environmental friendly companies for reverse logistics services.

5.6.2 Intermodal Link

One of the major reasons why Panama logistics performance is rated higher than Jamaica is because of the country’s efficient intermodal links which supports the logistics centre in Colon. Logistics centre must be supported by intermodal links such as roads, rail, sea, inland waterways and air. Panama railways system is currently rated at 4.2 on the LP index and plays a critical role in the connection of Balboa Port (Pacific) and Colon Port (Caribbean). The transfer of container by rail enables the Panama logistics network to be very efficient. Jamaica needs to re-establish the railway network between north and south coast for better connectivity. The Port of Montego Bay would play an integral role in transportation cost saving and fuel for transshipment ships coming from North America.

5.6.3 Tariff

Tariff is one of the major areas that both shippers and carriers seek to reduce. Jamaica has the second highest tariff charges among the competing ports which means that investment opportunities will be constrained, therefore, the government needs to revisit the tariff charges to attract shippers and improve competitiveness. Panama is currently the lowest in the region rated at 6 according to the logistic performance index. Panama has established a tax free logistics centre (CFTZ) near the Port of Colon. Jamaica need to re-establish their free zone areas to support the port’s pricing structure.
Reverse logistics as a value added service for Jamaica’s transhipment

5.6.4 Shredded scrap tyres for export and transhipment

The reverse logistics of shredded tyres as an added value for transshipment is a new concept that seeks to consolidate scrap tyre waste from small Caribbean states and Latin America region for a sustainable supply chain to India, China and Vietnam. This concept will enable scrap tyres to be shredded for commercial use for fuel, asphalt and re-manufacturing. This is a green concept of reverse logistics that cleans the environment while creating commercial revenue both locally and regionally for scrap tyres. As it relates to added value services, Jamaica would be a processing and consolidating centre for Post Panamax vessels returning to South East Asia. This would reduce freight rates for small Caribbean states because the rate of empty container returns would be reduced.

Shredded tyres for transhipment will be a growing business based on the influence of reverse logistics that will facilitate environment control for organizations and small island states that are unable to effectively control pollution due to lack of recycling infrastructure.

Transhipment will be a major supply chain for companies that use shredded tyres to produce products and alternative fuel for manufacturing processes globally. The reverse logistics processes in the hub will enable scrap tyres to be shredded locally and consolidate regional shipment for Post- Panamax ships returning to southern Asia to processing plants. This will be added value by the Port of Kingston and logistics centre gaining revenue from tire recycling services for the Latin American and Caribbean region.

5.6.5 Scrap metal

The scrap metal industry is a growing trend due to iron ore demands in Turkey and China. In Jamaica, this trade now accounts for 80 percent of export activity through the Port of Kingston. This is an opportunity for Jamaica to capitalize as it relates to the transhipment of value added services of consolidating scrap metal from Central America and Small Caribbean states to use Jamaica as a transhipment hub.
5.6.6 Ratification of environmental law

The Basel Law is an important law that prevent the illegal dumping of electronic items. This problem is not prevalent in western region; however the reverse logistics will involve product recalls, customer product returns and assembling/disassemble. These processes of reverse logistics will need laws to protect and regulate the country from illegal dumping and control any unregulated procedure by any third party logistics company that may operate within the proposed logistics centre.

5.6.7 Continued Studies on reverse logistics

Reverse logistics is a subset of supply chain whereby, data are normally listed within the portfolio of logistics; however, there is a need for additional data that will enable further research as there is none for this topic in Jamaica and the Caribbean.
Reverse logistics as a value added service for Jamaica’s transhipment

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Reverse logistics as a value added service for Jamaica’s transhipment


Reverse logistics as a value added service for Jamaica’s transhipment


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