

SPACE TECH TO IMPROVE LOGISTICS AND SUPPLY CHAIN MANAGEMENT IN INDIAN SCENARIO

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Logistics and supply chain management are crucial foundations of the Indian economy, guaranteeing the effective movement of products, services, and individuals throughout the nation. The Indian government has effectively reduced the logistics GDP from 14% to around 7.8% to 8.9% through the implementation of programs such as Bharat Mala, Sagarmala, and PM Gati Shakti schemes. To accomplish the objective of Atmanirbhar Bharat by 2047, India needs to improve its current technologies, namely in the domains of transportation and logistics, which play a vital role in the supply chain.

The recent triumph of Chandrayan-3 holds the potential to greatly augment the capabilities of Indian space technology. The successful mission has enhanced the existing capabilities of space technology, such as satellite navigation systems, remote sensing, satellite communication, and web geographic information systems (GIS). The Global Positioning System (GPS) is a satellite-based radio navigation system used to communicate worldwide geographic location data. The Indian Regional Navigation Satellite System (IRNSS) has created its own regional satellite navigation system called NavIC (Navigation with Indian Constellation). NavIC is designed to offer accurate location data for both domestic and regional purposes. The constellation of seven satellites provides dependable positioning services not just within India but also to a substantial area spanning 1500 km outside its borders.

GPS technology can be used to trace recent wars between global countries or state boundaries that involve rivers, mountain ranges, and oceans. Surveyors employ the accuracy of absolute positions to create maps and establish property borders. It is possible to determine the optimal locations for facilities, allocate resources, establish warehouses, and identify suitable sites for multi-modal logistic parks and special economic zones. Telematics is a technology that combines GPS technology with computers and mobile communications networks to provide improved automobile navigation systems. The Wide Area Augmentation System (WAAS) can be utilized to monitor the movement of vessels and containers, providing information on their velocity, speed, direction, and position. This technology will significantly benefit the port and logistics industries. The subject of focus for worldwide governments in recent years is intelligent transportation systems for urban traffic management. The extensive utilization of GPS technology in automobiles presents a tremendous prospect to transform traffic management. Thousands of vehicles are sending real-time data from urban roads, including latitude, longitude, speed, and other pertinent metrics.

The dynamic information can be utilized to facilitate various research and applications in Intelligent Transportation Systems, resulting in improved traffic flow, reduced congestion, and strengthened safety procedures. Satellite-derived data can be used to exchange information between airport planners and managers and their counterparts at other agencies to expediate infrastructure development and urban planning activities in their respective regions. Remote

sensing can be applied to evaluate the impact of landscape patterns, land use types, and increasing urban temperatures on urban thermal environments. It enables the use of commercial satellites for traffic monitoring and detection of moving vehicles. This technology can assist army and police departments in tracking and tracing activities. Incorporate Unmanned Aerial Vehicles (UAVs) into satellite systems for operations that go beyond the visual line of sight (BVLOS), such as covering terrestrial range and providing assistance in areas affected by natural disasters or prone to interruptions. Space Internet is a telecommunications service that utilizes satellites positioned in geostationary orbit, namely at a height of 35,786 kilometers above the Earth's surface.

Unlike the constraints imposed by fiber-optic cables or wireless networks, these satellites in space possess the capacity to surmount obstacles. Developed nations are utilizing space-based internet to acquire airborne laser scanning (ALS) data for the purpose of reconstructing railway overhead lines, hence providing reliable and secure transportation services. The implementation of satellite-based internet is essential for providing connectivity to remote places characterized by difficult topography, such as the Himalayas and isolated regions in the north-east. Additionally, it is also valuable for the purpose of fleet tracking. The use of precision agriculture and point cloud data in geological surveys has resulted in a more dependable internet connection in this domain.

The integration of space technology into logistics and supply chain management offers India a pathway to achieving its vision of Atmanirbhar Bharat. By leveraging advancements in satellite navigation, remote sensing, satellite communication, and space internet, India can increase the efficiency, reliability, and resilience of its logistics networks. Space technology, including satellite communication, GPS and remote sensing, revolutionizes logistics by enhancing real-time tracking, optimizing routes, forecasting the weather to mitigate risks, and improving inventory management. Additionally, space tech enables global communication networks for seamless coordination and facilitates advanced geospatial analysis for supply chain management, enhancing adeptness and reducing costs across industries. As the country continues to make strides in space exploration, these technologies will play a critical role in supporting sustainable economic growth and strengthening India's position in the global supply chain.