

**A STUDY OF EMPTY CONTAINER REPOSITIONING STRATEGIES,
ISSUES AND SOLUTIONS**

*Submitted to the School of Maritime Management, Indian Maritime University in
partial fulfilment for the requirements for the award of degree in MBA -
International Transportation & Logistics Management*

Submitted

by

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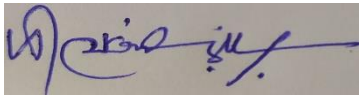
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DECLARATION

I, BILLA SIVA KRISHNA (**Reg. No. 1903305010**), student of School of Maritime Management, Indian Maritime University –Chennai Campus, hereby declare that this project report titled “**A STUDY OF EMPTY CONTAINER REPOSITIONING STRATEGIES, ISSUES AND SOLUTIONS**” submitted in partial fulfilment of the requirement for the degree of **Master of Business Administration in International Transportation and Logistics Management** is my original work carried under the guidance of my project guide. It has not formed the basis for the award of any Degree/Diploma of any University/Institution. The information submitted is true and original to the best of my knowledge.



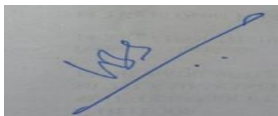
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EXECUTIVE SUMMARY

Empty container management deals with repositioning empty containers at minimum costs while fulfilling empty container demands. Due to imbalances in trade, some areas have a surplus of empty containers, while others have a shortage. Therefore, empty containers need to be repositioned globally to make sure that sufficient empty containers are available everywhere. Empty container management from the micro-logistics of a port area to the repositioning at various geographical regions has been aimed at finding out best logistic solutions and logistic cost reduction to the minimum. Besides, empty containers need to be repositioned regionally between shippers, consignees, inland depots, terminals and ports in order to fulfil demand. In the project, the focus is on the empty container management problem at various level. The problem is described in detail and opportunities for reducing empty container movements at various strategies.

Different existing strategies like cargo rotation, cross loading and symmetric approach are explained in detailed, feature trends which are innovative and new ways of doing things such as foldable containers which changes the entire course of business and its cost analysis, usage of new technology, modelling and its practical applications in optimising the repositioning, grey box pooling which is a common container for all the players, horizontal diversification and secondary use of empty containers.

In the recent years shipping industry faces monetary problem with the empty container logistics. The study finds that the Underutilisation of resources, co-ordination and cooperation among the industry players and uneven usage of the technology are the key challenge. Hence a common platform for industry players and exchange of information is suggested.

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CHAPTER - 1

INTRODUCTION

1.1 Introduction

Since the presentation of the maritime container in the mid 1950's, liner shipping bunches have relocated from customary freight taking care of methods to huge cell vessels which can be seen at any of the world's significant ports today. The utilization of the compartment improved multi-purpose efficiency and takes into account shorter point to point travel times. Also, freight harm is decreased. On one hand, shippers and transporters have profited massively. Then again, they are looked with expanded operational multifaceted nature just as a huge number of variable and fixed expenses. Dealing with these is significant specifically in circumstances with serious challenge in fierce money related occasions. Also, the expansion of the holder populace just as an expanding worldwide exchange awkwardness brought about collection of void compartments (or purges) in some significant port zones and holder lack in different districts. In 2017, worldwide seaborne exchange achieved 10.7 billion tons. Of this, containerised trade accounted for 1.82 billion tons. Containerised shipping is an important component of global trade and currently there are over 22 million containers operating around the world.

The unassuming and pervasive container which was made in 1956 is generally hailed as one of the best developments of the advanced world, one that totally changed the manner by which business has been done since the twentieth century and truly and really made the world a littler spot and the one genuine engineer of Globalization. In any case, as much as it is significant in the worldwide exchange, to numerous ports far and wide, empty containers appear to have likewise turned into an unavoidable truth. This is on the grounds that they are taking up important yard and stacking space in specific ports. Particularly ports which have major exchange unevenness.

To suit exchange and keep up the efficiencies that right now exist in the cargo transportation and coordination's industry, brief stockpiling of empty holders is inescapable. Movement and storage of empty intermodal containers, which are part of the operating procedures but are often described as inefficiencies of the freight transportation system, cost the industry billions of dollars each year and have raised environmental, social and economic concerns. This report examines the root

causes of the empty container accumulation, the state-of-practice in dealing with related issues around the world and synthesizes factual data to develop a detailed mapping of how containers move at a global, regional and local level, including moving and accumulation of empty intermodal containers

Empty container movement

A chronic issue of container transportation inherent to the system is an empty container imbalance on different regional levels. Generally, an increase in volume leads to even larger volume imbalances, i.e., large export flows from Asia to North America and Europe with smaller import flows to Asia

1.2 Rate Terminology in container trade

The following definitions explain key terms of rate and tariff used in the container shipping industry.

Freight Rates: Indicate the rates applicable for export shipments obtained by directly contacting the carriers' agent or the freight forwarders.

Tariff: A tariff is a freight rate published by the ocean carriers in a rate book called The Tariff, which gives the rates for different kinds of cargo between specific ports worldwide. The freight conferences publish these ocean cargo rates.

Applicable Tariff Rates: The carrier, or the carrier's agent often refers to The Tariff for applicable freight rates. These are the freight rates that are influenced by the volume of traffic on a given route. When an exporter contacts the carrier or the carrier's agent for the freight rate, the information normally required of the exporter is the kind of cargo and its intended destination, the gross weight and total cube of the consignment, the expected date of shipment, and whether the freight will be prepaid or collected. Based on this information the applicable tariff rate is determined.

General Cargo Rates: The general cargo rate applies to a shipment of mixed products.

Specific Commodity Rates: The specific commodity rate applies to a shipment of a specific product between specified ports. It is lower than the general cargo rate. In practice, most export goods are transported under the specific commodity rate.

NES Rates: The NES rate (Not Elsewhere Specified rate) or the NOS rate (Not Otherwise Specified rate), sometimes referred to incorrectly as the FAK rate (Freight All Kinds rate), applies to a product that is not specifically listed in the tariff for a given route, that is, a product not found under the specific commodity

or the general cargo classifications. The NES rate is higher than the specific commodity and the general cargo rates.

Box Rates: Most ocean freight in modern shipping is containerized. Hence, there is a trend towards the flat rate per container for FCL (Full Container Load) shipments, known as box rate, at times also referred to as FAK rate (Freight All Kinds rate), instead of a weight-based rate or measure that is commonly applied in the LCL (Less than Container Load) shipments. The box rate is convenient in simplifying the freight cost calculation in consignments consisting of a wide range of products.

Through Freight Rates: The through freight rate is used in multimodal transport and transshipment. It covers the specified route and mode of transportation to the final destination.

Conference and Non-Conference Rates: The term conference rate refers to the rate of the conference carrier. The term non-conference rate refers to the rate of the independent or non-conference carrier. The freight rate from members of a conference is uniform, but it may differ between the conferences. The non-conference rate varies among the independent carriers. The non-conference rate is lower than the conference rate.

Charter Rates: The charter rate used in the charter industry varies greatly among the charter operators. It is the lowest rate per weight or measure. The operator may offer a very low rate on a return trip in order to secure the cargo, for example, in the return trip from a voyage charter.

Trade imbalances. They are probably the most important source in the accumulation of empty containers in the global economy. A region that imports more than it exports will face the systematic accumulation of empty containers, while a region that exports more than it import will face a shortage of containers.

Repositioning costs. They include a combination of inland transport and international transport costs. If they are low enough, a trade imbalance could endure without much of an impact as containers get repositioned without much of a burden on the shipping industry.

Repositioning costs can also get lower if imbalances are acute as carriers (and possibly terminal operators) will offer discounts for flows in the reverse direction of dominant flows.

Revenue generation. Ship-owners allocate their containers to maximize their revenue, not necessarily the economic opportunities of their customers. For instance, while a container could take 3 to 4 weeks in the hinterland to be loaded and brought back to the port and earning an income of about \$800, the same time can be allocated to reposition the container across the Pacific to generate a return income of \$3,000.

Manufacturing and leasing costs. If the costs of manufacturing new containers, or leasing existing units, are cheaper than repositioning them, which can be possible over long distances, then an accumulation can happen. Inversely, higher manufacturing or leasing costs may favour the repositioning of empty containers. Such a condition tends to be temporary as leasing costs and imbalances are correlated.

Usage preferences. A large number of shipping lines uses containers as a way of branding the company name and to offer readily available capacity to their customers. This observation combined with the reluctance of shipping lines and leasing companies to share market information on container positions and quantities for competitive reasons, makes it very difficult to establish container pools or to widely introduce the 'grey box' concept.

Slow steaming. Excess capacity and rising bunker fuel prices have incited maritime shipping Companies to reduce the operational speed of their containerships from 21 knots to 19 knots, a practice known as slow steaming. The resulting longer transoceanic journeys tie more container inventory in transit, incite Trans loading in proximity of port terminals and reduce the availability of containers inland.

1.3 Problem Identification

Because of the unique job of empty containers in the container transportation process, empty container re positioning is a point of convergence in the delivery business. For this issue, very proficient and achievable models are basic in improving the advantage for transportation organizations and expanding their market intensity. Operational choices are influenced by strategic ones. Gone for this point, we propose a strategic and operational agreeable empty container repositioning improvement model. To cut the hunt space and acquire the ideal arrangement rapidly, a few introductory arrangements age rules are extricated, in view of business stream. As a result of absence of legitimate technique and absence of coordination between the players makes repositioning a costly issue.

1.4 Research Objective

This study used the secondary data to analyse the current trends in empty container repositioning strategies. The various data collected or analysed with the help of information contain in the research paper, reports, journals, website, reference books, newspaper and magazine, annual report of the ports, chamber of commerce, concerned books, shipping magazines are provide secondary

data, various authenticated blogs written by industry professionals, a talk with industrial players for the trends and suggestions.

1.5 Scope of study

The study covers the container integral part of movement with empty container repositioning, findings of study will be useful to professionals from logistics, logistic planners, freight forwarders, shipping lines and container leasing companies. Students and researchers may also find the report useful as there are not much published work in this subject.

1.6 Limitations of the study

The study based predominantly on secondary data which is descriptive in nature. Repositioning of containers is a niche area in logistic planning and there are not much statistical data available from reliable sources. For the same reason, analytical tools could not be used. However, interviews with industry experts and telephonic discussions with container leasing companies have enabled vast inputs that have been built into analysis and interpretation.

1.7 Dissertation Structure

- CHAPTER – 1 Gives the Introduction of empty container repositioning, top leasing companies, terminology, Statement of the Problem, Objective of the Study, Research methodology, Limitation of the study, Scope of the study, and Chapter Scheme.
- CHAPTER – 2 Deals with the Review of Literature.
- CHAPTER – 3 Existing strategies of empty container repositioning following by industry players
- CHAPTER – 4 Current trends and new strategies in repositioning systems
- CHAPTER – 5 Will be the different solutions, Findings and Conclusion.

CHAPTER – 2

REVIEW OF LITERATURE

The following are the review of various articles on this topic by various authors, various papers are disclosing the issues and various trends in the empty container repositioning.

2.1 Di Francesco et al. (2009) addresses a container repositioning problem with several uncertain Parameters and data shortage. They propose a time-extended multi-scenario optimisation model in which scenarios reflecting shipping company opinions can be generated. Two different types of ports are considered for taking different restrictions regarding the storage of empty containers into account.

2.2 Crinks (2012) as well as Be henna (2011) emphasise the need for increasing the equipment visibility among ocean carriers since carriers, shippers, and vendors find it difficult to manage their assets effectively due to the information gaps or 'blind spots' along the transport chain. Container operators are prevented from realising all possible equipment management options currently available to them (e.g., interchange or triangulation) and are hindered to realise a more efficient equipment usage. It is noted that approximately \$100 billion are spent for container handling and asset management, and it is estimated that approximately \$16 billion of that are attributable to the costs of repositioning empty containers only. It is concluded that the greatest opportunity for reducing costs by increasing the equipment visibility is during blind spots on the landside when the assets leave the ocean carrier's network.

2.3 Bandeira et al. (2015) present a DSS for the integrated transshipment of empty and full containers based upon a network model with nodes representing incorporated actors and arcs representing transportation routes. In a first stage, the model assigns priorities and adjusts full container demands taking available empties into account. In a second stage the model statically minimises total costs (transportation, storage and handling).

2.4 JAKOV KARMELIĆ, (2012) the study outcomes point to the fact that the logistics of empty containers represents a complex system with a large number of subjects involved (owners/operators, leasing companies, port authorities, terminal operators, and local public authorities). Empty container management from the micro-logistics of a port area to the repositioning at various geographical regions has been aimed at finding out best logistic solutions and logistic cost reduction to the minimum. Where modern container lines are concerned, the logistics of empty containers has been based on team cooperation between logistics and commercial departments and it represents an integral part of the global transport system.

2.5 Rafael Epstein, Andres Neely, Andres Weintraub (2012) this project and the resulting OR-based solution provided a decision support framework that changed how logistics planners make their decisions and coordinate empty container logistics. This change produced important qualitative and quantitative results and also plays a key role in CSAV's operational strategy today. OR allowed CSAV to coordinate empty container logistics and support decision making under uncertainty, changing conditions, and imperfect information.

2.6 Smilowitz, 2003, introduced an application of a Multi-Resource Routing Problem (MRRP) in drayage operations. Drayage involves the movement of loaded and empty equipment between rail yards, shippers, consignees and equipment yards. The problem is modelled as a MRRP with flexible tasks, since the origins and destinations of some movements can be chosen from a set of possible nodes. The complexities added by routing choice are studied. A set partitioning formulation of the problem is presented along with a column generation solution methodology.

2.7 An analysis of the Chinese mainland's container distribution network is presented in Cullinane, 2016. It analyses China's inland distribution network that has become a bottleneck impeding the fast development of its container throughput. They apply a multi-objective programming approach to optimize the network configuration and flow. The approach focuses on import of laden containers and avoids the complexity caused by having to export empty containers.

2.8 Perez and Holguin-Veras, 2017, propose a multipored programming approach to model the empty containers distribution problem and gain insights into the effectiveness of alternative policies to mitigate the situation. The proposed model - a simplification of the real-life system - reflects the operational and planning complexity of the container distribution problem. An example used to demonstrate the formulation suggested that, under current policies, the number of empty containers stored in urban areas is fairly insensitive to taxes and other fees, suggesting that land use regulation may be the most efficient way to deal with this problem.

2.9 Huseyin Gençer (2019) Container shipping industry struggle with the problem of trade imbalances which cause too much ECR and costs. This issue in container imbalances have been interested in the academic world as well. Many studies developed new strategies and offered new methods to solve this problem. In this study, prominent studies related to ECR were discussed and issues not studied in the literature were emphasized. This study has demonstrated that some models developed in the literature can be easily applied in practical life to help shipping companies, while some applications in container shipping industry need to be examined in detail from a scientific point of view.

CHAPTER – 3

AN ANALYSIS OF CURRENT REPOSITIONING STRATEGIES

3.1 Definition of Container transport

Container transport refers to the transportation of goods in standardized re-sealable transportation boxes by rail and sea. Data are expressed in tons and twenty-foot equivalent units (TEU). TEU is based on a container of 20-foot length (6.10 m) providing a standardised measure of containers of various capacities and for describing the capacity of container ships or terminals. One 20-foot container equals 1 TEU.

3.2 Container movement across nations



Figure no 1. Container movement across nations

Let us see the all three major trade lines and imbalances in trade,

Trans pacific: It is the one of the major trade line and trade imbalance is high in the region it is 1:3 in ratio, for every one laden container there is three empty containers

Trans-Atlantic: A major imbalance also appears here; 40% containers empty when it is USA to Europe.


Far East: It is the oldest trade route, the imbalance in this route is quite low due to involvement of many countries, if any empty produced it can be consumed in one or another nearby country.¹

Empty container the board manages repositioning empty containers at least expenses while satisfying empty container requests. Because of uneven characters in exchange, a few zones have an overflow of empty containers, while others have a lack. Along these lines, empty containers should be repositioned universally to ensure that adequate empty containers are accessible all over. In addition, empty containers should be repositioned locally between shippers, representatives, inland warehouses, terminals and ports so as to satisfy request.

This is a rundown of the world's main 10 container renting organizations positioned arranged by the twenty-foot proportional unit (TEU) limit of their armada.

3.3 Top 10 container5 leasing companies

Leasing company	Capacity	Market share	Image
Triton Container / TAL International	4,550,000	25.2%	
Textainer Group	3,230,000	17.9%	

Leasing company	Capacity	Market share	Image
HNA / Bohai Group	2,177,500	12.1%	
Florens Container Leasing	1,895,000	10.5%	
SeaCube Container Leasing	1,237,500	6.9%	
CAI International	1,165,000	6.5%	

Leasing company		Capacity	Market share	Image
Dong International	Fang	755,000	4.2%	
Beacon Leasing	Intermodal	660,000	3.7%	
Touax Solutions	Container	630,000	3.5%	

3.4 Types of Container Leases

There are a variety of container leases, falling under three general categories: spot, term, and master.

Spot Leases: In spot leases, also known as “short-term” or “trip leases,” users request one or more containers for a short period of time or for a specific trip or purpose. Prices for spot leases fluctuate widely, depending on market conditions at the time of request. Users may get low prices by shopping the market, but should not depend on the spot market for major requirements because of the market’s vulnerability to sudden upward price fluctuations. Similarly, leasing companies try to keep their spot leasing activities to a minimum in order not to be caught in a low-rate period with too many unemployed containers.

Term Leases: A term lease is sometimes used for prolonged possession of containers by the lessee. This type of lease is usually a “dry” lease without the lessor providing any service except buying the container from the manufacturer and leasing it. In a term lease, the leasing company is almost wholly in the financial end of the business, in direct competition with banks and other financial institutions.

Master Leases: Master leases, also known as “pool management plans” or “full- service leases,” are long-term leases where the leasing company undertakes full management of the container fleet, including maintenance, repair, repositioning, and all other services to fit the user’s needs. Master leases are quite complicated, involving debits and credits between the parties according to the containers at time of interchange and service. Each lease is separately negotiated to fit the user’s specific requirementsⁱⁱ.

3.5 Movement Flows and Empty Container Logistics

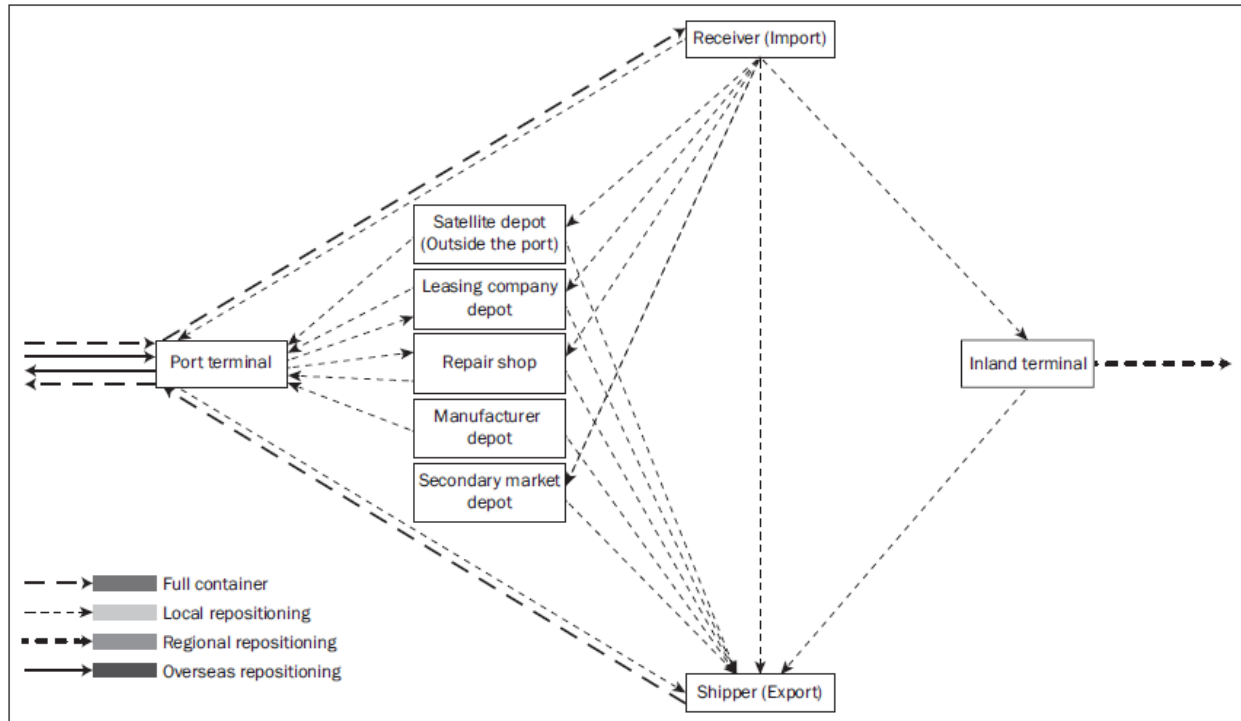


Figure no 2. Movement Flows and Empty Container Logistics

Once a container has been stripped, there are different possibilities at disposal for the empty container optimal point of return to be determined:

- where the container has not left the port/container terminal because unsnuffing was performed at the port warehouse upon consignee’s request, the empty container will be repositioned to the empty container stacking area within the container terminal,
- where transport to the final inland destination is being performed either by the owner/operator or by the transport operator designated by the customer or by the consignee, and the container has been unstuffed, empty container may be:
- returned to the port container terminal, provided empty container space availability,

- returned to the port empty container satellite depot, outside the port area, provided empty container space availability within the designated port/terminal,
- left on the transport means (from import) on account of the export cycle or stuffing of the same box having been agreed (triangulation),
- returned to the leasing company depot on account of the subject container return having been agreed in the leasing arrangement,
- left at the specified inland container terminal, in order for the empty container to be positioned “closer” to the next container user in the export cycle, or for groups of empty containers to be further repositioned to the closest regional market short of empty containers required for the export leg,
- Left at consignee’s industrial depot, to be used by the same user in the next export cycle,
- Left at the designated river container terminal for further repositioning by inland waterways
- left at the container buyer’s depot for the secondary market (civil engineering companies, container repair shops, individual buyers, and the like), where it has been decided for old containers’ repair not to be profitable any more,
- Left at the container terminal or depot agreed upon for container equipment interchange with another operator, left at the container repair shop depot, where container repair has been agreed upon

3.6 Types of repositioning

There are three different geographical levels for repositioning

Local repositioning; repositioning within a region. For instance, an empty container having arrived to Chennai from import is being transported empty to Kanchipuram for stuffing in export;

Regional repositioning; repositioning between nearby regions where one is with container “surplus” or imports exceeding exports, and the other with container “shortage” or exports exceeding imports. For instance, empty containers from Rijeka are being repositioned either by rail to Austria or by sea to Italian ports.

Overseas repositioning; empty container repositioning by maritime liner container services from ports with container equipment “surplus” (imports exceeding exports) to overseas markets with

container equipment “shortage” (exports exceeding imports). For instance, empty container carriage by sea from Rijeka to Chinese portsⁱⁱⁱ.

In very inverse circumstances, where a specific market is encountering container gear deficiency (or fares surpassing imports), the administrators have the accompanying alternatives: container hardware import repositioning from business sectors/ports with empty container surpluses, both at the local and abroad dimension,

- Container hardware renting from renting companies,
- Purchase of new containers from container equipment makers,
- Container hardware exchange with different operators (where there are different administrators in the zone with empty container gear "excess" right now).

3.7 Mapping Container Movement

If the inflow of containers to that area is greater than outflow (import center) then the area shows a surplus of empty containers. Therefore ocean carriers are faced with one of the following options: to reposition empty containers to areas of high equipment demand at their own expenses, to off-hire the surplus containers and allow lessors to take the appropriate decision about their availability, to temporarily store them in depot at the surplus area, to allow some time before taking decision, to sell out them to secondary market-particularly if their age greater than ten years and their condition substantiates such a decision, to match their needs with other carriers' needs, although this decision is rather rare and normally it happens only between members of the same alliance.

On the other hand, when outflow is greater than inflow (demand area) the Ocean Carrier is faced with the following options: to import repositioned empty containers from surplus areas, to lease containers from lessors (either locally available or to be repositioned from other areas), to purchase containers (particularly when available at the local market (a case common in Far East, since the area is a container making area and a high demand area at the same time) or to match the needs with other carriers.

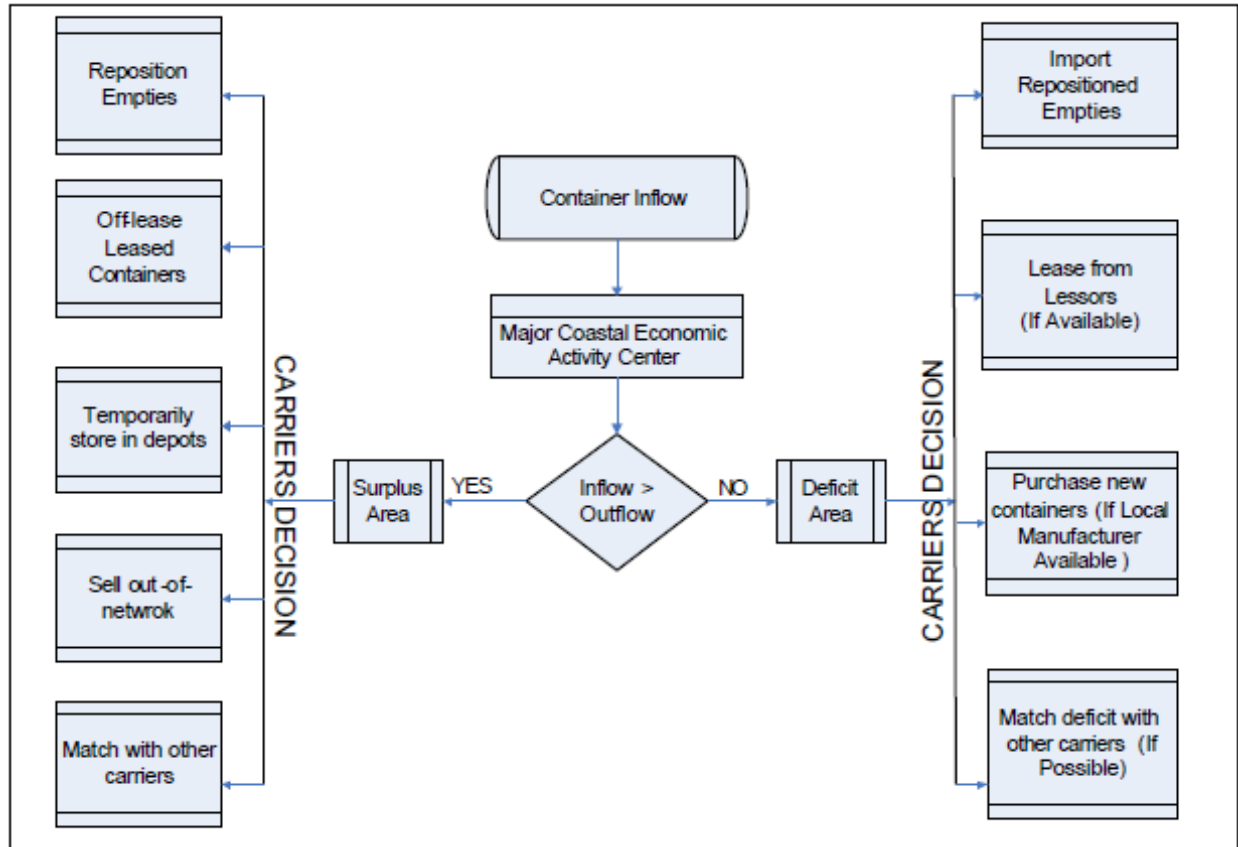


Figure no 3. Mapping Container Movement

3.8 Empty container flow

Direct empty pick-up (street turn) is the most efficient interchange procedure in terms of equipment use and empty trip minimization. Following emptying a container at a consignee's premises the following options are available: either to return it to the marine (port) terminal to be repositioned through all water transportation or to send it full to the next destination or to reposition it intermodal or to return that to a depot or to street-turn it to the next customer to be used for export. Empty containers reach also depots from marine terminals to be stored temporarily. These containers can be property of ocean carriers or lessors. If containers are property of lessors (leasing companies) they can be off hired by ocean carriers, depending on the lease contract terms.

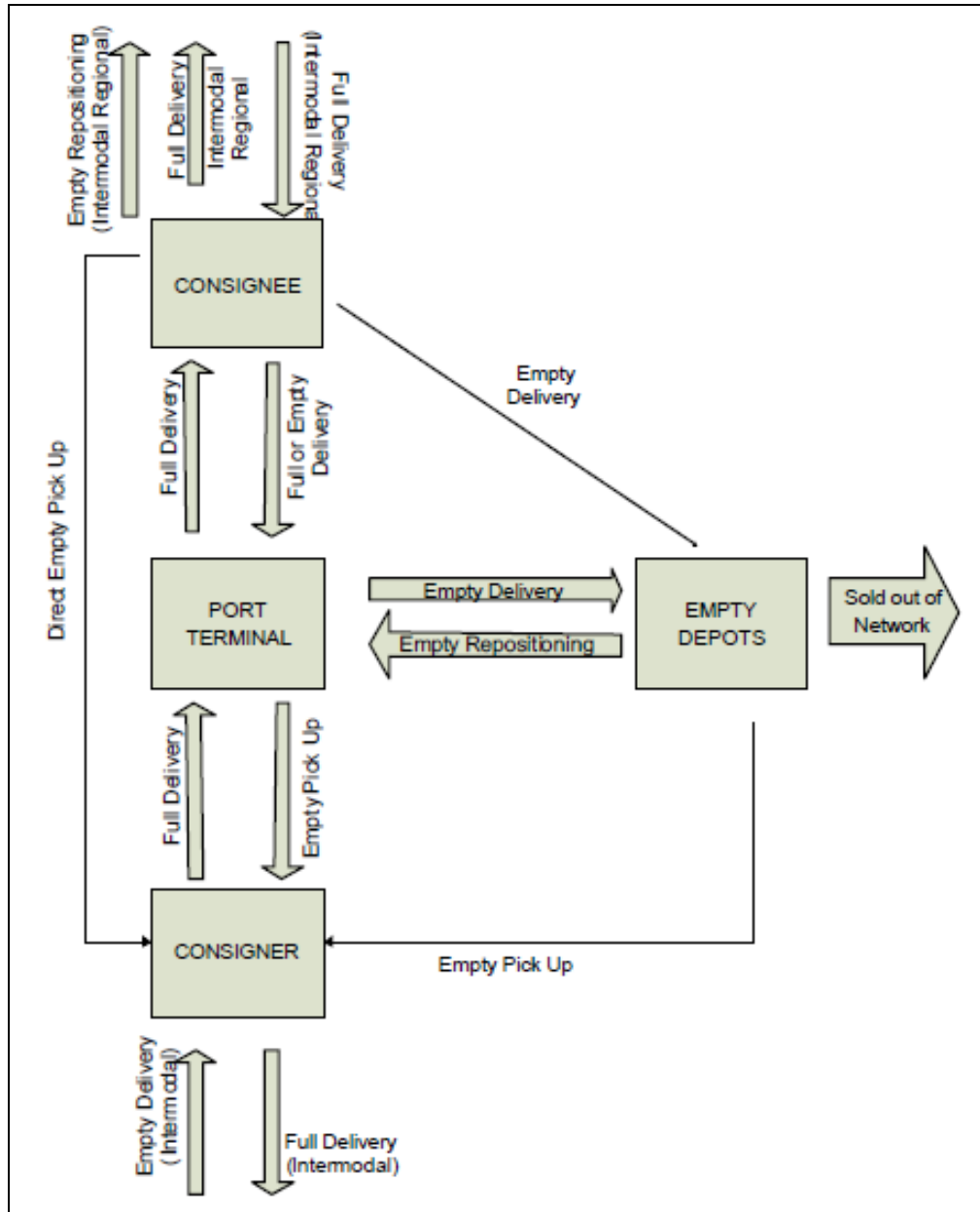


Figure no 4. Empty container flow

Empty containers accumulated in a region and often stored in depots fall within the following categories:

- (1) Those that are within the transportation network, temporarily stored, waiting to be filled and exported or to be repositioned back to demand areas.
- (2) Those that are long term stored, waiting to be sold in the secondary market, aged (more than ten years) and effectively out of the transportation network.

These two categories require different approaches:

(a) Those in the network require an industry-based initiative to increase matching possibilities and decrease empty trips.

(b) Those out of the network require periodically reviewed measures to increase the possibility of removing them to secondary market or to scrap. A continuous monitoring system would be required to record the accumulation and movement of empty containers.

3.9 Decision support system

The number of empty containers stored in a region or sub-region is monitored. The size of the region to be considered may vary from an individual facility to a county, zip code, or an area extending several miles around a major activity centre and may include several zones, sub-zones and intra-zone sections. Based on the observed conditions in the region, stakeholders may select to evaluate policies and strategies, which are expected to help achieve a desired outcome. Different actions may either target the overall container accumulation, or focus on long-term stored containers, or on older containers with the objective to facilitate their selling to the secondary market.

An expert system needs to be built to allow for estimates of the anticipated impact and for evaluation of the various policies. The inference procedures of the expert system manipulate and use knowledge in the knowledge base to determine the outcome of proposed actions. The knowledge base is built based on factual and heuristic knowledge, meaning knowledge that is commonly agreed upon, as well as more experiential knowledge, including good practice benchmarking, good judgment and plausible reasoning from experts in the region and simulation and analytical model outcomes if available.

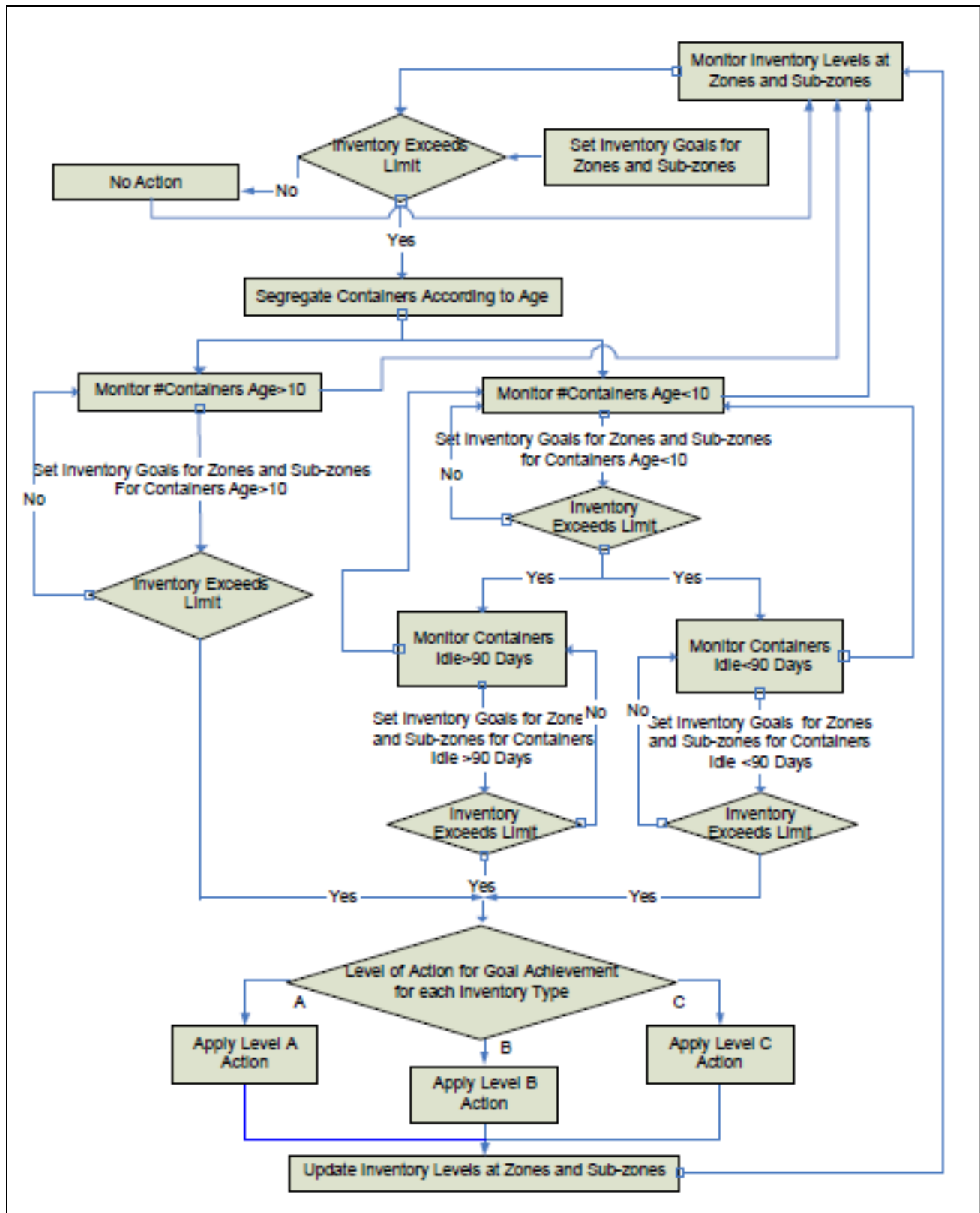


Figure no 5. Decision support system

3.10 Current repositioning strategies

3.10.1 Cargo Rotation

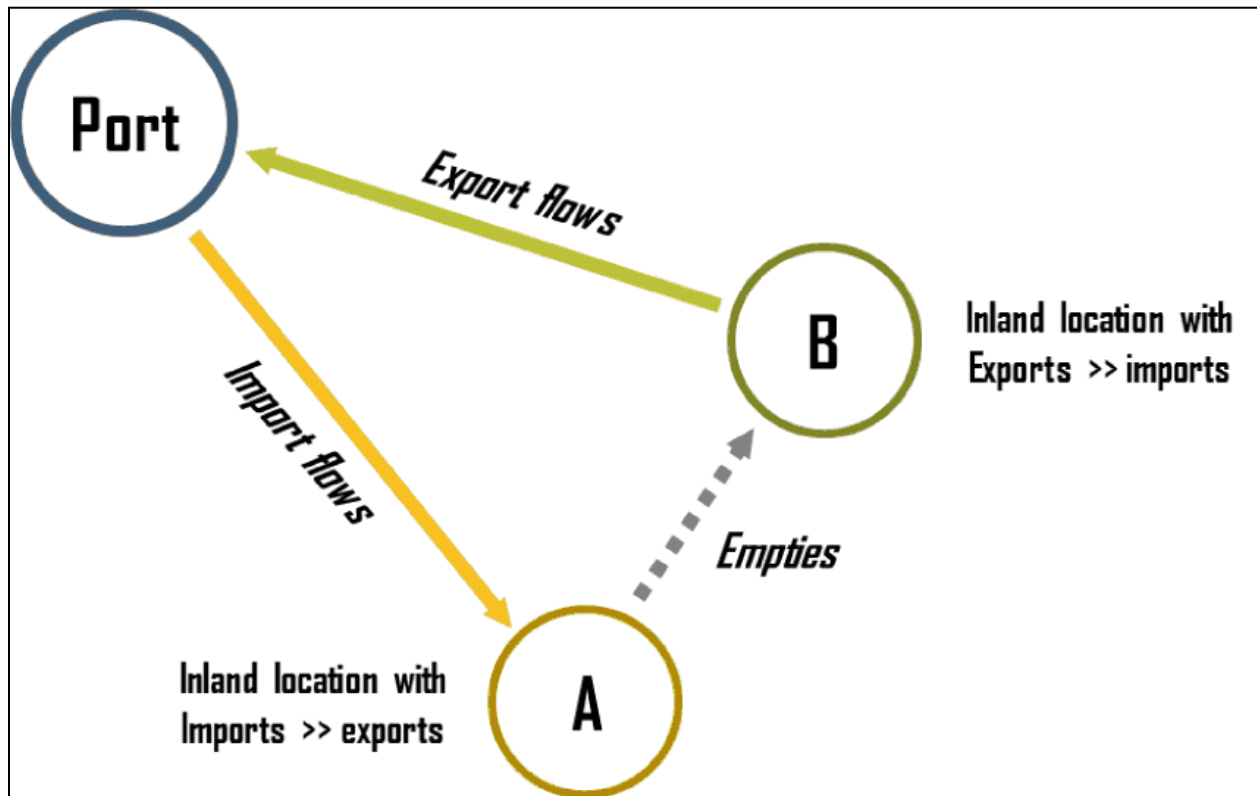


Figure no 6. Cargo Rotation

The development of empty trucks or containers speaks to a standout amongst the most intricate transport issues in cargo circulation. Intense uneven characters in universal exchange have extended the size of this issue and even affected on cargo transport rates (transpacific rates are generally higher for eastward streams than for westward streams). Since transport frameworks are currently increasingly coordinated, in part because of coordination's, it winds up conceivable to adapt all the more proficiently to this issue by limiting empty developments through freight turn.

On the above figure, it is expected that there are two inland areas, one which imports more that it sends out (area A) and the other that trades more than it import (area B). In a broken arrangement of supply stream, the executives (for example, every area is overhauled by various transport organizations), this circumstance would produce an enormous number of empty streams, namely from the import location back to the port terminal and then from the port terminal. However, by

integrating the flows, it is possible to re-allocate empty flows from location A to location B and thus improving the efficiency of distribution. However, this requires a marketplace where container demand can be reconciled with container supply^{iv}.

3.10.2 Container Trans loading

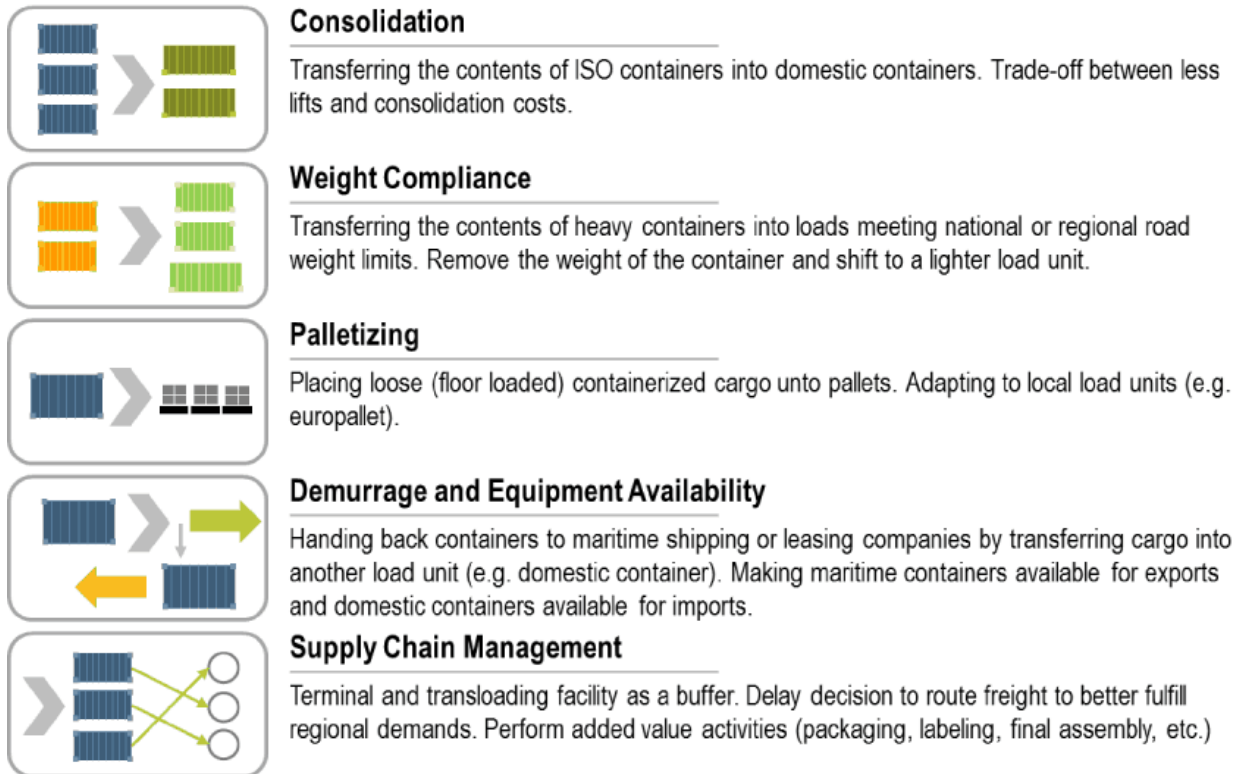


Figure no 7. Container Trans Loading

Trans stacking includes exchanging freight starting with one burden unit then onto the next, which is basic in containerized transportation. It empowers to lessen transportation and stock expenses through DE stuffing (or stripping) the substance of a heap unit and stuffing it in another heap unit that is increasingly appropriate for the included transport leg. There are a few motivation behind why container Trans stacking is performed, which will in general happen in the region of port terminals or inland (satellite) terminals:

- **Consolidation.** When there is a critical market for residential containers and the local burden unit is bigger than the sea load unit, shipments solidification is regularly performed. In North America the biggest household load unit is 53 foot long, which speaks to the

maximal lawful size of a truck load on the Interstate. In this manner, in dispersion focuses in the region of a few noteworthy port terminals the substance of three sea containers can be moved into two local containers. This empowers cost investment funds as shipment costs, including terminal expenses, are built up as far as burdens. Rail terminals charge by the quantity of lifts, which implies it costs the equivalent to deal with a 40 foot or a 53 foot container. Under such conditions, Trans stacking costs are repaid by investment funds on inland transport costs, which can be in the scope of 30% contrasted and the alternative of moving sea containers inland. However, Trans stacking involves some risks such as damage and theft or additional delays to perform (about one day), which may not be suitable for some supply chains.

- **Weight consistence.** Includes moving the substance of substantial containers into lighter loads, for example, local containers or twenty footers. This is especially the situation for the containerized development of products. Be that as it may, Trans stacking substantial sea containers into local containers is certainly not a typical practice.
- **Palletizing.** Extremely regular for the shipments of utilization merchandise. To pick up shipment space in imbalanced streams numerous containers are "floor stacked" and once touching base close utilization showcases, the shipments are separated and collected into beds. This likewise offers the chance to adjust to nearby load units that include various sizes, for example, North American and European beds. Doing such an errand at the purpose of cause would be strategically mind boggling.
- **Demurrage and hardware accessibility.** Containers are normally rented for a particular timeframe. The renting contract may likewise determine that the oceanic container can't leave the region of the port or can't spend in excess of a particular measure of time inland. Trans stacking is along these lines performed to safeguard that the rented container is given back to the sea shipping or the renting organization without extra charge. This decreases the repositioning of empty containers over long separations and advances a larger amount of advantage use for the container lessor. Trans stacking additionally empowers an increasingly productive utilization of both container resources (global and household) and can encourage universal exchange by liberating transport limit. For example, moving sea containers over long separations in the North American transport framework can be considered a problematic use of transport hardware, especially from the point of view of

maritime shipping companies. Conversely, the global maritime shipping industry is mainly designed to handle 40-foot containers and cannot accommodate domestic containers. However, a large amount of Trans loading for inbound shipments may reduce the availability of maritime containers available for export at inland locations. This is a salient problem for the export of containerized commodities.

- **Supply chain management.** A Trans loading office can go about as a cushion inside a store network, empowering shippers some space to synchronize the conveyance of products with the prerequisites of their clients. This is especially the situation for long separation exchange where a shipment can be in travel for half a month while the interest conditions at the goal may have in the interim changed. Trans loading empowers to defer the choice about steering cargo to the last goal by utilizing the office as a chance to do a minute ago alterations as far as which shipments ought to go to which markets. Another regular store network practice concerns the gathering and union of burdens for a particular market (converge in-travel) amid trans loading. For example, huge retail shippers ordinarily buy merchandise from a few remote providers. Trans loading offers the chance to combine the heaps for explicit territorial circulation focuses or stores. In this setting the trans loading office plays out a capacity like a cross-docking office. Likewise, trans loading speaks to a chance to play out some additional esteem exercises (bundling, naming, last get together, and so on.) before shipments touch base at definite markets. It functions admirably when long inland separations and a few provincial circulation focuses are concerned.

3.10.3 Asymmetries between Import and Export-Based Containerized Logistics

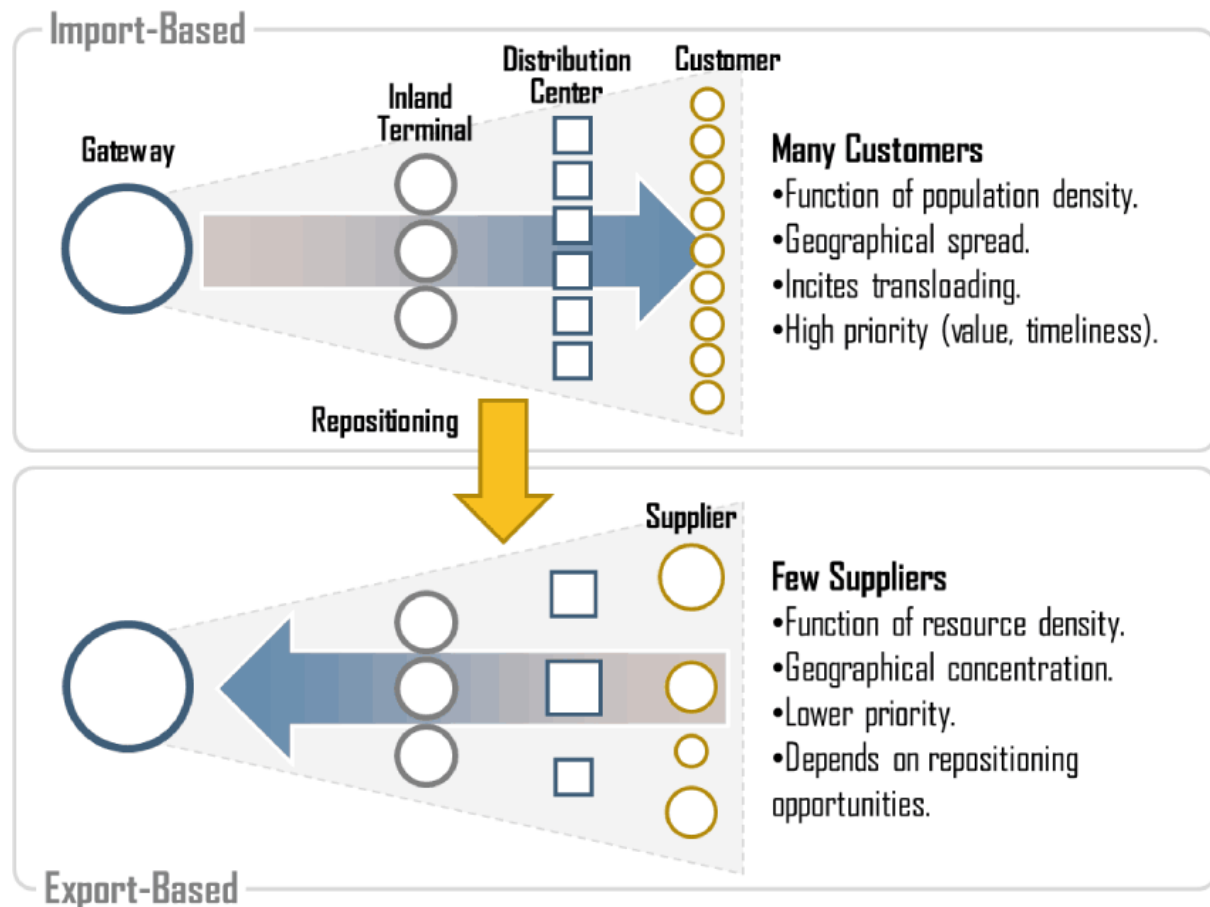


Figure no 8. Asymmetries among Import and Export-Based Containerized Logistics

At the point when the long separation transportation of containers depending on the utilization of inland ports is confronting an asymmetry between import-based and send out based coordinations. This is especially the situation in Europe and North America where there is a huge distinction between the idea of imports and fares, inferring that inbound and outbound coordinations are relies upon the present situation of the circumstance.

- **Symmetric Import-based** containerized payload will in general predominantly concern retail merchandise, suggesting that the appropriation design is a component of the populace thickness. Since most of the populace is urbanized, the circulation design is nodal however spread over the topography. This trademark prompts trans loading at the passages as massification favorable circumstances decrease quickly once an inland terminal has been

achieved; every individual container in the long run discovers its way to a neighbourhood or local conveyance focus and its wide client base. Import-based coordination's will in general have a high need as the section produces the most salary for shippers. Because of exchange uneven characters (high rate on inbound than outbound containers), the estimation of the freight and its season of transport differs and relies upon the ebb and flow position and kind of load.

- **Symmetric Export-based** containerized payload will in general concern products where the beginnings are a component of asset thickness. They have an abnormal state of fixation, yet their locational attributes are altogether different than import streams (for example provincial territories for grain and much progressively remote regions for wood items). According to unit of mass or volume, the freight has a much lower an incentive than inbound load, inferring that its catch has a lower need for shippers overseeing containerized resources. This freight has anyway the upside of being less time obliged, except if identified with the virus chain. The chances of fare based containerized coordinations are therefore much reliant on the accessibility of different containers in the specific structure at spots.

3.10.4 Container Flows and Repositioning using an Empty Depot

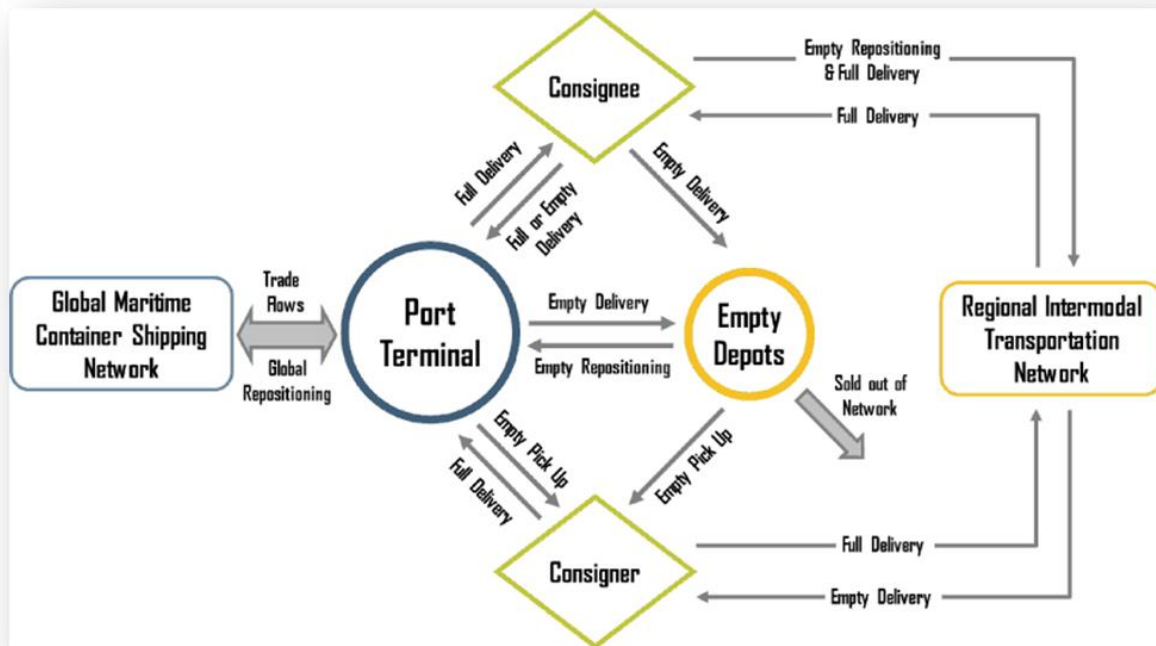


Figure no 9. Container Repositioning using an Empty Container Depot

Among the variety of roles that an empty container depot can fulfil, the most prevalent include:

- An unbiased area where empty containers possessed by renting organizations and sea shipping organizations can be put away hanging tight to be reused or repositioned. It bolsters a trade advertise for container resources between various on-screen characters engaged with supply chains (for example shippers and exporters).
- An expansion to a sea (or rail) terminal, frequently alluded as a satellite terminal (an all-encompassing door), that can have a more prominent adaptability in its entrance and opening times. Especially, an oceanic terminal can approach requirements because of neighbourhood blockage at pinnacle terminal hours. Empty containers can be put away at the empty stop and made accessible for fare exercises. Containers that should be repositioned to the oceanic terminal can be gotten outside pinnacle hours (when more truck drivers are accessible).

The station can likewise go about as a cushion to the sea terminal limit, quite in light of the fact that the capacity of empty containers is a lower included esteem action that can be seen as an imperfect utilization of the sea terminal's land resources.

- A closer area to coordination exercises helps lessen developments, which is especially advantageous for a metropolitan territory where oceanic (or rail) terminals are in high thickness and clogged zones. The stop empowers a superior reaction to the requests of cargo dispersion exercises and can have increasing impacts whenever situated inside a coordination group. These impacts incorporate an all the more convenient accessibility of empty containers and a superior potential at payload turn among import and fare-based firms inside the group.

- The development in worldwide exchange and cargo dissemination has prompted an interest for new containers. Every year, about 1.5 to 2.5 million TEUs worth of containers are fabricated, the extraordinary larger part in China, exploiting its containerized fare excess. Generation topped to 3.9 million TEU in 2007 with the worldwide stock of containers assessed to be at 37.6 million TEUs starting at 2015. This around suggests 3 TEUs of containers for each TEU of oceanic containership limit. The standard 20-foot container costs about \$2,000 to produce while a 40-footer expenses about \$3,000. In this way, a twenty-foot container costs \$1.71 per cubic feet to make while a forty-foot container costs \$0.80, which underlines the inclination for bigger volumes as a progressively successful use of benefits. All things being equal, the twenty-foot container remains a prime transport unit, especially for the transportation of wares, for example, grain where it speaks to an ideal size assessing weight per unit of volume limit of containers, around 28 metric tons.

- China represents over 90% of the worldwide creation of containers, which is the result of a few variables, especially its fare situated economy and its lower work costs. Taking into account that China has a positive exchange balance, prominently in the assembling segment which exceptionally relies upon containerization, it is a sensible system to have containers produced there. This empowers a free development since once created another container is promptly moved to a close-by fare action (production line or dispersion focus), at that point stacked and conveyed to a container port. A long separation empty repositioning is hence not required for the recently

fabricated container. Each container use system should accordingly consider creation and area costs.

A significant pattern lately has been the developing offer of container possession ascribed to oceanic delivery organizations, which achieved 59.8% in 2008.

This development can be clarified by the accompanying:

- Containers are an advantage that oceanic delivery organizations make accessible to support their clients. Giving containers help increment the use rate of containerships.
- A developing dimension of multi-purpose incorporation and control where oceanic shippers are interfacing with port terminal administrators (some legitimately work port terminals, for example, (APM) just as with inland transport frameworks, for example, railroads and inland ports. In such a unique situation, controlling container resources empowers an increasingly effective utilization of the vehicle chain.
- The increasing expense of new containers, the repositioning of purges and efficiently low cargo rates along a few exchange courses, have made the container renting business less gainful. Sea bearers likewise have a more noteworthy capacity to reposition empty containers since the control an armada and can reposition their containers when limit is accessible. It is likewise normal that an entire containership will be sanctioned to reposition purges.

3.11 Challenges for Empty Containers

Skilled Resources:

- One of the significant difficulties that associations face is their capacity to draw in and hold the correct ability. With the innovation being just couple of years old and experiencing an uncommon rate of appropriation the interest overwhelms supply by various folds. While engineers would need to upskill themselves to assemble containerized applications, the genuine test lies in dealing with the activities. The ranges of abilities expected to work container-based stages are altogether different than what customary tasks proficient have. Very products scripting and great coding aptitudes are expected to viably oversee tasks, in addition to a smart thought of the application design, information stream and application logging is additionally an unquestionable requirement.

Organisation inertia:

- Implementing containers productively is a major move from the customary methods for working that associations are utilized to; it contacts every one of the parts of an applications lifecycle crosswise over and operations. It requires quick pace of advancement just as enabling the engineers and considerably reskilling the tasks groups. Standards must be pursued and computerization in must be worked to prevail in a containerized situation.
- While building up a containerized application for a huge neighbourliness player, it was a test to get the containerized stage access for designers and the activities engineers discovered it amazingly difficult to investigate the application issues.

Selection of Technologies:

- With a quick development of the eco-framework and plenty of choices, it turns out to be very hard to pick the correct arrangement of innovations. There are such a large number of choices accessible and dissimilar to the Enterprises of the past; there are no out and out pioneers, a new companies may have a superior and more applicable container situated apparatus than an innovation goliath.
- Organizations think that it's exceptionally difficult to have the option to choose the correct instruments for their utilization case and remaining tasks at hand while guaranteeing that the apparatus will likewise meet their future needs.

Implementation Strategy:

- Another barricade that associations face in container reception is the absence of a legitimate usage procedure. Container reception has seen greatest footing at designer and tasks engineer level, yet for an effective generation execution there should be a legitimate technique set up. In many associations the reception is impromptu without a firm arrangement, various groups picking their own systems.
- Applications are not picked remembering the focal points/inconveniences of moving to containers and as needs be the consequence of the move are not as foreseen.

Container Monitoring:

- Container observing is an alternate brute all together and not many associations have had the option to get a decent handle on the most proficient method to screen transient, super-quick and light weight containers. This must be accomplished while guaranteeing that we don't put undue burden on the containers.

Container Security:

- Security is as often as possible referenced as the top worry for moving to containers. Endeavours should be sure that their base pictures are secure before confiding in delicate information in containerized applications. Overviews directed by Forrester Research, the Cloud Native Computing Foundation, and Research uncovered that 35-45% of member detailed security as an essential concern in regards to containerizing generation conditions making it the most well-known concern affecting container appropriation.

Are problems caused by empty shipping containers?

In a perfect world, containers ought to dependably be full when they are moved. This is the most proficient approach to transport merchandise and results in the least expenses. Tragically, because of worldwide exchange irregular characteristics and different issues, possibly transporting containers when they are completely unthinkable.

The above issue arises for a following reason:

- It costs to transport a container, regardless of whether it is full or empty.
- It costs nearly as a lot of money to transport an empty container as an entire one.
- Just putting away containers, regardless of whether they are empty or full, ordinarily brings about an expense.
- The cost of transporting a container to where it could be reused might be higher than the expense of obtaining another container.
- This can result in empty containers being rescued for steel, or being reused in different ways.
- Other issues incorporate an ascent in access charges, squandered labour spent hanging tight for access to merchandise and lost profitability because of clog.

The great majority of containers are either owned by maritime shipping companies or container leasing companies. With the beginning of containerization in the 1970, a container leasing industry emerged to offer a flexibility in the management of containerized assets, enabling shipping companies to cope with demand. The leasing industry went through a period of consolidation in

the 1990s, on par with the container shipping industry. Repositioning strategies that are using by industry is cost effective and time consumers. We can look at the current trends which are emerging in empty container repositioning.

CHAPTER – 4

TRENDS AND SOLUTIONS IN EMPTY CONTAINER REPOSITIONING

Since 2005, international container movements have increased at a 4.6 percent compound annual growth rate (CAGR) based on United Nations Conference on Trade and Development (UNCTAD) data. This development has been the after effect of such macroeconomic occasions as worldwide populace development, a rising white collar class in developing markets, and the extension of industrialization.

Have benefits endured as well as effectiveness has expanded. For instance, 21 percent of transportation and port taking care of is squandered on empty containers. On the China-Australia course, for each 100 containers into the port of Sydney, Australia sends out just 35 containers. This outcome in a local amassing of 65 in each 100 containers that are required to be delivered back north empty.

Since, by and large, sea bearers need to fill a ship to in any event 91 percent with billable payload to take care of costs, lines are losing a huge number of dollars consistently migrating, putting away, and dealing with their container armadas. Moreover, the overcapacity issue is an issue now, a slacking impact of the worldwide monetary emergency.

4.1 Foldable containers

The foldable containers are the new development to the business to cut the repositioning and terminal dealing with expenses and take care of the space lack issue of terminals and yards. The idea has been around for some time. A portion of the plans were not pragmatic for shifting reasons, for example, long time spent collapsing the container and reassembling, higher assembling costs contrasted with standard containers, and basic shortcomings. Extremely fruitful models are additionally acquainted with transportation world by few organizations. These plans in its crumbled state can involve as low as 1/5 of the volume of an ordinary container, they fit in with ISO gauges for sea containers. A few models can be collapsed just in 3 minutes with an assistance of a forklift and 2 men. Contrasted with the standard containers the expense is 10% to multiple times higher than ordinary containers. A few models are made of composite materials which can likewise cut the container upkeep cost as they don't erode as steel container while a portion of the

structures weight up to 25% not exactly standard ones. Another advantage introduced by trailblazers is natural. As indicated by the examinations, by stacking upwards of 4-5 containers can really cut the quantity of treks made by every container.

A container that falls from a width viewpoint with a 4:1 proportion which implies 4 of these empty units can be productively fell and joined to frame a solitary unit of the equivalent ISO container measurement. When consolidated, the space, taking care of and transportation of this framework (for example 4 exhausts consolidated) can be diminished by up to 75% in contrast with a standard container.

The container is completely CSC confirmed whether it is a solitary unit or when joined as a lot of 4 and therefor fulfils ISO container guidelines/measurements. Every unit purportedly can be securely crumpled and consolidated by 2 individuals from the outside the container in less than 5 minutes.

The worldwide transportation and coordination industry is said to spend near \$30 billion every year as expenses for capacity, taking care of and conveyance of empty containers around the globe.

According to industry gauges, empty container developments over the globe represented:

- 15% of all container developments in the US
- 14% in Latin America
- 29% in Europe
- 16% in the Middle East
- and 25% in China

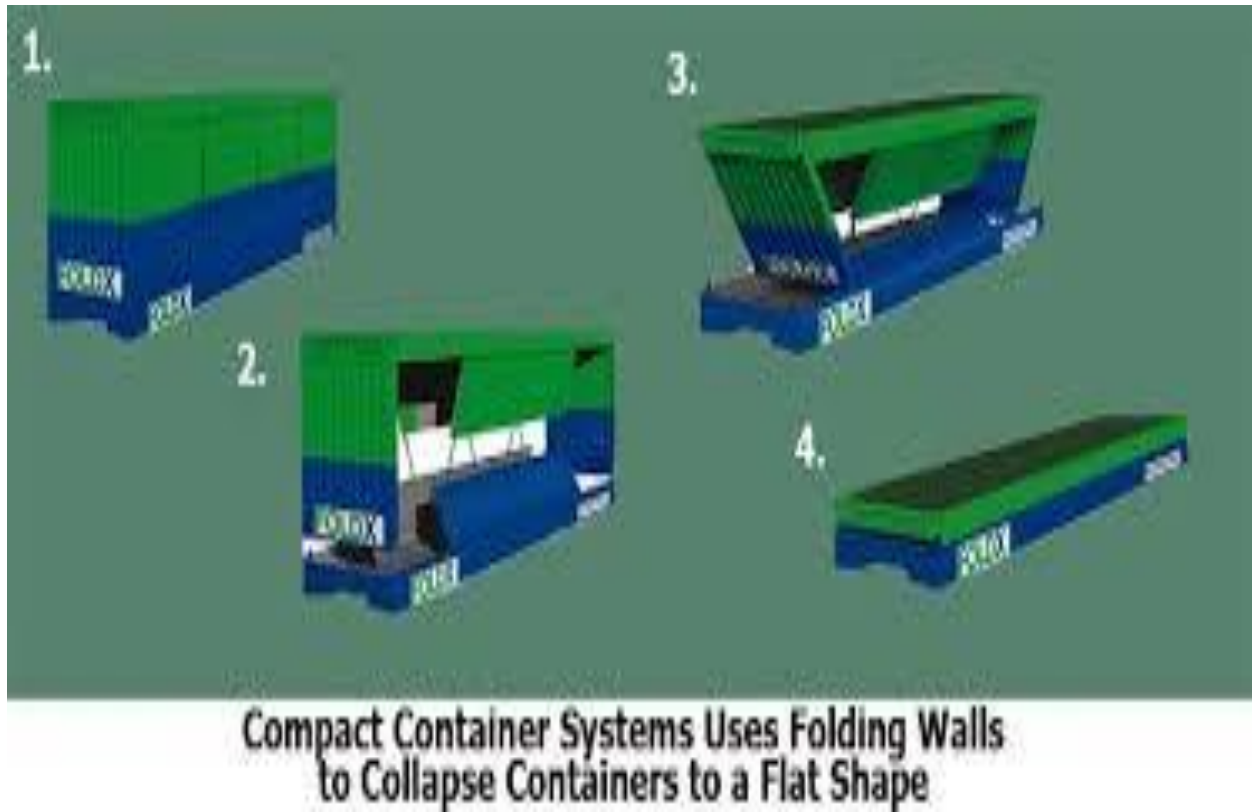


Figure no 10. Foldable containers

There is no uncertainty that, foldable containers are just valuable in the event that they convey a superior cost execution than standard containers. Unmistakably the sending of foldable containers makes some extra expenses in the strategic chain. Extra dealing with (labor) and auxiliary gear are required for the collapsing and unfurling activities. Another factor is the expansion in abuse costs. It will cost more to fabricate a foldable container than a standard container, in light of the fact that the development is increasingly perplexing.

All the more expensive assembling infers higher buy costs and henceforth misuse costs will be higher. In addition, abuse costs will be pushed up by higher upkeep and fix prerequisites. These extra costs must be counterbalanced by reserve funds (benefits) somewhere else in the strategic inventory network that is by decreasing the quantity of empty excursions by truckers just as space.

Cost's examination

Clearly, foldable containers are just valuable on the off chance that they convey a superior cost execution than standard containers.

- It is evident that the sending of foldable containers makes some extra expenses in the calculated chain. Extra taking care of (labour) and subordinate gear are required for the collapsing and unfurling activities.
- Another factor is the expansion in abuse costs.
- It will cost more to make a foldable container than a standard container, in light of the fact that the development is increasingly mind boggling.
- More expensive assembling infers higher buy costs and consequently abuse costs will be higher. In addition, abuse costs will be pushed up by higher upkeep and fix prerequisites.
- These extra costs must be counterbalanced by reserve funds (benefits) somewhere else in the calculated chain if foldable containers are to be a practical option in contrast to standard containers.

Benefits

As referenced, foldable containers will convey benefits on the off chance that they can be

- Bundled and transported together. Less transport limit will at that point be required and the vehicle costs per unit will be lower.
- Foldable containers open up open doors for funds in different connections of the empty container transport chain, that is, away and transshipment.
- As foldable containers in empty state can be collapsed and packaged with a couple of others to be put away in a spot and
- The impact of foldable containers on the expenses of container repositioned to different places as a solitary standard container, the foldable containers will occupy less room and less expense per unit.
- Savings can likewise be acknowledged in transshipment costs whenever collapsed containers can be packaged, interlocked and transhipped in one move.

4.2 Gray box pools

On the off chance that you can spare a large number of dollars, does it make a difference if your container is blue, green or red, and has no organization name as an afterthought?

The world's main 30 container transportation lines are currently assessed to spend a consolidated \$20 billion every year on repositioning empty containers, because of the colossal lopsided characteristics in worldwide exchange streams.

As indicated by an ongoing report, Maersk alone burns through \$1 billion every year dispatching empty boxes to where exporters need them, including in excess of two million boxes every year just to Asia, speaking to an immense measure of wastage in the present worldwide supply chains.

There have been a few endeavours throughout the years to acquaint dim boxes with the business. In wide terms this would see a gathering of transporters putting some portion of, or the majority of, their box armadas into a typical pool, which would then be overseen by a free organization that would coordinate individual bearers' requests for gear in explicit areas with dim container accessibility in those equivalent districts. The net impact would imply that transporters would need to reposition their marked boxes far less.

Joined, the gained container armadas of the lines went to nearly 115,000 units, with a yearly working cost of about \$107 million every year. Over a 18-month time span, the administration of the various armadas consolidated through a brought together IT framework, while examination of the different interest and supply examples of the various lines saw the armada diminished to 87,000 units; the yearly working cost decreased to \$85 million every year and 10% more prominent development of stacked boxes.

Further effective ventures were attempted for Global Equipment Management, the gathering of different Scandinavian lines, and the gathering of Italian transporters working under the Inter strategic standard. All were in this way separated when singular transporters were hence obtained by bigger remote ocean container lines in the combination period of the 1990s and mid 2000s.

"The inconvenience is that business divisions need to see a box with their logo landing at the shippers' premises. It has been the greatest obstacle we have gone over.

"The main other thing that would be basic is that you need a generally excellent brought together IT framework that deals with every one of the appointments, control and support of the armada, and the inconvenience is that there aren't numerous such frameworks out there," this pooling idea is all around worked with the renting organizations.

"The crucial point of renting organizations is to rent whatever number units to lines as would be prudent – a dark box pool looks to decrease the measure of units worked," However, with the approach this time of a lot bigger transportation partnerships, for example, the merger of the Grand Alliance and New World Alliance into the G6 Alliance on the Asia-Europe exchange, one union and 2m there is definitely an open door for the bearers to run preliminaries on chose strings.

The issue isn't characteristic to container shipping, however different modes have started to make advances into the pooling idea. Airship cargo is likewise harrowed by the extreme expenses of repositioning, as per CHEP Aerospace Solutions, which gauges airship cargo bearers spend a consolidated \$70 million every year on repositioning empty ULDs [unit load devices].

Be that as it may, something in the locale of 12% of the worldwide ULD armada is presently "claimed and additionally overseen by re-appropriating suppliers",

"A viable pooling framework could spare the business around 60% of the \$70 million, around \$40 million every year, by assessments".

4.3 Box swapping

Carrier container repositioning, an overall industry practice costs a few billions of dollars a year. Formal administration frameworks may help decline this sum generously. Toward this path, a box swapping framework, a co-usable gear plot, can work for both transporter claimed containers and for rented ones.

The box coordinate idea is anything but difficult to oversee and delivers critical funds for both the surplus and the interest parties, contrasted with different choices.

For Example: the leasing of an extra box for 8 to 12 months costs \$700-800 after including all charges (per diem, on-hire/off-hire and pick-up/drop-off costs, repairs); borrowing a box from a fellow carrier under a formal box match interchange scheme will cost hardly any more than using one's own container (i.e., around \$400 - a depreciation cost of around \$300 for the same period plus a flat pre-determined repair fee of \$100 and a small cost to cover the box match administration). For the surplus line, repositioning a box using one's own containership costs some \$500, as mentioned above; having a surplus box picked up and redelivered to an agreed point costs its owner nothing but the administration fee, the cost of depreciation and repair will be levied on the third party.

At the point when the box coordinate idea is one imaginative method for diminishing empty hardware repositioning. Different arrangements are: impromptu coordinated gear trades between transporters; renting and off-procuring hardware as required and joint container pools. A further alternative is to get an outside repositioning firm to carry out the responsibility for you by utilizing your empty box to complete someone else freight additionally conceivable.

4.4 Horizontal Diversification

The Many enormous transporters are on a level plane expanding by acquainting supporting units with their essential action. For instance, Maersk Domestic and Maersk Data USA offer help to Maersk Sea land, to expand profitability and better the usage of assets.

For Example: A high percentage of imports from Chennai port is having the final destination of Bengaluru which is 347.6 km away from Chennai. A major concern to ocean carriers is the cost of repositioning equipment from the Bengaluru to Chennai, so instead of that they can look at cargo which is west bound like from Mangalore which is 351.8 km which actually adds to the increase of gaining from the activity.

4.5 Yield Management

To be beneficial, a container shipping line needs to make a move to turn into a proactive administrator of the worldwide pool through an automatic way to deal with yield the executives. Yield the board is the specialty of boosting benefit in a business with considerable fixed resources by controlling and guiding the advantage's use. The objective of effective container the executives isn't use in the exacting sense, however the minimisation of removal.

Yield the board for a worldwide container administrator intends to participate in a complete exertion to diminish container uprooting, while in the meantime utilizing the delivery assets close by. This may sound clear at first - all container-shipping lines endeavor to maintain a strategic distance from empty developments - yet, it is once in a while done in an orderly and successive way.

Example: In the case of HLCL, yield management is one of the reasons the carrier is being 'pretty good' in reducing the incidence of empty container repositioning. Introduced three years ago and currently undergoing further refinement, the system compels HLCL staff at the time of making a booking to take account of the next turn of a container. Typically, it is not the first move, which matters; but the second. Whilst the first one can be very productive and very profitable, it can be spoilt by the second.

4.6 Utilization of empty containers

Transportation containers are progressively being re-purposed to construct a wide range of structures the world over. Sending empty delivery containers back to their ports of root is exorbitant when contrasted with the expense of the container itself, which means numerous shipyards are loaded up with destitute containers. Rather than sending them back they can be utilized as exchange purposes.

Two sorts of containers are accessible for procurement. The first being exhausted containers that have been resigned by delivery organizations. These are the most reasonable choice. The second sort of containers accessible are one excursion containers that were utilized for a solitary voyage. These containers are regularly in astounding condition and are the more costly alternative.

Where to purchase your container? Transportation containers can be bought from distribution centres, port terminals, or even eBay and Craigslist! A significant note! Before proceeding with your venture, guarantee there are no container building limitations in your general vicinity.

Transportation containers are progressively being utilized to manufacture an enormous assortment of structures far and wide. The reusing of freight containers is the ideal method to reuse materials while building excellent and special structures. Delivery container development is the perfect method to give all the forlorn containers at port terminals another possibility!

4.7 Different uses of empty containers

4.7.1 Agricultural Uses:

Containers are great for the agriculture business. They are wind and weather tight, well-sealed to keep out elements and varmints, which makes them perfect for feed storage. Produce can easily be grown inside of these containers. Farm equipment can also be stored inside to keep them out of the weather or turn them into your next barn or for your basic storage needs. Below are a couple examples for great agricultural use.



Figure no 11. Agriculture Farming using

4.7.2 Residential Uses:

There are many practical uses for containers at your residence. The options are endless. Many people are using these for homes, garages, auxiliary storage, sheds, pool houses, even the pool itself, or just a secluded cabin or storage out in the woods. You can even create a play fort for the kids! It's all up to the imagination.

Shipping containers are increasingly being re-purposed to build many different structures around the globe. Sending empty shipping containers back to their ports of origin is costly when compared to the cost of the container itself, meaning many shipyards are filled with homeless containers. Instead of sending them back they can be used as alternate purposes.



Figure no 12. Residential Uses Container

4.7.3 Container restaurants:

Instead of going for a huge investment a container restaurant is more feasible and easier to construct, transport and modify.



Figure no 13. Container restaurants

4.7.4 Rock Climbing on The Containers:

A new innovation happened by just putting a 40 ft container in a vertical position.



Figure no 14. Rock Climbing on The Containers

4.8 Damaged shipping containers

SHIPPING containers can be harmed in any number of ways. Harm doubtlessly occurs amid travel on a vessel, or taking care of at the port or terminal. In case you're purchasing another transportation container it's not liable to be harmed, and it will be simpler to spot on the off chance that it is. Notwithstanding, in case you're purchasing an utilized container the harm might be disguised because of blurred paint or characteristic mileage that is happened over the life of the container.

Any sort of harm on a container can make rust and consumption spread quicker, and the container can lose a portion of its security.

Container harm that happens from dealing with gear is probably going to be twists, imprints, or punctures. In the event that a container tumbles off a stack it doesn't have to fall far to make huge harm the container. Moreover, if an unpractised to divert fork lift administrator inadvertently runs a forklift into the side of a container and punctures the steel. While it may sound worse, a puncture is easier to repair than structural damage to the frame.



Figure no 15. Damaged shipping containers

Damage container survey

- Conduct surveys at the request of clients in regard to report of damaged containerized or its interior
- Gather background information as is possible (i.e.: exceptions at time of loading, stowage location, weather information, method of securing, etc.)
- Inspect cargo and, if possible, inspect securing used to determine if securing is sufficient for mode of transportation
- Report on nature and extent of damage
- Make recommendations on efforts to mitigate loss

These damaged containers are available to use in different purposes and mostly by construction purpose and are available in BOXHUB and CONTAINER AUCTION.COM

4.9 Solutions for the Issue Empty Container Repositioning

4.9.1 Digital Revolution Driving Solutions

Inevitably most of the answers are found in the digitisation of the shipping industry, as data can flow more efficiently through the supply chain and more timely decisions can be made and action taken to reduce the ‘down time’ of empty containers.

But the ‘magic bullet’ is to ensure the quality and accuracy of the data generated is good and from there the industry can move forward.

“The problem with the data is not so much with the transport companies themselves, such as shipping lines who typically generate quite good data, but the problem is with the lower quality data that comes from the shippers. It is sent via various EDI devices, protocols, it is maintained by different systems, so much data is still received by fax and so on. All of these factors negatively affect the data quality and accuracy.”^v

“And we are talking here about the minimum set of data that you absolutely require in order for the shipping line to accept your order. That is why another big impact for the shipping industry will come from the digitalisation of the freight forwarders that is happening at the moment,”

So, if poor data is so widespread in the industry what can be done to ‘clean’ it up and make it fit for purpose?



Accessing the historical data of shipping companies and applying to it data cleansing with business rules.



Applying data cleansing with AI technologies, where the computer algorithms learn themselves how to clean the data.



Working with customers to improve their front-end processes so that they generate better data.

While finding the physical space to store empty containers and utilizing prescient innovation to decrease the quantity of unused boxes, there is additionally the 'matchmaking' model which hopes to 'connect' empty containers with shippers.

The framework, which spares repositioning costs, time and decreases discharges and port blockage, has been taken off in eleven European nations and Mexico and is relied upon to extend to cover North America and Asia in the not-so-distant future.

4.9.2 Technology solution

With the correct devices, coordination among organizations can yield extensive business advantages and cost investment funds with no negative effect on client administration levels.

Named among Top 5 AI Start-ups for Supply Chain Management by Business Insider Intelligence, Tran's measurements grew such an answer for prescient empty container the executives called Asset Metrics. The product comprises of three primary modules – information purging and improvement, AI-driven interest gauging dependent on the authentic information and the outer components, and prescient streamlining. In only a couple of snaps, coordination arranging groups can figure the most ideal and noteworthy worldwide system plan for empty container repositioning, stockpiling, fix and upkeep for as long as 12 weeks ahead of time, which considers all the related costs (counting evaluating, stevedoring, entryway costs, and so forth.

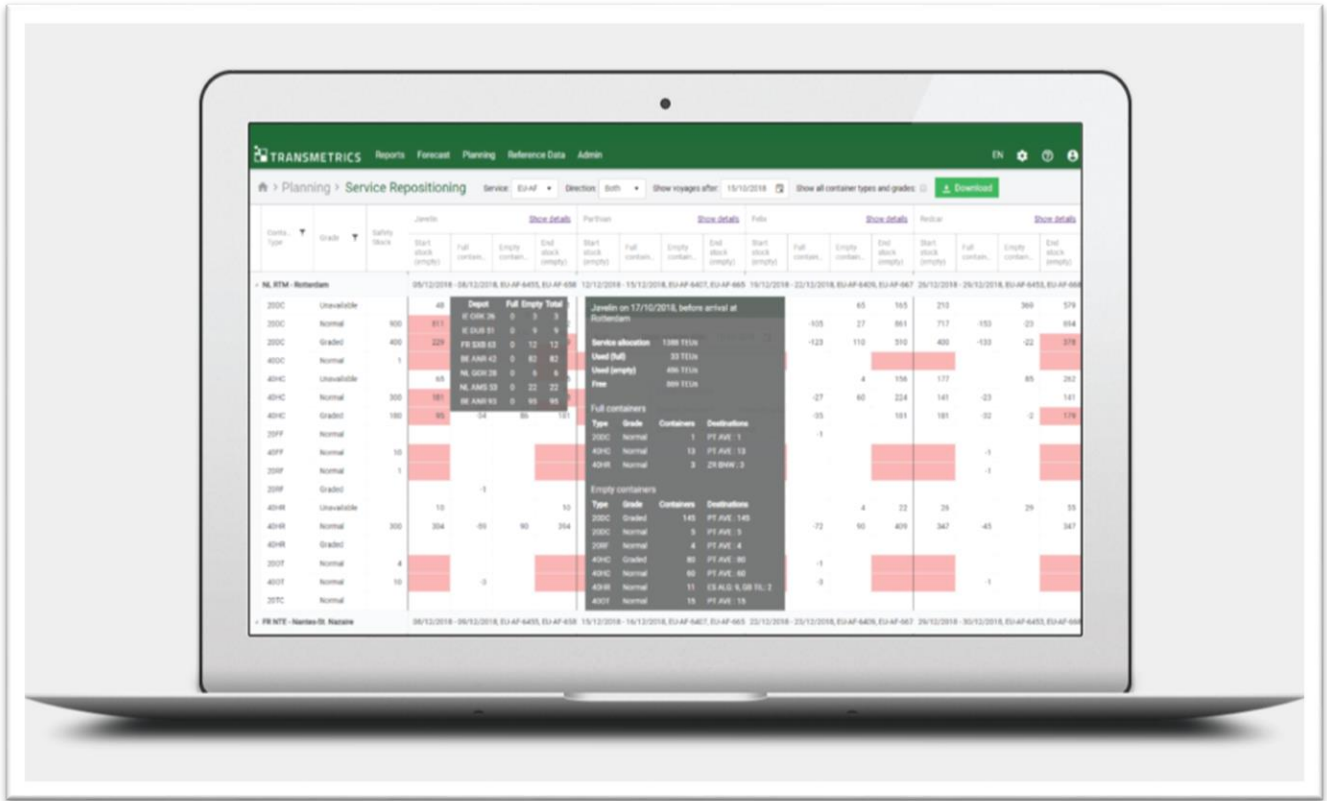


figure no 16. Trans metrics

Throughout the years, Transmetrics has conveyed various fruitful undertakings with top-level coordinations organizations around the world. Organizations that work with Transmetrics accomplished 20+% rate investment funds through the decrease of expenses for taking care of empty containers, specifically, stockpiling and transport costs, and a 10% decrease in the quantity of containers utilized. Another computerized arranging framework from Transmetrics permits increasingly exhaustive and information driven choices about the administration of empty containers on all dimensions (station/warehouse, provincial, worldwide) and better perceivability on the information and business forms.

Another technology company **xChange**.

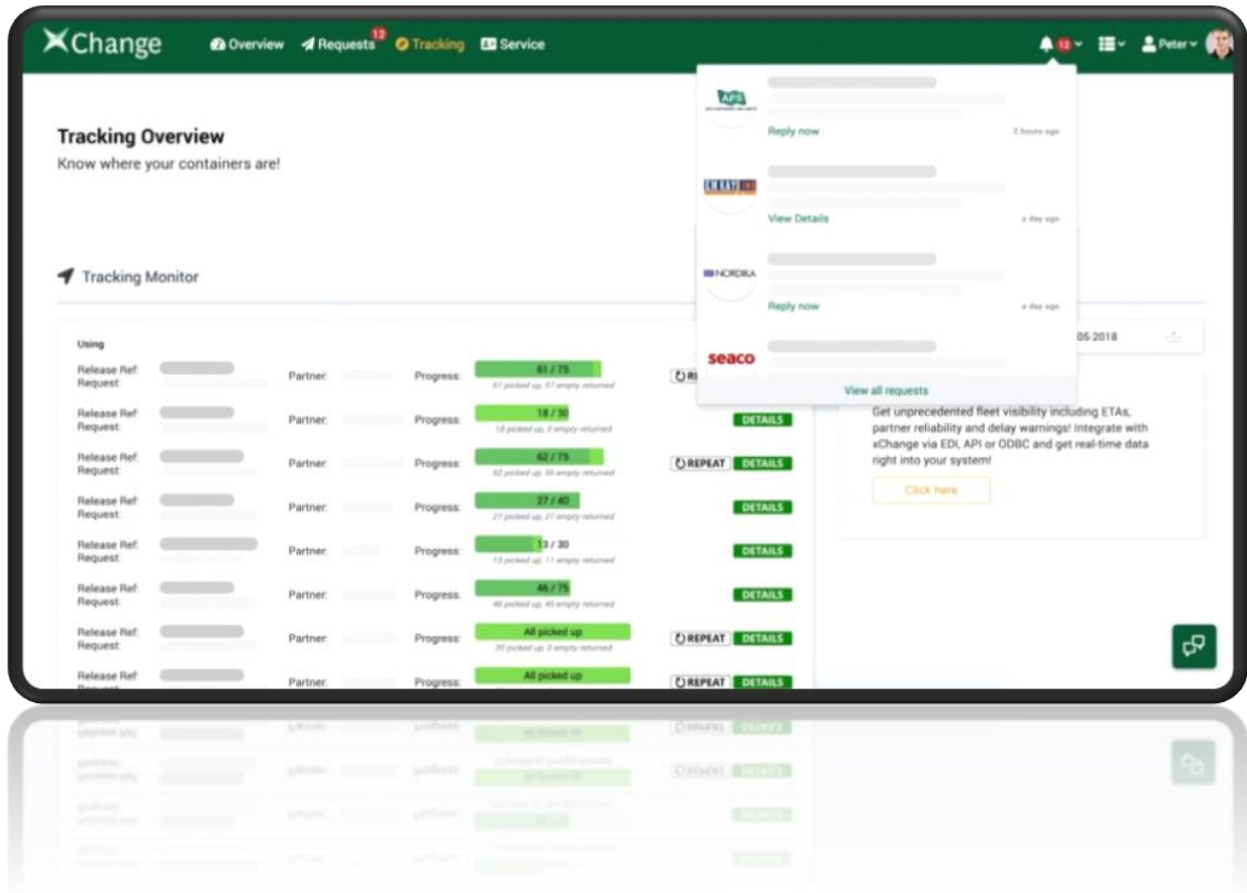


figure no 17. xChange

A Boston Consulting Group, handles the issue from another side. On their stage for empty containers, individuals can discover accomplices to coordinate burdens and outsider gear for their single direction container moves. It is professed to be the main online commercial center for container coordination to help arrange bargains, track containers, and advantage from low demurrage and confinement expenses in addition.

XChange has more than 300 organizations on its stage, including sea shipping lines, container renting organizations, container brokers, NVOCCs and a few shippers. The administration covers 2,500 areas worldwide and offers in excess of 300,000 potential chances to exchange containers. To accelerate the contracting procedure, xChange clients sign a multi-party exchange

understanding, sparing them days or even a long time from setting up legitimate understandings and arranging offers. The normal funds are assessed at \$200–\$400 per container, which for the most part originate from diminishing the expenses for land transportation and the utilization of terminals.

4.9.3 Policy Solutions

Different arrangement arrangements are being proposed as well as have been actualized in different pieces of the world. These arrangements incorporate different tax collection plans for containers put away for in excess of a specific timeframe, constraining the tallness at which empty containers might be put away, changing gear devaluation period, and so forth.

In Argentina for instance, corrective measures were presented for containers put away for in excess of a specific number of days. All the more explicitly, Article 46 of the new law stipulates that each containerised unit faces a fine of \$100 every day, up to a limit of 90 days, in the event that it surpasses the 270-day limit. This implies, a unit which is just worth about \$1,500 whenever obtained in Asia, could prompt a fine of as much as \$9,000 being forced. Three Buenos Aires-based dispatching organizations have just been fined, and an aggregate totalling \$40,000 is said to hang more than one of the three. A similar circumstance is exhibited in each country

4.9.4 Modelling solution

The repositioning of empty containers in time subordinate, multi-purpose appropriation system of delivery lines of different areas and coordination's specialist organization organizations in direct time settings under vulnerability and information lack

Abusing the operational law of autonomous unsure factors, the questionable ECR issue is initially displayed and dissected in the system of vulnerability programming. So as to tackle the unsure ECR issue, another helper (α, β, γ) (α, β, γ) - ECR model is proposed and its equality connection with questionable ECR issue is illustrated. By abusing this connection, the first dubious ECR issue is fathomed and the vulnerability conveyance of the ideal coordination's cost is gotten.

Interruptions produce stuns in the delivery business, just as in a few arranging exercises. Explored the arranging of empty containers repositioning when dubious occasions or interruptions may happen. They should be impermanent occasions happening in a port that keep the empty containers from being appropriately repositioned in the oceanic system.

Mostly current trends are based on the new innovative and evolving technology in maritime sector. These new trends like box swapping and grey box pooling makes the viable repositioning cost to the industry players, using new technology like big data analysis and artificial intelligence makes things easier and we can see the findings and suggestion in the following chapter.

CHAPTER -5

SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION

The following are the findings from analysing the trends and strategies for empty container repositioning.

5.1 Findings

- There are various strategies for various geographical locations, specific strategies are particularly applying for those locations.
- The main challenge for the ECR is its cost for transport and storage which need to bear by container owner
- Underutilisation of resources also a problem for the industry, because lack of co-ordination and cooperation among the industry players.
- Very less usage and application of new technology like big data analysis
- Since it is a capital-intensive industry adopting new changes is a difficult issue and involves with new funds.
- One standard strategy will not work out all the time based on the time and place we need to change our trends
- Following industry trend is essential to sustain in the markets, we need to adopt new technology and new ways of satisfying customers.
- Visibility among the industry is very less since shipping is an invisible industry, blind spots are very often in the industry
- Information gap among players also there because every organisation is having their own platforms and lacking a common platform
- It is a complex system which involves large number of subjects like shipper, liners, leasing companies, freight forwarders and port operators
- Bottle necks are very common which leads to delay of time and underutilisation
- Different trade routes are having different ratio of imbalance major one is trans pacific
- Out of different repositioning strategies, local repositioning is the most effective way which involves minimum waste of time and cost. And for monitoring and allocating of containers using decision support systems make an effective approach

- Cargo rotation (ABC model) is effective strategy which is using currently and it minimise the operational level difficulty
- Foldable containers are the feature solution for repositioning problem, which is an effective way to tackle the ECR problem
- Shipping containers are increasingly being used to build a large variety of structures around the globe. The recycling of cargo containers is the perfect way to reuse materials while building beautiful and unique structures.
- Containers being reused at construction sites is the ideal way to give all the idle containers at port terminals another chance!

5.2 Suggestions

- There is a need to encourage new startups in maritime sector, which are of digital platform based and which can provide solutions for many repositioning problems. A common platform is required for easy access of information.
- Co-ordination and cooperation among the players are required to minimise their cost and maximize the profits.
- New innovations need to be funded by industry players.

5.3 Conclusion

Empty container management deals with repositioning empty containers at minimum costs while fulfilling its demands. Due to imbalances in trade, some areas have a surplus of empty containers, while others have a shortage. Therefore, empty containers need to be repositioned globally to make sure that sufficient empty containers are available where needed. Empty container management from the micro-logistics of a port area to the repositioning at various geographical regions has been aimed at finding out best logistic solutions and logistic cost reduction to the minimum. Solving the empty containers distribution problem gives insights into planning an effective logistic solution to entire maritime fraternity.

CHAPTER – 6

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