

End-to-end and Optimization of Inventory and Supply Chains in Asia

Efforts by the Hitachi Smart Transformation Project

Hitachi is working to lower logistics costs and to reduce inventory levels through shorter lead times by optimizing and enhancing logistics networks based on an overview of the entire supply chain, from procurement and manufacturing to sales. A significant shortening of lead times has been achieved in logistics spanning multiple production and sales centers in Asia by localizing repair services as well as through integrated transportation and shared shipment. More use is being made of local purchasing in procurement logistics, and Hitachi has established operations and practices based on information technology for shortening the cycle of activities in procurement logistics to manage inventory levels based on what is happening in day-to-day production. In the future, Hitachi intends to contribute to expanding the logistics business by utilizing these initiatives to deploy services.

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1. Introduction

Hitachi is continuing to work on its Hitachi Smart Transformation Project for structural reform, which seeks to reduce costs and improve resource efficiency. In China, where Hitachi has a large number of production centers, the rising cost of labor over recent years together with the emergence of countries such as India and those of the Association of Southeast Asian Nations (ASEAN) is making competition more intense, creating a need to further reform and strengthen the logistics sector.

This article describes work on logistics improvement and operational standardization that utilizes Hitachi's operations, especially those in China, and

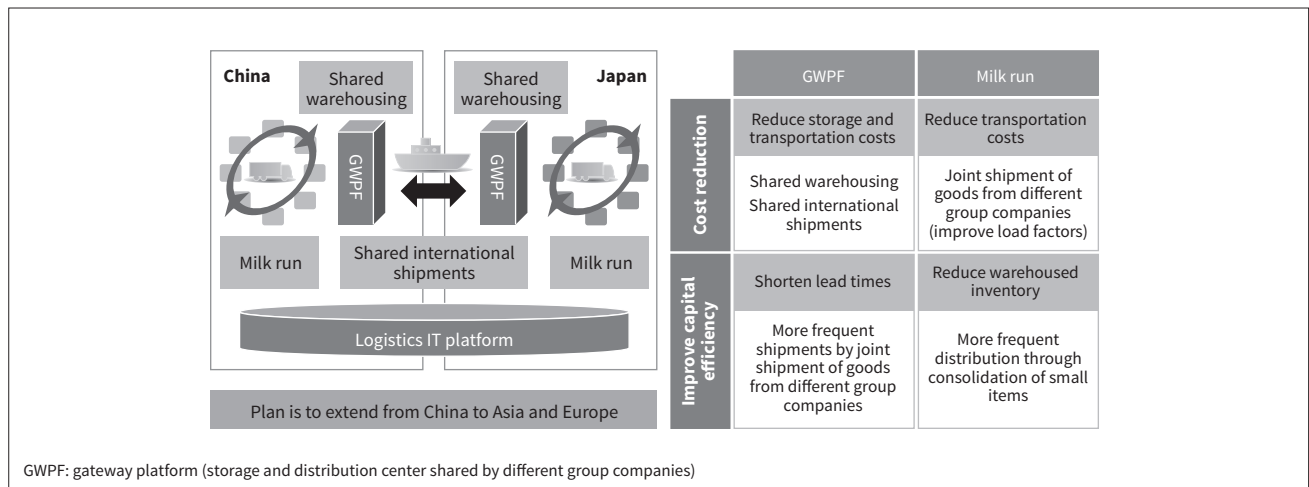
includes cutting logistics costs and reducing and rationalizing inventory levels along the entire supply chain, from procurement and manufacturing to sales, and also describes initiatives aimed at creating a service business.

2. Hitachi's Aims for Logistics Reform in Asia

Hitachi is seeking to build a logistics scheme in Asia through measures that include drawing on group-wide economies of scale to reduce logistics costs by sharing transportation and using a gateway platform (GWPF) that makes shared use of Hitachi sites for storage and distribution, and also by shortening logistics lead times through frequent dispatch and distribution and improving capital efficiency by reducing warehoused inventory (see **Figure 1**).

Figure 1 — Hitachi's Logistics Reforms in Asia

In addition to sharing transportation to reduce logistics costs, Hitachi is establishing a logistics scheme in Asia that uses frequent shipments to shorten logistics lead times and compressing warehoused assets to improve capital efficiency.



In work aimed at making further enhancements in these areas, Hitachi is also seeking to build a value chain that can respond quickly to fluctuations in supply and demand, adopting measures that contribute to shortening lead times in end-to-end (E2E) terms. Specifically, this involves:

- (1) Reducing logistics costs and shortening lead times by reviewing and reconfiguring increasingly complex logistics networks in Asia.
- (2) Shortening supply lead times by localizing some inward goods work and repair and maintenance work through coordination between production and sales.
- (3) Further reducing logistics costs and shortening lead times by keeping track of fluctuations in market demand and manufacturing centers' day-to-day production statuses to dynamically optimize things like freight volumes and distribution routes.
- (4) Establishing operational platforms to sustain ongoing logistics improvement.

The following sections describe that latest activities in terms of these areas.

3. Implementation and Enhancement of Logistics Reforms through Coordination between Sites in Different Parts of the World

To expand its business and improve profitability in Asia, a major market for automated teller machines (ATMs), Hitachi-Omron Terminal Solutions, Corp. is taking steps to strengthen its overseas production centers.

3.1

Promoting Logistics Reforms Based on Production Center Strategy, and Associated Challenges

To strengthen its overseas production centers, Hitachi-Omron Terminal Solutions has successfully implemented the following logistics reforms (see **Figure 2**).

(1) Integration of transportation in Asia

In association with changes in distribution channels, the company reduced costs and improved quality by integrating the operations of the logistics network from production in China to the sales company warehouse.

(2) Optimization of logistics based on factors such as the tax systems in each country

The company optimized logistics routes (including production logistics) and dramatically reduced logistics costs by taking account of local factors, such as the tax system in India.

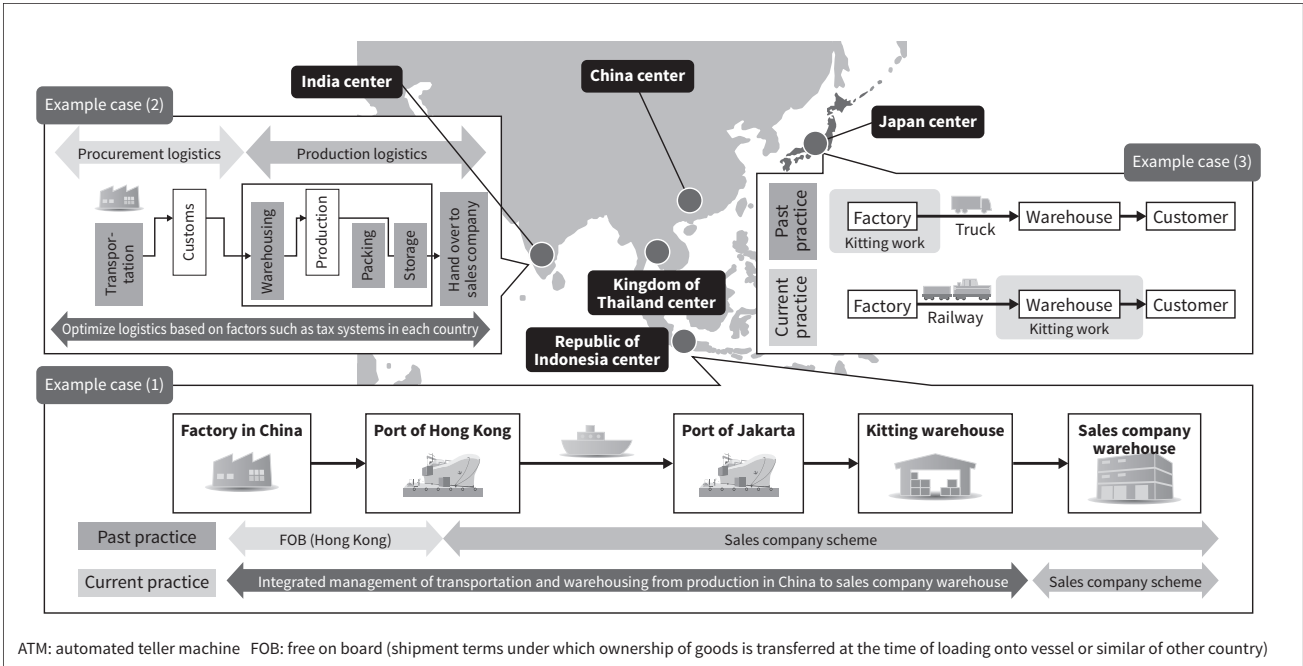
(3) Utilization of modal shifts and prioritization of railway transportation

By reducing transportation costs and cutting carbon dioxide (CO₂) emissions, the company helped reduce the load on the environment.

Meanwhile, with the increasing number of ATMs in use in the ASEAN region, the time taken for the roundtrip from sales company to manufacturing center and back again to have repairs done had become a problem, creating a need to coordinate production and sales activities in order to optimize the routing of products under repair on an Asia-wide basis.

Figure 2 — Example Case Promoting Logistics Reforms in Asia

Along with establishing centers in response to local demand, Hitachi's ATM business outside Japan is also pursuing reforms that include: (1) Integration of transportation in Asia, (2) Optimization of logistics based on factors such as the tax systems in each country, (3) Utilization of modal shifts and prioritization of railway transportation.



3.2 Promoting Optimization of Repair Operations in Asia

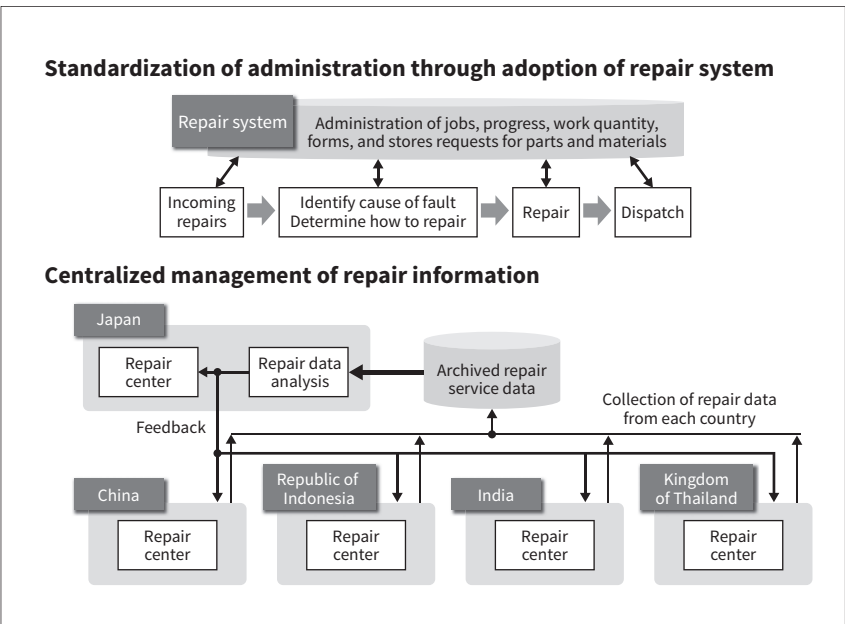
To shorten the time taken to repair parts that require maintenance, it is essential that the repair work be undertaken close to where those parts are used. To achieve this, Hitachi revised its Asia-wide strategy for repair centers and adopted a policy of handling

repair locally by establishing in-market repair centers, particularly in the ASEAN region.

As part of handling repair locally, Hitachi implemented the following measures with a view toward standardizing work practices, ensuring quality, and improving productivity. In addition, to establish a management system with a Japanese plant serving as a “mother” repair center, Hitachi adopted a repair

Figure 3 — Adoption of Repair System to Standardize Administration and Centralize Management of Repair Information

For the maintenance operations of its overseas ATM business, Hitachi is adopting locally based repairs and a common new repair service.



system (made by Hitachi Terminal Mechatronics, Corp.) and constructed a system for standardizing administration and centralizing the management of information (see **Figure 3**).

- (1) Provide repair equipment and tools for fault diagnosis and testing
- (2) Provide repair-related documents (redesigned for English and visual presentation)
- (3) Adopt a repair system for standardizing work practices and centralized management of repair information.
- (4) Train repair technicians

3.3

Benefits and Future Efforts

The localization of repair work commenced with the establishment of repair centers in the Republic of Indonesia and the Kingdom of Thailand in FY2016, and their use to handle repairs in the respective countries. This significantly shortened shipping lead times, especially those involving import and export, shortening the lead time for repairs by about half compared to having the work done in Japan.

In addition to reforms such as expanding the range of parts that can be repaired and consolidating repair work from nearby countries at overseas repair centers,

possibilities to be considered in the future include shortening the lead times for component procurement and compressing and rationalizing parts inventory through coordination of manufacturing and sales in Asia.

4. Deployment and Enhancement of Procurement Logistics in Asia

Hitachi has been operating a procurement logistics service business for Chinese manufacturers since 2015 that puts know-how from the Hitachi Smart Transformation Project into practice⁽¹⁾. This section describes examples of how this service is being deployed and enhanced.

4.1

Background of Past Activities

Driven by rising labor costs, TOTO (SHANGHAI) CO., LTD. (hereinafter “TOTO Shanghai”) has made ongoing improvements at its production sites aimed at reducing labor requirements and improving work quality (see **Figure 4**).

Along with constructing an automation system for the conveyance of parts in 2015 to obtain real-time information on work progress, part lots, and

Figure 4 — Procurement Logistics Efforts at TOTO Shanghai

Advanced operations that can respond quickly to changes in production were achieved by connecting information end-to-end.

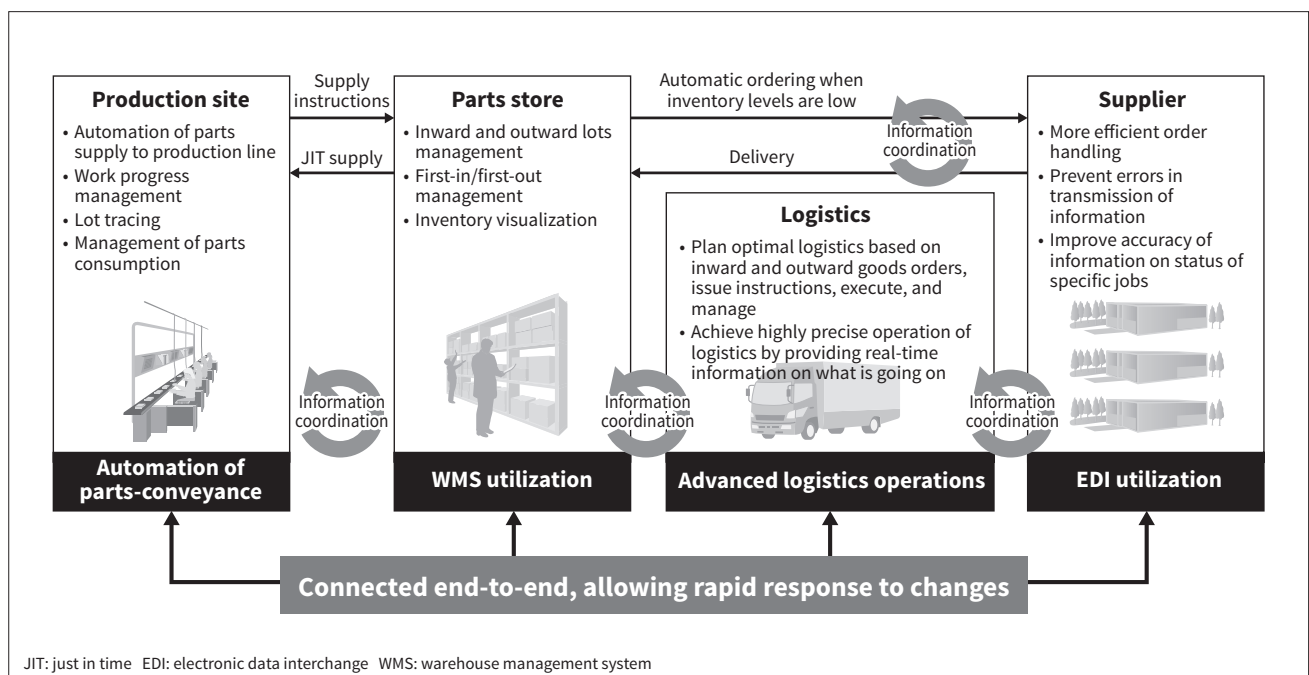
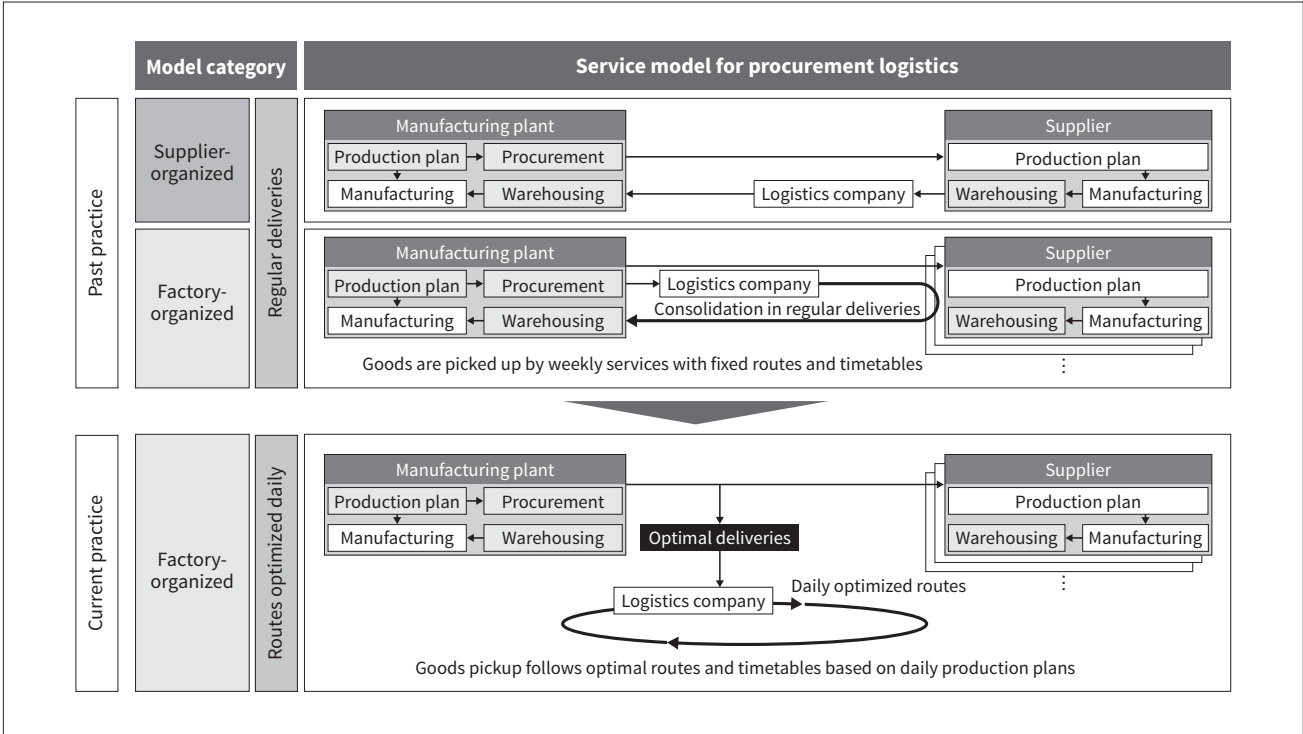


Figure 5 — Enhancement of Procurement Logistics

Progress is being made on further rationalizing inventory held at the factory by reorganizing the regular factory-organized milk runs used in the past to shorten the cycle times for procurement and pickup to the level of day-to-day operations.



the consumption of parts on the production line, the company also adopted just-in-time (JIT) delivery in which synchronized ordering for deliveries from the parts store to the production line were coordinated with the warehouse management system (WMS). The WMS was also equipped with capabilities for lot management of inward and outward goods, first-in/first-out management, and inventory visualization, and also for issuing orders to suppliers automatically when inventory levels in the parts store are low. These orders are issued using electronic data interchange (EDI) via TWX-21^{*1}, and the efficiency of inward goods processing at TOTO Shanghai has been boosted by having suppliers attach a delivery docket containing a QR code^{*2} specified by the company in the EDI data.

4. 2

Challenges and Measures for Dealing with Them

Limited warehousing space posed a problem for TOTO Shanghai when it experienced rapid growth in demand from the Chinese market. In response, Hitachi implemented improvements in procurement

and logistics after first conducting an analysis of the existing logistics with the aim of reducing the warehouse area, identifying sleeping stock, and using the amount of space taken up by each item to determine which ones were causing problems.

Warehousing space was also under pressure due to instances in which, once parts had been manufactured, more than the required number were being delivered from the domestic Chinese supplier. At the instigation of TOTO Shanghai, a practice of operating procurement logistics “milk runs” was adopted for locally sourced items to deal with this.

The factory-organized milk runs previously operated as regular services with fixed routes and timetables for traveling around to suppliers to pick up goods. To reduce and rationalize its parts inventory, TOTO Shanghai adopted information technology (IT)-based practices and operational enhancements to shorten the cycle of its JIT inward goods handling to a day-to-day operations level, only delivering the required quantity of parts needed for daily production (see Figure 5).

Specifically, practices were put in place for formulating an optimal truck dispatch plan for the following

^{*1} An Internet-based business application service supplied globally by Hitachi.
^{*2} QR code is a registered trademark of Denso Wave Incorporated.

day by calculating the number and type of trucks required based on information on orders issued to suppliers and delivery instructions collected by TWX-21, taking account also of supplier location, goods quantity, pickup time, and delivery time, and also for outputting the forms required for procurement logistics. Quality improvements were also made in the operations of the logistics company by fitting its delivery trucks with global positioning system (GPS) receivers to track their progress and handle any divergence from the truck dispatch plan. Future plans include analyzing collected data so that it can be used to determine suitable delivery routes that account for congestion.

Through this use of IT, TOTO Shanghai has, without adding any additional work, succeeded in keeping to a minimum the cost of operating sophisticated procurement logistics in which cycle times have been shortened to the level of day-to-day operations. While these practices are currently used with 24 suppliers, the intention is to contribute to reducing and rationalizing the parts inventory by expanding the scope of operation to include more suppliers in the future.

4.3

Future Developments

Hitachi intends to build on the efforts described above by expanding business process outsourcing (BPO) services that use information on delivery instructions as a basis for improving the efficiency of procurement logistics (see **Figure 6**).

Hitachi is aware of instances in the procurement operations of manufacturers where tasks such as negotiating with suppliers and coordinating delivery times to keep up with demand that fluctuates from day to day have gotten in the way of their core sourcing work, such as identifying new suppliers.

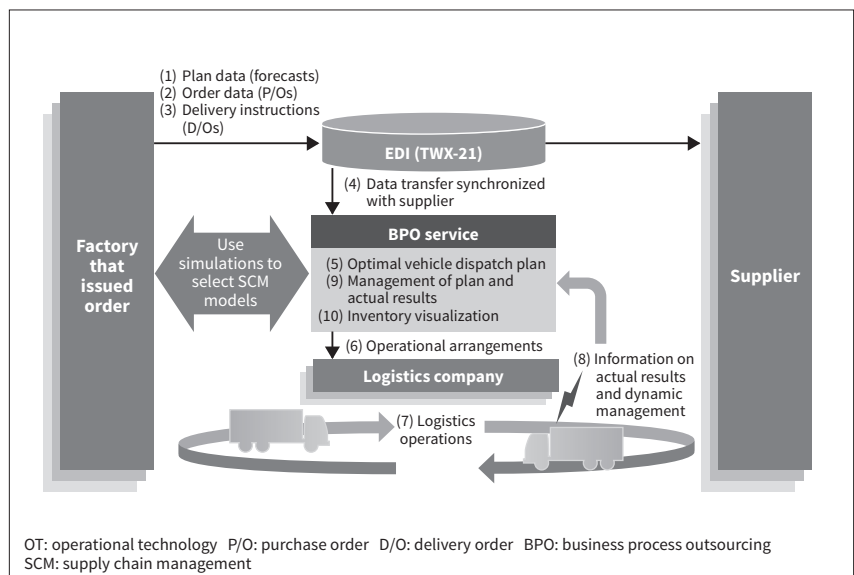
Accordingly, it is Hitachi's belief that providing BPO services for logistics that also cover operations, consolidating information on delivery instructions for inward goods from individual manufacturing companies to perform overall optimization of daily vehicle dispatch plans, will allow those companies to focus on their core activities. By using BPO to consolidate and efficiently execute the procurement operations of manufacturing companies that are essential for advanced operations in which cycle times have been shortened to the level of day-to-day operations, Hitachi also believes that it can supply new value in ways that manufacturers have not been able to achieve by acting on their own in the past, including by reducing inventory, cutting logistics costs, and improving logistics quality.

5. Conclusions

This article has described Hitachi's work, particularly in China, on reconfiguring and optimizing logistics networks that takes an overview of all aspects of these networks in Asia from an E2E perspective, and also

Figure 6 — Overview of Procurement Logistics BPO Service

The service provides support for everything from the use of simulations to estimate operational efficiency to actual operations. The service uses an IT × OT platform to provide a high level of daily procurement operations.



its work on using IT to establish practices for operating the networks at a high level and with short cycle times. The purpose of these activities is to cut logistics costs and reduce and rationalize inventory across the entire supply chain from procurement and manufacturing to sales.

In the future, Hitachi intends to go more deeply into this work and contribute to the expansion of the logistics business in Asia by establishing and enhancing it as a common platform for IT and operational technology at Hitachi, and by using the platform to operate services.

Reference

- 1) K. Terauchi et al., "Use of Smarter Distribution for Global Logistics Service—High Added Value Service Achieved through Integration of Procurement, Logistics, and Information—," Hitachi Review, 64, pp. 280–285 (Jun. 2015).

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