

# The Rise of the East India Company as a Study of Network Dynamics and Organisational Innovation

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The English East India Company (EIC) played a pivotal role in the trade between Asia and Europe[Furber1976]. During its more than two centuries of operation, thousands of intercontinental voyages were conducted. The paper places the EIC's evolving shipping network within the context of political events, trade flow shifts, and corporate structural changes. Time series of network properties are analysed and exhibit inflection points. This includes the number of nodes and edges, and more derived properties such as network centralities, diversity, and entropy measures. The British Library, London, generously provided digitised shipping data extracted from archive material[Farrington1999], which forms the basis of our investigation. The original file containing information of ship descriptions and ports visited was processed using pretrained language models, including GPT and other techniques. This converted unstructured into structured data, and allowed the journeys between destinations to be plotted as a journey weighted network. In addition to automated structuring methods, other substantial corrections, e.g. name unification and metadata association, were undertaken. The resultant network was plotted and analysed with software packages including *igraph*, *Networkx* and standard statistical methods. Figures produced show the evolution of the shipping network, where vertices correspond to ports and edges correspond to voyages. We provide analysis of various network properties, including entropy over time slices, and establish some inflection points, which coincide with known structural changes in the organisation of EIC. In addition, centrality measures show the rise and fall of selected ports over time, for example, the change of importance of Surat compared to Mumbai.

Entrepreneurial activities of its employees were encouraged through a gradual privatisation of the intra-Asian trade, while the EIC headquarter in London retained the monopoly on shipments to and from Britain[Chaudhuri1965, Erikson2014]. Information from a multitude of sources was assiduously collected, collated and processed. It enabled a quantitative evaluation of employees and was forwarded in a distilled form to shareholders. The devolution of control paired with the ability to measure and, as a consequence, reward outcomes pre-empted ideas associated with modern management and portfolio theory[Anderson1983], and coincided with a growth of shipping activity, in terms of the size of the fleet, number of ports visited and yearly voyages. The EIC eventually dominated its European commercial rivals, developed territorial ambitions and enabled London's rise to financial preeminence. The shipping network developed into a hub and spoke system around the three main bases - modern-day Mumbai, Chennai and Kolkata, called 'presidencies'. In the later half of the 18th century, the EIC's transition from its initial purely commercial operation towards a territorial empire is reflected in diverse network measures.

**Keywords:** East India Company, Industrial Revolution, Trade, Industry, Shipping, Capitalism, Colonialism, Corporations, Management

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at the British Library, London, for generously providing digitised EIC shipping data. Alex Hailey extracted the shipping data used in the paper from [Farrington1999].

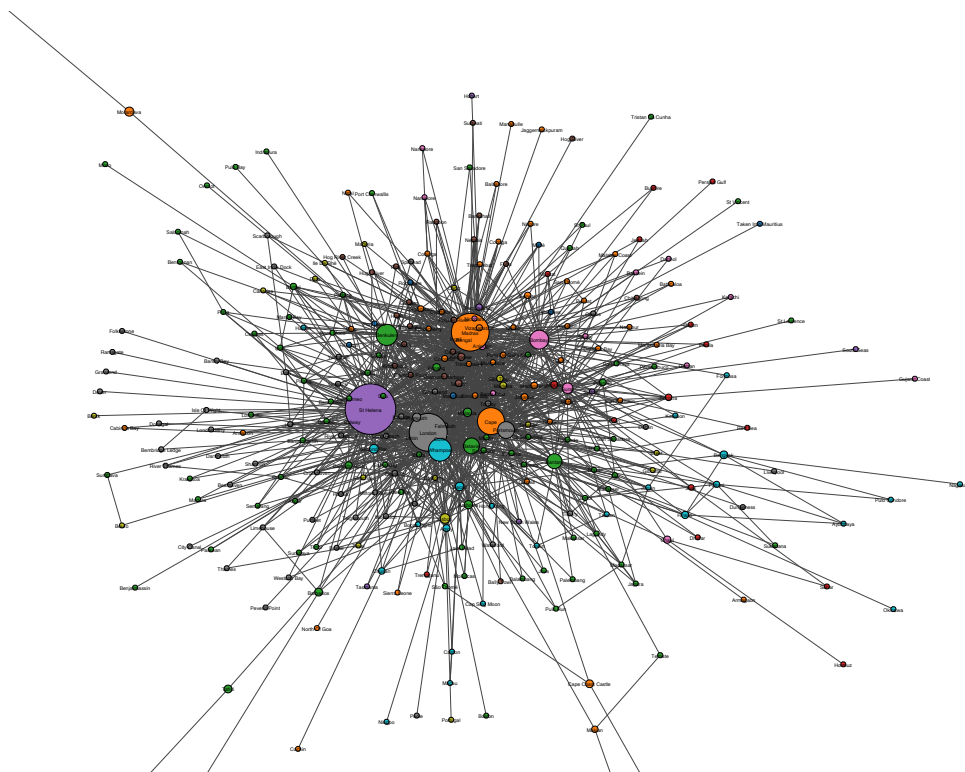


FIG. 1: Network Graph for EIC voyages between 1600 and 1833.

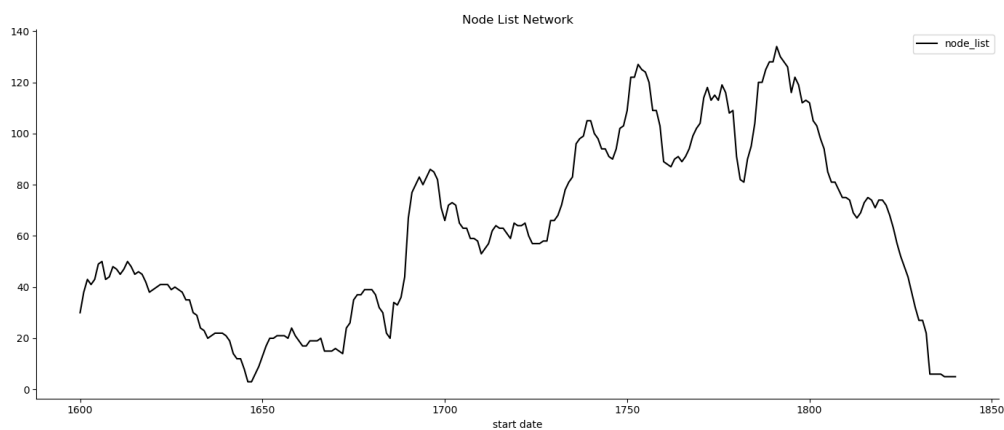


FIG. 2: Number of ports visited by EIC ships averaged over ten-year intervals. The graph can be divided into three periods with distinct behaviour. The foundation period from 1600 until about 1650; followed by a growth phase, where the privatisation of the county trade led to increased activity; and finally a declining phase from the late 18th century coinciding with the switch from the commercial to the territorial phase and the loss of trade monopolies.

start date	end date	edges	nodes	av. clustering	diameter	av. shortest path	av. degree
1600	1665	189	74	0.336642	6	2.693817	5.108108
1666	1758	626	161	0.500703	5	2.509239	7.776398
1759	1833	949	210	0.611624	8	2.581362	9.038095
1600	1833	1443	298	0.551210	8	2.609608	9.684564

TABLE I: Table shows statistical network properties of the graph of Figure 1 during different periods of EIC's development