This thesis is concerned with the study of ports and their dynamics. The research work identifies the cause and effect structure that govern the performance of the ports. The research work investigates the cargo handling behavior of the major Indian ports, and explores the way the ports are managed through their policies and strategies.

This research work presents a computational framework to determine causality. The computational framework aims at determining the components of causality namely isolation, association, and direction of influence. The computational framework used in this research is a blend of statistical and system dynamics techniques which enables to take the advantages of the data driven approach as well as causal approach. The data driven approach allows us to understand and develop causal model, which finally aims at understanding the dynamics of the port system.

In this thesis, the causes of change in behaviour of the port system, such as fluctuations in cargo handling, ship-visits, and revenue earning of the ports are analyzed. A causal model has been developed that captures the basic theory of trade, transportation and supply chain management. The study was extended to determine the impact of policies in a competing scenario.

The study revealed the theories and paradoxes of port dynamics. It provided the guiding principles in deciding on policies and strategies to the port planners.

In this thesis a framework for implementing strategies and policies has been developed, that define the structure-strategy-performance paradigm for ports.

Keywords: Port, cargo, ship (vessel), berths, draft, output, productivity, efficiency, structure-strategy-performance paradigm of ports, causality, dimensions, relationship