

# Challenges of Handling Bulk Cargoes at Discharging Port

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**Abstract**-This study is based on bulk cargo handling by a freight forwarding company. Due to heavy globalization, the number of companies operating overseas is continuously extending their organizations offering the capability to deal with the complexities inherent in international trade. Since bulk cargo handling plays a wise role in the logistics industry are considered as main logistic mediator in trade, selecting a freight forwarder is a significant element in a company's success overseas. As major challenges are faced while handling bulk cargoes which has to be tackled as early as possible for future development.

The study attempts to analyse the issues in handling bulk cargoes and techniques used for handling bulk cargoes which would help to resolve issues and contributes for major improvement for loading and unloading. There are different storage methods and the different types of bulk cargoes are stored differently and different handling equipment's are used. The study is based on both primary and secondary data. The primary data is collected from 50 respondents through questionnaire survey.

**Keywords:** Bulk cargo , challenges , Discharging port, Effectiveness, port, safety

## 1. Introduction

Bulk cargo is a cargo which is handled unpackaged and distributed in the same way and sometimes as break bulk. Bulk cargo provides huge profit to the company and the same time better handling of cargo with advanced handling equipment for easy loading and unloading bring wide business opportunity globally. The storage of bulk cargoes plays a major role and major issued are faced in storage while transferring bulk cargoes to different storage areas. The different storage system for edible oil, petroleum

products and wheat like tankers and open yard. Bulk cargoes have different handling techniques with regard to different cargoes it handle. Major issues are faced while handling bulk cargoes and they lead to losses. Wide procedures goes on with bulk cargoes and also with documentation. Transportation of cargo from storage area to destination is one of the other challenges widely faced. While transporting bulk cargoes huge traffic is faced as port is within the city so the movement of cargo is done mostly at night for quick and easy access. At the same time safety measures to be followed for avoiding accidents and damages or losses. Major precautions should be taken by labors to avoid accidents and prevent mutual safety for them and cargo. Terminal infrastructure plays a major role and major development can bring huge changes like fast and easy handling of cargo , large bulk carriers can berth and loading and unloading can be done fast. Providing huge facilities in Chennai port for handling bulk cargoes can improve further infrastructure. Major challenges faced while handling bulk cargoes at discharging port are described as Loading beyond the seaworthiness of ship, unclean holds, damages during loading and unloading, lack of proper usage of handling equipments, lack of safety for equipments and reliability and performance of equipments. Major problem caused at discharging port are port traffic, berth restriction leads to failing of bulk cargo storage, inadequate advanced techniques and ships need to wait due to in adequate berth availability. As the increase of high demand in logistics field it has been a wide change with huge benefits for the industry. The development of industry as well as bring wide employment. The future development of bulk cargoes are more advanced with the help of advanced technologies and better infrastructure. Major of the issues are tackled easily by avoiding the

challenges faced. The bulk cargoes are handled in various larger cargo carriers and different handling equipments are advance for easy loading and unloading. Some times because of non-availability of berth the bulk cargo carrier has to wait up to the limited period of one day and not less than that.

## 2. Literature Review

In manufacturing and distribution organizations logistics management plays a major role, and logistics organizations provide services to the manufacturing and distribution companies [1]. A Logistics Company may be referred as an exterior supplier that performs all different part of a company's logistics functions with different cargoes and especially with bulk cargo. Smaller shippers are able to convert business into big deal when they go up with handling of bulk cargoes and improving profitability refer the involvement of global work in bulk cargoes handling which deals with big business and at the same time huge issues are faced because of non-availability of advanced handling techniques as well as infrastructural development globally [2]. Safety measures are more important and unskilled labours should be properly trained for adopting safety at every stages of handling bulk cargoes. The survey describes that major accidents occur while handling bulk cargoes. So in hand to avoid the accidents major actions should be taken properly [3]. The main objective of a bulk carrier is to carry huge amounts of loaded bulk cargo "economically and safely" from one place to another in a definite timeframe over varying distances [4]. The most important decision troubles that usually grow in the storage yard operations are: (1) yard design, (2) storage space assignment for containers, (3) dispatching and routing of material handling equipment to serve container storage and retrieval processes, and (4) optimizing the remarshalling of containers. transportation is a big strategy majorly faced while handling bulk cargoes as it's a huge transportation of cargoes in unpackaged manner. The transport of bulk cargoes to various areas to be transported in different modes and utilize time [5]. Multimodal transport is used in India

widely for identifying the numerous facet of the system; and studies the task of multimodal transport in the economic growth of a country. It also says that the shortcoming and issues faced in India is facing because of legislation, policy failures, infrastructure limitation and operational deficiencies and suggest wide measures for improving efficiency of the operation in the field [6]. The technology and infrastructural development plays a major role in logistics industry for a wide development as well as easy and quick service throughout. An innovative technology should be spread across for better service as well as for huge profit, have emerge and they have wide range of equipments for flawless development where these ideas have great future ahead for logistics industry [7]. The authors have advocated the international maritime codes that covers the transport of solid bulk cargoes at sea and the paper explain a probable method for purpose of ship's heeling moment due to liquefaction of cargo and the probability of cargo shifting due to liquefaction process [8].

## 3. Objectives of the study

- To examine the challenges faced while handling bulk cargoes at discharging port
- To analyse issues in handling bulk cargoes and to examine the terminal infrastructure for handling larger bulk cargo vessel.
- To identify the relationship between various factors which has impact on effectiveness of handling bulk cargo

## 4. Methodology

The research design followed in the study is both descriptive & explorative in nature. The data is collected from primary and secondary source. The primary data is collected from 50 freight forwarders through questionnaire survey. The sampling technique adopted for the selection of sample is purposive and judgement sampling. Various statistical tools & techniques are used to draw conclusion

## 5. Results & Discussion

**Table 5.1: Issues in Handling Bulk**

ISSUES IN HANDLING BULK CARGOES	Mean	Std. Deviation
Loading beyond the seaworthiness of ship	4.54	.542
Unclean holds	3.90	.974
Damages during loading and unloading	4.28	.640
Lack of proper usage of handling equipment	4.32	.741
Lack of safety for equipment	4.14	.783
Reliability & performance of equipment	3.98	.915

### Cargoes

The above table shows freight forwarders perception towards the challenges in air cargo operations. Table shows the item mean score and standard deviation. Based on the mean score "Loading beyond the seaworthiness of ship"(4.54) is the top strategy that is experienced by the respondents, followed by lack of proper usage of handling equipment (4.32), Damage during loading and unloading (4.28), lack of safety for equipment (4.14), unclean holds (3.90), reliability & performance of equipment (3.89). The experience that respondents get from the service is important to determine the level of effectiveness of handling bulk cargoes. The bigger vessels have huge problems when it comes to bulk cargo carrier, wide range of facilities are need to compete the reliability and technical means of transport which is more essential for abolishing the issues faced while handling bulk cargoes.( Kuznets (2007)

### PROBLEM CAUSED AT DISCHARGING PORT

From a terminal operator's point of view, the important way of discharging bulk cargoes nearer to the storage area or tanks for easy and quick work or services.

For a terminal operator, handling bulk cargoes in a developing port where resources to remedy such problems are limited or are not available could mean

that discharge operations will prove to be very costly. There are three key stages in the logistics cycle of handling bulk cargo from shipper to end user and careful consideration is the key to maintaining integrity of the cargo throughout. These are, the preparation and shipping of the cargo; the handling of the cargo at the discharge port, and the direct or indirect delivery to the end user from the port.

**Table 5. 2. Major Problems Caused at Discharging**

MAJOR PROBLEM CAUSED AT DISCHARGING PORT	Mean	Std. Deviation
Port traffic	4.26	.565
Berth restriction leads to failing of bulk cargo storage	4.72	.573
Inadequate advanced techniques	4.06	.793
Ships need to wait due to inadequate berth availability	4.06	.793

### port

The above table shows the mean score for the problem experienced by the respondents in handling bulk cargoes at discharging port. Based on the mean score "Berth restriction leads to failing of bulk cargo storage" (4.72) is the top strategy that is delivered by the experience of the employees, followed by port traffic (4.26), inadequate advanced techniques and ships need to wait due to inadequate berth availability (4.06). The result indicates that discharging port should be developed for effective handling.

**Table 5.3. Issues in Transporting Bulk Cargoes**

IN TRANSPORTING BULK CARGOES	Mean	Std. Deviation
Overloading of cargo	4.18	.850
Accidents	4.50	.544
Lack of infrastructure	3.96	.856
Pilferage	4.20	.881

The above table shows the mean score and standard deviation for the problems in transporting bulk cargoes experienced by the employees. Based on the

mean score "Overloading of cargo" (4.18) is the top strategy that is experienced by the employees, followed by accidents (4.5), Pilferage (4.2), lack of infrastructure (3.96). The result indicates that excess of load brings accidents which causes huge issue in handling bulk cargoes.

**Table 5.4. Problems in Transferring Bulk Cargo To**

PROBLEMS IN TRANSFERRING BULK CARGO TO STORAGE PLACE	Mean	Std. Deviation
Cargo contamination	3.94	.890
Damage and loss of cargo	4.44	.611
Lack of handling equipment	4.16	.792

**Storage Place**

(Source: Primary data)

The above table highlights the mean score for the issues in "transferring bulk cargo to storage place", experienced by the employees. Based on the mean score "Damage and loss of cargo" (4.44) is the top

Terminal Infrastructure	Mean	Std. Deviation
Inadequate draft level affect efficiency of handling larger vessel	4.24	.716
Incoming vessel sometimes need to wait due to non-usage of berth	3.90	1.147
Inadequate facilities by port side lead to capital and customer loss	4.26	.965
Infrastructure is a major reason behind less volume of handling bulk cargoes	4.14	1.010

strategy that is experienced by the employees, followed by Lack of handling equipment (4.16), Cargo contamination (3.94). The Result indicates advanced

handling equipment is needed to decrease damage and loss during transfer of cargo.

**Table 5.5 Terminal Infrastructure**

The above table exhibits the mean score for Terminal infrastructure, experienced by the employees. Based on the mean score "Inadequate facilities by port side lead to capital and customer loss" (4.26) is the top strategy that is experienced by the employees, followed by Inadequate draft level effect efficiency of handling larger vessel (4.24), Infrastructure is a major reason behind less volume of handling bulk cargoes (4.14), Incoming vessel sometimes need to wait due to non-usage of berth 1 (3.9). The result indicates that each variable denotes that terminal infrastructure for better handling of bulk cargoes.

**Table 5.6. Safety Measures**

SAFETY MEASURES	Mean	Std. Deviation
Lack of safety access to ship holds, cargo deck, crane	4.04	1.049
Lack of safety facilities for staff	4.34	.745
Improper usage of machinery	4.26	.777
Lack of firefighting appliances	3.84	.934

(Source: Primary data)

The above table indicates the mean score of the problems with regard to Safety measures, experienced by the respondents. Based on the mean score "Lack of safety facilities for staff" (4.34) is the top strategy that is experienced by the employees, followed by Improper usage of machinery (4.26), Lack of safety access to ship holds, cargo deck, crane (4.04), Lack of firefighting appliances (3.84). The result indicates that lack of safety in Chennai port which leads to major accidents

STORAGE	Mean	Std. Deviation
Enough space for storing bulk cargoes	4.40	.670
Properly cleaned	4.22	.996
Technically advanced handling equipments	4.18	.896

**Table 5. 7. Future Developments for Material Handling Equipment**

Future Developments For Material Handling Equipment	Mean	Std. Deviation
Innovative technologies	4.36	.485
Progressive computer aided designs & process tools	4.52	.762
User friendly equipment	4.40	.808

(Source: Primary data)

The above table shows the mean score for the Future Developments for material handling Equipment, experienced by the respondents. Based on the mean score "Progressive computer aided designs & process tools" (4.52), is the top strategy that is experienced by the respondents,

followed by Innovative technologies (4.36), User friendly equipment (4.4). The result indicates that in future material handling equipment will be advanced.

**Table 5.8. Problems in storage**

The above table shows the mean score for the problems in Storage experienced by the respondents. Based on the mean score "Properly cleaned" (4.22), is the top strategy that is experienced by the respondents, followed by

technically advanced handling equipments (4.18), enough space for storing bulk cargoes (4.4). The result indicates that the problems in storage may affect the service.

### MULTIPLE REGRESSION ANALYSIS

In this study, the dependent variable is efficient handling of bulk cargoes; Independent variables are transport of bulk cargoes, terminal infrastructure and advanced material handling equipments discussed as follows:

Dependent variables: Efficient handling of bulk cargoes (Y)

Independent variables : 1.Transport of bulk cargoes(X1)  
: 2. Terminal infrastructure(X2)

: 3. Advanced handling equipment(X3)

Multiple R value : .698

R square value : .488

F value : .454

P value : .025

### 5.9 Variables in the multiple regression analysis

Variab les	Unstandar dized Coefficients		Standar dized Coeffici ent s	t - valu e	P - valu e
Constant	1.17 7	.52 1		2.26 0	.029
X1	.468	.13 3	.504	3.53 1	.001
X2	.055	.12 7	.056	.432	.668
X3	.214	.10 3	.251	2.07 2	.044

(Source – Field survey)

The multiple correlation coefficient is .698 measures the degree of relationship between the actual values and the predicted values of the adjustment. Because the predicted values are obtained as a linear combination of Transport of bulk cargoes (X1), Terminal infrastructure (X2) and advanced material handling equipments (X3), the coefficient value of .698 indicates that the relationship between adjustments and two independent variables is quite strong and positive.

The coefficient of determination R – square measures the goodness-of-fit of the estimated sample regression plane (SRP) in terms of the proportion of the variation in the dependent variables explained by the fitted sample regression equation. Thus, the value of R square is .488 simply means that 48.8% of the variations in adjustment is explained by the estimated SRP that uses handling of bulk cargoes, terminal infrastructure and advanced material handling equipments as the independent variables and R square value is significant at 1% level.

The multiple regression equation is

$$Y = 0.521 + 0.504 X1 + 0.056 X2 + 0.251 X3$$

Here the coefficient of X3 is .251 represents the partial effect of terminal infrastructure on adjustment, holding the other variable as constant. The estimated positive sign implies that such effect is positive that adjustment score would increase by .251 for every unit increase in terminal infrastructure and this coefficient value is significant at 1% level.

Here the coefficient of X1 is .504, represents the partial effect of transport of bulk cargo on adjustment, holding the other variable as constant. The estimated positive sign implies that such effect is positive that adjustment score would increase by .504, for every unit increase in transport of bulk cargo and this coefficient value is significant at 1% level.

Here the coefficient of X2 is .056, represents the partial effect of advanced handling equipment on adjustment, holding the other variable as constant. The estimated

positive sign implies that such effect is positive that adjustment score would increase by .056, for every unit increase advanced handling equipment and this coefficient value is significant at 1% level.

The analysis shows that majority of the respondents stated that loading beyond the seaworthiness of ship (Mean 4.54) is a major issue faced while handling bulk cargoes. The major problem caused at discharging port is berth restriction leads to failing of bulk cargo storage (Mean 4.72) It is found that major problem that damage and loss of cargo (Mean 4.44) are huge issue faced while transferring bulk cargo to storage. The major challenges faced with inadequate facilities by port side lead to capital and customer loss, (Mean 4.26) for which terminal infrastructure to be developed. Majority of the respondents stated that lack of safety facilities for staff (Mean 4.34) is a major issue faced while safety. It is found that majority of the respondents agree with progressive computer aided designs & process tools (Mean 4.52) which is useful for future development of handling equipments. Based on the analysis, is found that majorly respondents say that enough space for storing bulk cargoes but not properly maintained (Mean 4.22) is a issues while storing bulk cargoes. Multiple regressions indicate that transport of bulk cargoes, terminal infrastructure and advanced material handling equipment have effect on efficient handling of bulk cargoes

## 6. Conclusion:

Through this study it is clear that for effective handling of bulk cargoes needs huge infrastructure development with advanced technologies should be implemented through which wide issues can be tackled. Better terminal infrastructure makes huge profit with fast handling of cargoes and saves time. Huge advanced handling equipment should be used to avoid damages and loss of cargo while transferring. The availability of berth should be frequent enough so that work can go fast

as possible and time can be saved without paying demurrage.

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