FREIGHT TRANSPORT – IMPROVING SUPPLY CHAIN THROUGH INTEGRATED TRANSPORT PLANNING

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Abstract

This study investigates the Inland Water Transport (IWT) affairs with research proposition positioned as 'modal shift (in favour of IWT mode) in the existing supply chain will improve its efficiency measured in terms of cost, reliability, timeliness and inventory management'. An efficient freight transport system contributes to the nation's economy by improving the supply chain. The strength of the system comprising various modes viz. road, rail, inland waterways etc depends on the synergies that result from the integration of the modes and from the collaborative efforts of the stakeholders. The requirement therefore is integrated transport planning where the modal choice is commodity oriented. There are external costs associated with freight transport. Lack of integrated approach to transport planning will lead to further increase in external costs.

The research in freight transport modelling has lagged behind the research in passenger modelling due to complexities such as freight shipment characteristics, complex interaction among shipper, receiver and carrier etc involved in the case of freight transport. The supply chains have become highly competitive these days and this has led to innovations in logistics management practices; the major one being the shift from inventory based 'Push' system to just-in-time based 'Pull' system.

The freight transport affair should be viewed from the larger perspective of optimizing the total supply chain performance. The trade-offs in logistical activities are key to developing an effective Logistics and SCM strategy. In the context of transportation of bulk non-perishable cargo, the `trade-off' aspects tend to favour waterborne transport mode.

Indian IWT sector is sub-optimally developed and there are several supply side bottlenecks. As a result, the capacity of IWT sector remains under-utilized and its modal share insignificant. In contrast, outside India - Continental *Europe, USA and China* notably, inland navigation infrastructure is highly developed and IWT figures prominently in their freight supply chains. In these regions, the supply side deficiencies have been taken care of by sustained public funding over a long period.

The framework for developing IWT mode in a manner it finds its rightful place in the transportation link of the supply(freight) chain should therefore facilitate infusing supply side efficiencies in terms of quality fairway infrastructure, inter-modal linkages, cargo-handling equipments, productivity of

vessels and project implementation framework. The capacity and qualitative aspects of the Regulator/Developer are also equally important.

An analysis of the supply side issues in IWT sector has been studied with the help of a Pentagon Model, the five components of which are 'Hard ware', 'Soft ware', 'Org ware', 'Fin ware' and 'Eco ware'. Based on the pentagon model based stakeholder analysis and the opinion of experts, the enablers have been identified for designing an Interpretive Structural Modelling(ISM) based framework. The enablers are: Regulator/Developer, Fairway, Incentives, Public Investment, Private Investment, Promotions, R&D, Vessels, Terminals, and Project Management.

An integrated model for IWT development has been worked out using the Fuzzy-MICMAC based analysis. The fuzzy MICMAC analysis indicates that every enabler scores fairly high on both driving power and dependence suggesting a strong inter-dependence between and among the enablers. 'Regulator/Developer', 'Incentives/Subsidy', 'Public Investment', 'Fairway' and 'Private Investment' emerge as having predominantly 'driver' characteristics; while 'Terminals', 'Promotions', 'Vessels', 'R&D', and 'Project Management' have predominantly 'dependence' characteristics. While 'Fairway' and 'Private Investment' with maximum driving power would impact the IWT sector the most, it is the fairway with assured depth that emerges as the single most potent enabler of IWT affairs. At the same time, both of these (Fairway and Private Investment) are dependent heavily on the performance of other enablers.

The ISM based framework has been validated with the help of a case study relating to a modal shift project (transportation of coal through IWT mode for NTPC's power plant). The Situation-Actor-Process-Learning-Action-Performance (SAP-LAP) framework has been used for understanding the interplay of situation, actors, processes and finer aspects of project management, as also identifying the key factors behind the success. The modal shift was achieved satisfying the critical success factor, *i.e*. the landed cost post-modal shift to be cheaper. The success could be attributed to the inter-play of key enablers (fairway, cargo assurance, private investment) around 'project management' skills of the Regulator/PDO/PDC.

The presentation of enablers of IWT development in a hierarchy and the level partitioning of enablers on the basis of effectiveness (driver power minus dependence) is a maiden, unique and original effort in the area of integrated transport planning. The understanding of driving power and dependence characteristics of various enablers through fuzzy MICAMC analysis and identification of key/critical enablers is another major contribution of this research. Yet another take-away of this research is the confirmation that committing cargo for transportation by IWT mode (i.e. cargo assurance) on relatively long term basis for say 5-7 years is perhaps the most potent catalytic factor (for modal shift) from key stakeholders' perspective. ISM Model together with fuzzy MICMAC analysis does provide a good understanding of the relationship among the enablers and net relative effectiveness of each enabler.