# "SERVICE QUALITY AND ITS IMPACT ON CUSTOMER LEVEL OF SATISFACTION AND PORT COMPETITIVENESS WITH REFERENCE TO CHENNAI PORT"

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**Abstract:** *All ports are increasingly being perceived as integrated and inseparable nodes in their customers supply chains through logistic operations. Any failure or unreliability in ports service quality results in dissatisfaction of customers disrupting the smooth movement in the flow of business. Despite the aforementioned importance, what constitutes port service quality and its impact on the satisfaction of the port users have not been well investigated yet, in the previous studies in the case of major ports in the State of Tamil Nadu. Therefore, this gap motivates the researcher to make a valiant effort to examine the context based on perception of service quality of port users and its impact on level of satisfaction of port users with reference to selected ports in Tamil Nadu State (Chennai Port). In this research article researcher collect both secondary and primary data, Purposive sampling method adopted to collect 384 sample and analysis the data with software's like IBM-SPSS 25 and AMOS 23 by using CFA and SEM. The result evident that paved way to conduct path analysis explored with the Perception on Service Quality as exogenous factors and the endogenous factors are Port Competitiveness and Overall Satisfaction. It shows that there is positive effect of all service quality dimensions on both customer satisfaction and port competitiveness.*

**Keywords:** Service Quality, Seaport, Port user's satisfaction, Port Competitiveness

## 1. INTRODUCTION

The new economic policy of India, globalization, liberalization and privatization, a large number of multinational organizations have entered into the Indian market. Under the above circumstances, ports are well known as playing an important role in multimodal transport system and international supply chains, apart from their traditional role of cluster of economic activities port engage in various activities: such as loading / discharging cargo into / from vessels, providing value-added services such as labeling, packaging, cross-docking and others; and acting as warehouse and distribution centers.

All ports are increasingly being perceived as integrated and inseparable nodes in their customers supply chains through logistic operations. Any failure or unreliability in ports service quality results in dissatisfaction of customers disrupting the smooth movement in the flow of business. Despite the aforementioned importance, what constitutes port service quality and its impact on the satisfaction of the port users have not been well investigated yet, in the previous studies in the case of major ports in the State of Tamil Nadu. Therefore, this

gap motivates the researcher to make a valiant effort to examine the context based on perception of service quality of port users and its impact on level of satisfaction of port users with reference to selected ports in Tamil Nadu State (Chennai Port).

## 1.1 SEAPORT SERVICE QUALITY

SERVQUAL model proposed by **Parasuraman et al. (1988)**[1] has been used by many researchers in this area to measure seaport service quality **(Durvasula et al., 1999)**[2]. Thai **Van Vinh & Devinder Grewal (2005)**[3], compared the use of qualitative research, theory of services, service quality and SERVQUAL scale, and added an extra parameter to what was already provided, and tested the service quality. The 6 components of seaport service quality they incorporated in their study includes the following: (1) Resources, (2) Capabilities, (3) Process, (4) Management, (5) Image (6) Responsibilities.

The measuring scale by Thai Van Vinh & Devinder Grewal (2005) was established and was tested in the seaports of Australia, as against the seaport in Vietnam, Evidently the economic environment and conditions between these two places are extremely different. Thai Van Vinh & Devinder Grewal conducted survey of seaport service quality once again, in Vietnam and there too they enumerated these into the above mentioned six categories, indicating that irrespective of the economic set up of the seaports this method of evaluation, still holds good.

*Resources:* This parameter dealt with the Readiness/availability of the equipment; the working conditions of equipment; The information technological ability to be able to track cargoes in a systematic manner, and the infrastructures associated with it.

*Capacities / Outcome :* This parameter dealt with the rapidity/Speed with which the services were carried out; This is included the reliability of service (which included the time taken for the delivery of the service and whether this duration of time was acceptable to the customers); supply of homogenous/uniformity of the service, without much variations or fluctuations; The assurance of safety for the goods/cargoes; The quality and the exactness of documents; the value added services and the competitive edge, involving the diversification of the services in the port and the rapidity of service.

*Process:* This parameter involves the serving attitude of the employee; the manner in which they responded to the requirements of the customers; the sufficiency of the knowledge the employee possessed regarding the customer requirements, their needs; the application of technology in enhancing the customer service.

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[1] *Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. Journal of Retailing, (Spring), 12-40.*

[2] *Durvasula, S., Lysonski, S., & Mehta, S. C. (1999). Testing the SERVQUAL scale in the business-to-business sector: the case of ocean freight shipping service. Journal of Services Marketing.*

[3] *Thai, Vinh & Grewal, Devinder. (2005). An analysis of the efficiency and competitiveness of Vietnamese port system. Asia Pacific Journal of Marketing and Logistics. 17. 3-31. 10.1108/13555850510672269.*

*Management:* This parameter involved the application of technology in the development of the port, the firm; the enhancement of performance in development and management; development of critical capacities required for loading/unloading cargoes; understanding of the needs of the customers; improvement of services that are oriented to meet the needs of customers.

*Image:* This parameter deals with the reputation of the port, and how far it is reliable in the market, the image the port has developed by implementing the above discussed parameters.

*Responsibility:* This is an additional component, which deals with how responsibly the cargo is handled by the firm, and the safety measures that are implemented for both cargo and the customer.

## 1.2. OBJECTIVES OF THE STUDY
➢ To investigate the level of satisfaction of the port users in the study area.
➢ To measure the impact of port user's satisfaction based on service quality
➢ To contribute suitable suggestions and policy implications to improve service quality and satisfaction of port users.

## 1.3.CONCEPTUAL MODEL

The conceptual model is the proposed framework for the study supported by the theoretical aspects that have significant influence in the statistical tools.  Here, for this study the researcher proposed model with exogenous variables like Resources, Outcome, Process, Management and Image & Safety and the two endogenous constructs such as Port Competitiveness and Overall Satisfaction of all the three port users which are analyzed using multi-group moderation method and extracted the results to justify the proposed model. Following are the hypothesis framed for the multi-group moderation model.

### 1.3.1.  EFFECT OF SERVICE QUALITY ON PORT COMPETITIVENESS
➢ Positive direct relationship expected between Resources and Port Competitiveness
➢ Positive direct relationship expected between Outcome and Port Competitiveness
➢ Positive direct relationship expected between Process and Port Competitiveness
➢ Positive direct relationship expected between Management and Port Competitiveness
➢ Positive direct relationship expected between Image and Port Competitiveness

### 1.3.2.  EFFECT OF SERVICE QUALITY ON OVERALL SATISFACTION
➢ Positive direct relationship expected between Resources and Overall Satisfaction
➢ Positive direct relationship expected between Outcome and Overall Satisfaction
➢ Positive direct relationship expected between Process and Overall Satisfaction
➢ Positive direct relationship expected between Management and Overall Satisfaction
➢ Positive direct relationship expected between Image and Overall Satisfaction

**Figure 1: Proposed Conceptual Model for the study**
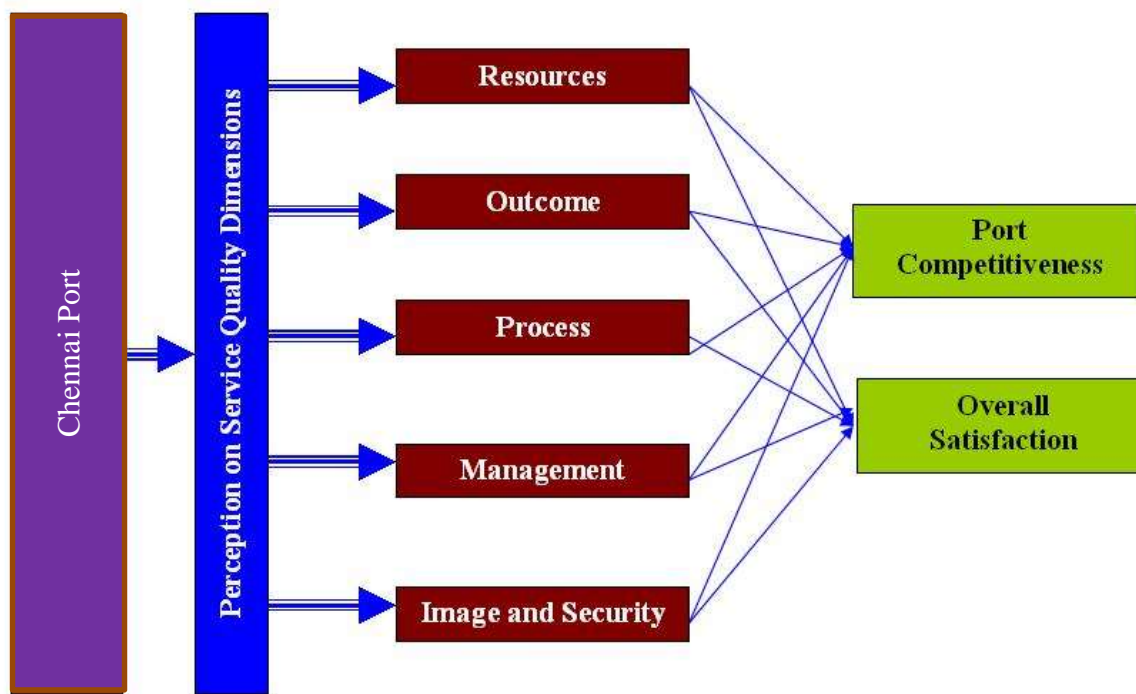


## 1.4. SAMPLING DESIGN

As stated by **Bryman and Bell (2007)**[4] there are three types of non-probability sampling, namely, Convenience Sampling, Snowball Sampling and Quota Sampling. Convenience Sample is one that is conveniently available to the researcher with its goodness of accessibility. The problematic facet of this type of non-probability sampling is that it is impracticable to generalize the results but at the same time the convenience sampling plays a more remarkable role than supposed. As explained by the authors in business and management field, this technique is more worthy as compared to sample based on probability sampling.

The area of the study is confined to Chennai port. Out of 12 major ports in India, three ports are operating in Tamil Nadu. The researcher attempted to collect information from the port users who are the customers considered to obtain primary data revealed the information related to port performance by way of perception on service quality. Considering the importance of service quality and port user's satisfaction questions were decided in consultation with the research supervisors, port officials and other professionals who have experience in the field helped to determine the instrument to collect the survey data. The data was collected from Chennai port alone and the constructs were checked. To assess the service quality and port user's satisfaction, of Chennai Port is considered for detailed survey to accomplish the study effectively. The researcher adopted convenience sampling technique. A total of 384 sample respondents were selected for the study from the port of Chennai.

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[4] *Bell, E., & Bryman, A. (2007). The ethics of management research: an exploratory content analysis. British journal of management, 18(1), 63-77.*

## 2.  DATA ANALYSIS AND INTERPRETATION

### 2.1. CONFIRMATORY FACTOR ANALYSIS

**Confirmatory Factor Analysis** (**CFA**) is a special form of factor analysis, most commonly used in social research It is used to test whether measures of a construct are consistent with a researcher's understanding of the nature of that construct (or factor). As such, the objective of confirmatory factor analysis is to test whether the data fit a hypothesized measurement model. This hypothesized model is based on theory and/or previous analytic research. CFA was first developed by Joreskog and has built upon and replaced older methods of analyzing construct validity

In confirmatory factor analysis, the researcher first develops a hypothesis about what factors believed are underlying the measures. This study is conducted to find out the underlying factors based major port user's perception on Service Quality and Satisfaction. The constraints may be imposed on the model based on these priori hypotheses. By imposing these constraints, the study is verified and forcing the model to be consistent with the theory.

The CFA model is conducted with respect to Overall Perception on Service Quality classified into five sub-dimensions namely, Resources, Outcome, Process, Management and finally, Image and Safety.

**Dimensions on Perception on Service Quality**

- Resources
- Outcome
- Process
- Management
- Image and Safety as a multivariate analysis confirmatory factor analysis using model has been done and the same are presented hereunder

**Declaration of Code in the Dimensions**

| Code | Statements |
|------|-----------|
| **RESOURCES** | |
| R1 | Availability of necessary equipment's and proper facilities to meet my requirements. |
| R2 | Equipment in the port I use are proper and always functional |
| R3 | The port ensures strong and stable financial stability |
| R4 | Excellent shipment tracking and tracing capabilities always guaranteed and exhibited by my port |
| R5 | Tangible aspects and Infrastructure facilities like berths, yards, warehouses, distribution centers and hinterland connection networks are at par excellence in my port |
| **OUTCOME** | |
| OC1 | Quality of service provided by my port is prompt and on-time |
| OC2 | Reliability of the service always ensured by my port |
| OC3 | Consistency in providing services is guaranteed by my port |
| OC4 | I am ensured with error free record maintenance and other documents during my shipments |
| OC5 | The safety and security aspects of the port are always reliable to fulfill my expectations |
| OC6 | The value of services offered by the port is competitive and economical |
| OC7 | Service provided by the port always met my expectations irrespective of time and place |
| **PROCESS** | |
| PR1 | Staff attitude and response in my port demonstrates professionalism to meet my requirements |
| PR2 | The staff in port always responds quickly to all my enquiries and requests |
| PR3 | The staff in my port understands the service importance and demonstrates good knowledge |
| PR4 | Appreciable quality of the staff to serve the customer with ICT applications also ensures comprehension |

| Code | Statements |
|------|-----------|
| **MANAGEMENT** | |
| Mgm1 | The ICT application in port operation and management is sufficient enough to fulfill my needs |
| Mgm2 | My port demonstrates high level of efficiency in operation and management |
| Mgm3 | My port management always demonstrates good knowledge, also competence and capability in handling incidents |
| Mgm4 | The management of my port always had good understanding of my needs and requirements |
| Mgm5 | My port always collect feedback of their service and reflect it through sustainable improvement |
| Mgm6 | My port continuously improve the customer-oriented operation and management skills |
| **IMAGE AND SAFETY** | |
| Img1 | The port demonstrates good relationship with other ports and land transport service providers |
| Img2 | The port that I am using possesses positive reputation and shares reliability in the market |
| Img3 | The quality of my port always emphasized on operations and work safety |
| Img4 | The port demonstrates good record and operations and ensures safe and protective environment |
| Img5 | The port make certain to enhance their goodwill through social responsibility among employees and other stake holders as well |
| Img6 | The port always emphasizes on environmentally responsible operations |
| Img7 | The port that I am using practice good environmental management system |

**Convergent and Discriminant Validity, Average Variance Extracted (AVE),  and Composite Reliability**

The first and foremost step to test the consistency of the dimension; Perception of Chennai Port users on Service Quality involved testing the validity and reliability of all five components of the PSQ instrument. The first order of the CFA model exhibited low fitness levels which was improved after elimination of few items of different components in the second order of the model to improve the model fitness.  The first order of the CFA model retained 29 items.  After elimination of few items from the model 18 items were retained to measure the Perception on Service Quality. The results of factor loadings, Cronbach's alpha, Average Variance Extracted and Reliability with respect to Service Quality Perception of Chennai Port Users are detailed in the Table 1.

**Table 1: Factor Loadings (λ), Cronbach's α and Composite Reliability**

| Constructs | Items | λ | Cronbach's α | AVE | Square Root of AVE | Composite Reliability |
|---|---|---|---|---|---|---|
| **Resources** | R1 | 0.59 | | | | |
| | R2 | 0.93 | 0.823 | **0.645** | 0.803 | **0.841** |
| | R3 | 0.85 | | | | |
| **Outcome** | OC1 | 0.68 | | | | |
| | OC2 | 0.89 | 0.798 | **0.524** | 0.768 | **0.811** |
| | OC3 | 0.72 | | | | |
| | OC4 | 0.57 | | | | |
| **Process** | PR1 | 0.47 | | | | |
| | PR2 | 0.83 | 0.773 | **0.494** | 0.702 | **0.790** |
| | PR3 | 0.76 | | | | |
| | PR4 | 0.70 | | | | |
| **Management** | Mgm1 | 0.87 | | | | |
| | Mgm2 | 0.95 | 0.902 | **0.708** | 0.841 | **0.906** |
| | Mgm3 | 0.78 | | | | |
| | Mgm6 | 0.75 | | | | |
| **Image** | Img1 | 0.46 | | | | |
| | Img2 | 1.12 | 0.777 | **0.588** | 0.767 | **0.804** |
| | Img3 | 0.67 | | | | |

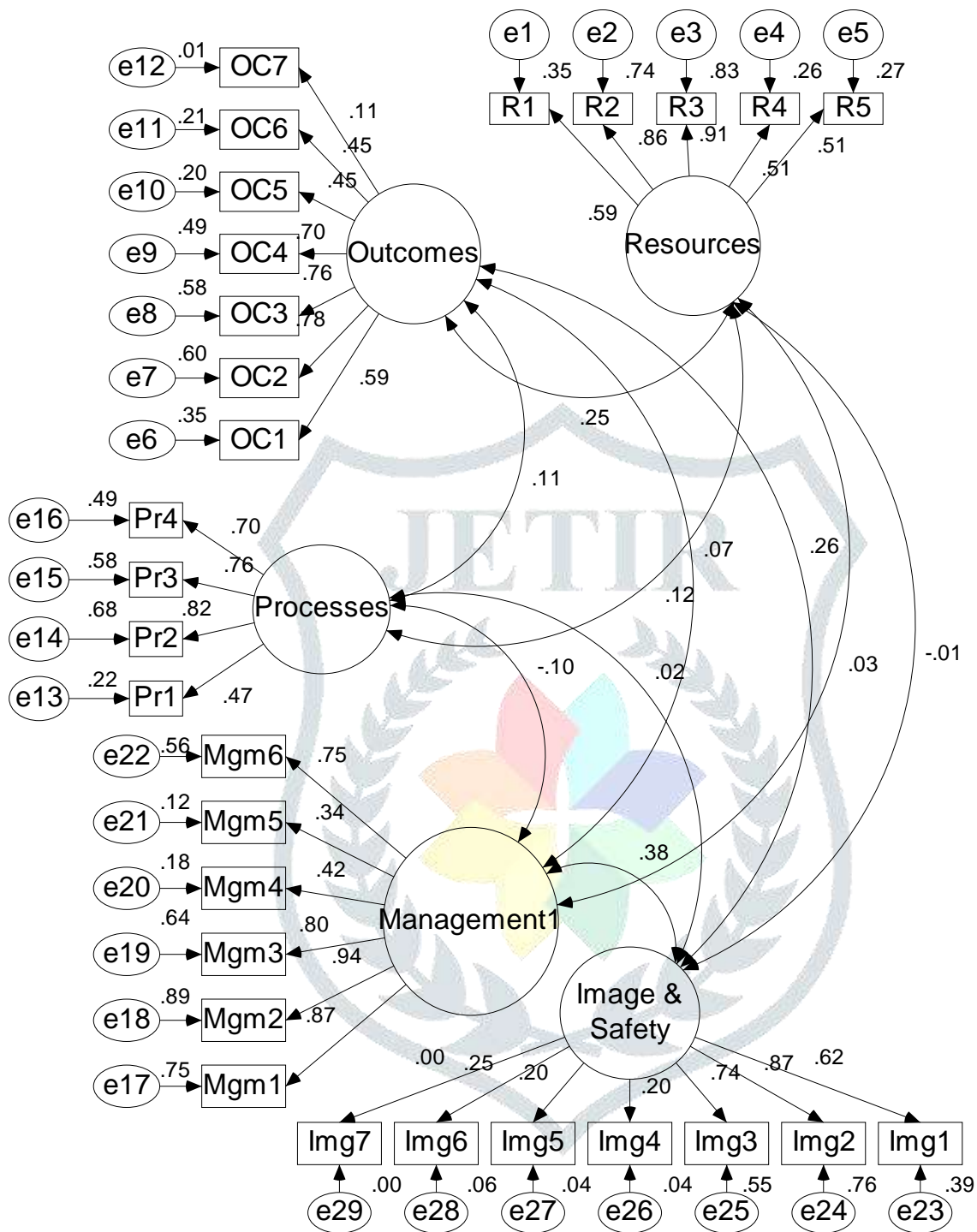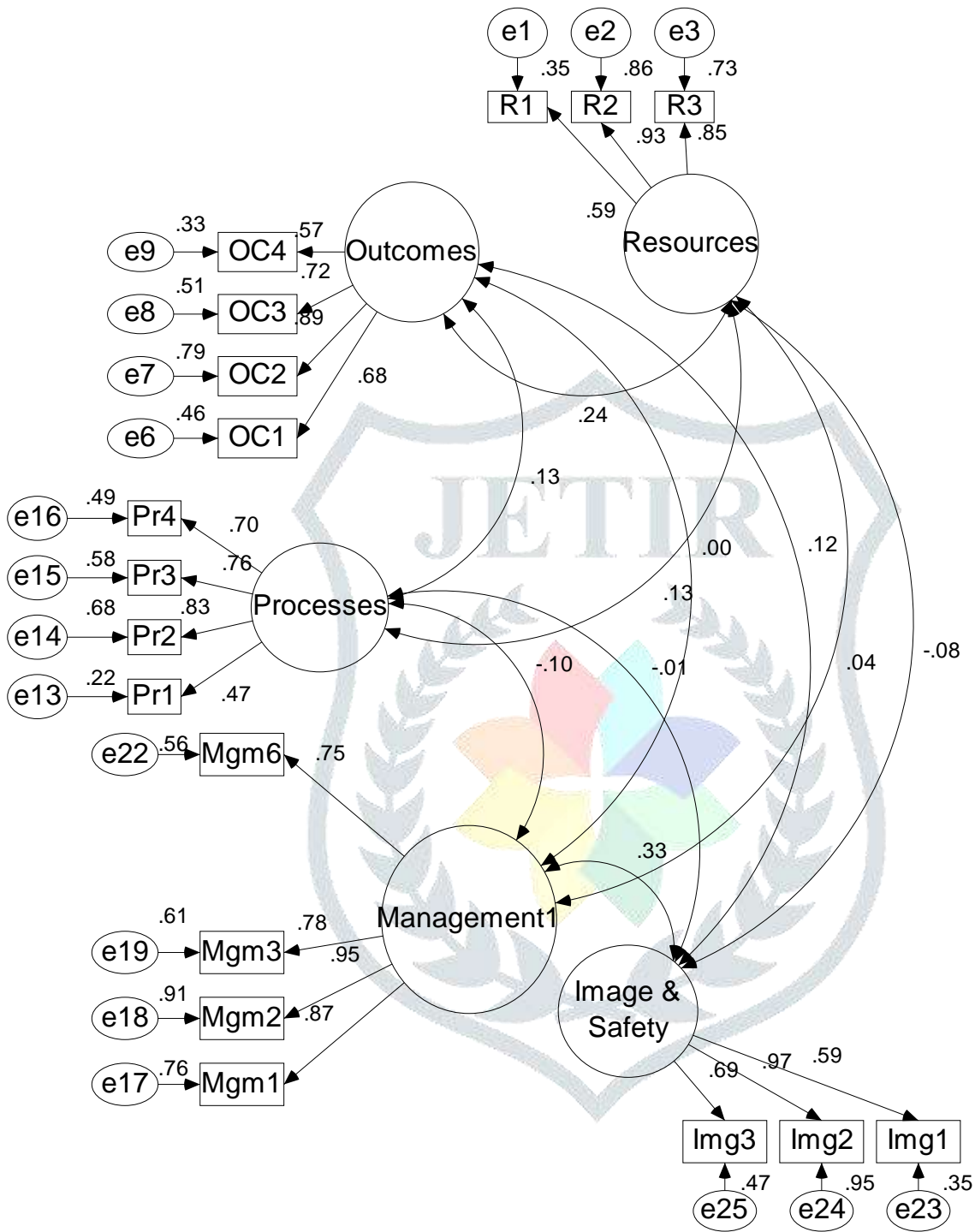**Figure 2: 1st Order of the Model showing Perceived Service Quality of Chennai Port Users**

**Figure 3: 2ⁿᵈ Order of the Model showing Perceived Service Quality of Chennai Port Users**

The second order of the model included the constructs: Resources (three items scale), Outcome (four item scale), Process (four item scale), Management (four item scale) and Image & Safety (three item scale) to substantiate the validity and reliability of the constructs with respect to Perception on Service Quality of Chennai Port users. The resulting model produced good fit indices $\chi^2$= 606.174, degree of freedom (df)=125, GFI=0.854, AGFI=0.800, CFI=0.860 and RMSEA=0.100. The t-values corresponding to all the items of Perception on Service Quality were significant (p<0.001).

The degree to which the construct items of Perceived Service Quality of Chennai Port users indicate the latent construct is given by measures of composite reliability. The study reveals the value of composite reliability of the constructs ranging between 0.790 to 0.906 which is more than the recommended level of 0.7 suggested by **Gefen et.al. (2000).**[5] In order to very the validity of the constructs, further the convergent and discriminant validity was assessed. To assess the discriminant validity, the square root of AVE shall be greater than the correlation between the construct and the other construct in the model and the square root of AVE was ranging between 0.702 and 0.841. The values of Average Variance Extracted (AVE) for the Service Quality perceived by the Chennai Port users vary from 0.494 to 0.708 for the constructs which confirms the convergent validity of the constructs. The value of Cronbach's alpha in all the scales were acceptable ranging between 0.773 and 0.902.

## 2.2.MODEL RESULTS

**Fig 4: Fully Constrained Model**



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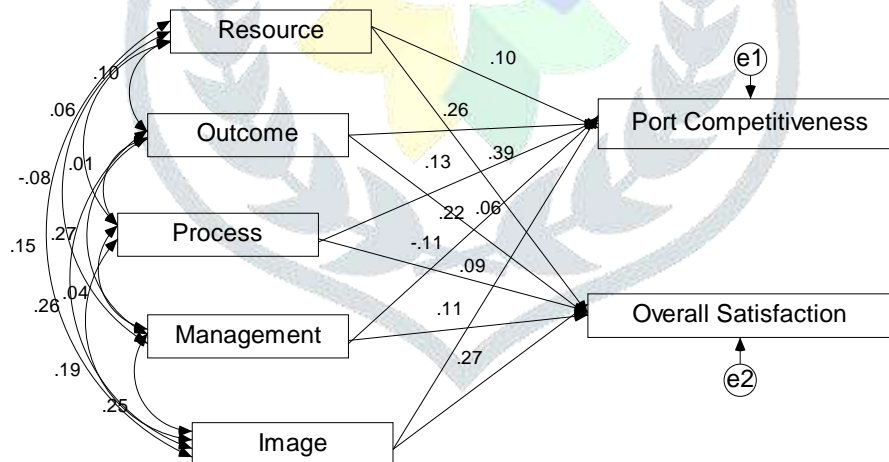
[5] *Gefen, D., Rigdon, E. E., & Straub, D. (2011). Editor's comments: an update and extension to SEM guidelines for administrative and social science research. MIS quarterly, iii-xiv.*

**Table 2: Model summary measuring the fitness index Chennai Port**

| Fit index | Recommended criteria | Chennai Port |
|---|---|---|
| $\chi^2$ | | 15.563 |
| $\chi^2/df$ | < 3 | 1.297 |
| Goodness of Fit Index | > 0.90 | 0.994 |
| Adjusted Goodness of Fit Index | > 0.90 | 0.970 |
| Normed fit index | > 0.90 | 0.975 |
| Comparative fit index | > 0.90 | 0.994 |
| Root mean squared error of approximation | < 0.08 | 0.021 |
| PCLOSE | | 0.972 |

It is clear from the Table 2 that the summary of model shows the perception on service quality compared with Port Competitiveness and Overall Satisfaction shows the result of Chennai Port CMIN = 15.563, CMIN/DF = 1.297, GFI= 0.994, AGFI=0970, CFI = 0.994, Comparative Fit Index : CFI value of 0.90 or greater **(Hu & Bentler, 1999)** [6]and NFI=0.975, Normed Fit Index (NFI) used to measure model fit above 0.90 are considered acceptable and RMSEA 0.021 shows excellent fit and proves that there is a close association and significance in measuring the perception on service quality compared with Port Competitiveness and Overall Satisfaction on Chennai Port users.

**Table 3**: **Fully Constrained Model Regression Weights: (Chennai - Default model)**

| | | | Estimate | S.E. | C.R. | P | Label |
|---|---|---|---|---|---|---|---|
| Port_comp | <--- | Resource | .091 | .031 | 2.933 | .003 | W1 |
| Satisfaction | <--- | Resource | .581 | .048 | 12.089 | *** | W2 |
| Port_comp | <--- | Outcome | .217 | .029 | 7.369 | *** | W3 |
| Satisfaction | <--- | Outcome | .093 | .045 | 2.041 | .041 | W4 |
| Port_comp | <--- | Process | .123 | .034 | 3.576 | *** | W5 |
| Satisfaction | <--- | Process | -.179 | .053 | -3.345 | *** | W6 |
| Port_comp | <--- | Management | .148 | .024 | 6.157 | *** | W7 |
| Satisfaction | <--- | Management | .124 | .037 | 3.339 | *** | W8 |
| Port_comp | <--- | Image | .071 | .028 | 2.540 | .011 | W9 |
| Satisfaction | <--- | Image | .361 | .043 | 8.321 | *** | W10 |

It is observed that the fully constrained model shows the positive effect of Resources on Port Competitiveness which means when Resources goes up by one degree, then there is 0.091 positive increase in Port Competitiveness perceived by Chennai port users. When the Resources goes up by one then the value of 0.581 increase is found with the Overall Satisfaction by Chennai port. When the Outcome goes up by one, there is a significant increase of 0.217 and 0.092 with the Port Competitiveness and Overall Satisfaction. When the Process goes up by on, then it is found 0.123 increase in Port Competitiveness as well as -0.179

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[6] *Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural equation modeling: a multidisciplinary journal, 6(1), 1-55.*

decline in overall satisfaction. It is also clear that when Management goes up by one, then it is identified that 0.148 increase in the Competitiveness, as well as 0.124 increase in the Overall Satisfaction stated by Chennai Port users. Finally, when the image goes up by one, then 0.071 increases was found with Port Competitiveness and 0.361 increase in Overall Satisfaction.

## 3. FINDINGS
### 3.1. CFA MODEL

The CFA model is conducted with respect to Overall Perception on Service Quality classified into five sub-dimensions namely, Resources, Outcome, Process, Management and finally, Image and Safety. It is observed that all the scales demonstrated the reliability, convergent validity and discriminant validity with respect to Perception on Service Quality Chennai Port. This has paved way to conduct path analysis explored with the Perception on Service Quality as exogenous factors and the endogenous factors are Port Competitiveness and Overall Satisfaction.

### 3.2.SEM MODEL

It is observed that the fully constrained model shows the positive effect of Resources on Port Competitiveness which means when Resources goes up by one degree, then there is 0.091 positive increase in Port Competitiveness perceived by Chennai port users. When the Resources goes up by one then the value of 0.581 increase is found with the Overall Satisfaction by Chennai port. When the Outcome goes up by one, there is a significant increase of 0.217 and 0.092 with the Port Competitiveness and Overall Satisfaction. When the Process goes up by on, then it is found 0.123 increase in Port Competitiveness as well as -0.179 decline in overall satisfaction. Finally, when the image goes up by one, then 0.071 increases was found with Port Competitiveness and 0.361 increase in Overall Satisfaction.

## 4. SUGGESTIONS

Shipping liners had higher level of positive perception towards competitiveness and there is no significant influence among the other port users with regard to port competitiveness while there is no significant difference in the overall satisfaction of all port users considered for the study. Hence, it is recommended that the all port users needed to provide higher standards of service quality to fulfill the requirements of the port users and satisfy them in all respect.

Lower experience category of Chennai port users indicated dissatisfaction towards service rendered with respect to terminal, transport and general aspects. Also the respondents utilized the port more than 50 times from Chennai port had higher level of satisfaction. Further, the Chennai port users having turnover less than Rs.50 lakhs, Therefore, it is recommended that all the other port users shall be considered to reveal their level of dissatisfaction areas and take immediate measures to fulfill their needs.

It is observed from the study that Port users perceived low level of satisfaction based on the Service Quality provided by Chennai port with respect to the Processes. Hence it is recommended that these processes are given the needed significant attention by the policy makers. They should also improve the professional attitude and behaviour of the personnel in charge to meet the requirements. These in charges should be able to address the enquiries swiftly and demonstrate adequate knowledge and comprehension to elevate the service quality of the respective ports.

## 5. CONCLUSION

It is evident that there is a need to improve the aspects like process, improvement in management operations and the need to elevate the capabilities to achieve positive outcome.  Further, it is recommended that the policy makers must make the necessary amendments to ensure that the port users are provided effective services at reasonable costs, since this factor has a huge impact on the higher level of service satisfaction on the customers. It is our honest intention that these recommendations are implemented at the earliest, to ensure that the ports are able to serve the customers more satisfactorily in the years to come.

## 6. FUTURE SCOPE OF THE STUDY

The sample port users are concentrated only Chennai Port, which shall be extended to all South Indian Ports and also Indian ports taking the same dimensions into consideration to provide generalized results from the studies.

### REFERENCES

1. Durvasula, S., Lysonski, S., & Mehta, S. C. (1999). Testing the SERVQUAL scale in the business-to-business sector: the case of ocean freight shipping service. Journal of Services Marketing.

2. Gefen, D., Rigdon, E. E., & Straub, D. (2011). Editor's comments: an update and extension to SEM guidelines for administrative and social science research. MIS quarterly, iii-xiv.

3. Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural equation modeling: a multidisciplinary journal, 6(1), 1-55.

4. Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. Journal of Retailing, (Spring), 12-40.

5. Thai, Vinh & Grewal, Devinder. (2005). An analysis of the efficiency and competitiveness of Vietnamese port system. Asia Pacific Journal of Marketing and Logistics. 17. 3-31. 10.1108/13555850510672269.