

Hitachi Digital Solution for Logistics: Enhancing Logistics in the New Normal to Improve Distribution Efficiency and Support Safe Operation

The arrival of the new normal is bringing changes in how people live, with an increasing number of consumers using e-commerce and other Internet services. This is being accompanied by a surge in the expectations being placed on logistics businesses to provide high-frequency, small-size, and short-lead-time deliveries, meaning that the labor market for drivers, warehouse workers, and other staff continues to be tight and there is an urgent need for countermeasures. In its pursuit of agile logistics, Hitachi is seeking ways of utilizing digital technology to overcome the challenges facing the logistics industry. This article presents examples of what is being done in relation to the Hitachi Digital Solution for Logistics, a suite of services for improving the distribution of goods.

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1. Introduction

Advances in electronic commerce (e-commerce) over recent years have led to ongoing increases in the volume of packages handled by logistics businesses. The new normal brought about by the pandemic is also driving changes in how people live, with an increasing number of consumers using e-commerce and other Internet services such as home delivery and online supermarkets.

To service the demand from *sugomori* consumers (literally “chicks in the nest,” meaning consumers who prefer to stay at home), retail and distribution companies in Japan are being required not only to deal with new suppliers and delivery routes as supply chains are impacted by the shift toward e-commerce and other digital practices, they are also being called on to reform how those supply chains are structured. At manufacturing companies, meanwhile, falling production has reduced the volume of industrial goods

being carried over medium distances and this has resulted in an excess of delivery trucks. For some products, on the other hand, there have been cases where higher delivery volumes caused by sudden fluctuations in demand have resulted in a shortage of trucks, risking delays and longer lead times.

While all this has been going on, a shortage of delivery drivers, warehouse workers, and other staff due to the decrease in the working population has made it difficult for logistics businesses to maintain the distribution infrastructure in the face of expectations for high-frequency, small-size, and short-lead-time deliveries. Moreover, the emergence of new patterns of behavior in the new normal, with its emphasis on physical distancing and avoiding close contact, has also created a need for automated operation with fewer staff that does not rely on intermediation by people.

Meanwhile, existing delivery networks, with their fixed routes and routine schedules, find it difficult to keep up with fluctuating workloads and this is creating a need for networks that can cope with changes in supply and demand. This is prompting companies to seek changes that improve

competitiveness and maintain business continuity, with logistics businesses having an urgent need to adopt “agile logistics” that can cope easily and freely with fluctuating supply and demand. To put it another way, the logistics industry is entering a period of change as it moves away from the analog practices of the past and toward a digital future.

As an example of Hitachi’s work on the operational improvements that make agile logistics possible, this article gives details of how its Hitachi Digital Solution for Logistics has been used in practice as well as what Hitachi hopes to do with this solution for enhancing delivery planning and operations in the future.

2. Vision for Agile Logistics

2.1 Adapting Delivery Operations to the New Normal

The use of analog practices remains widespread in the logistics industry. In the case of goods delivery, for example, it is not uncommon for logistics businesses to communicate with their customers by fax or telephone. Likewise, things like delivery instructions or the inspection and processing of inward goods are still frequently handled using paper forms.

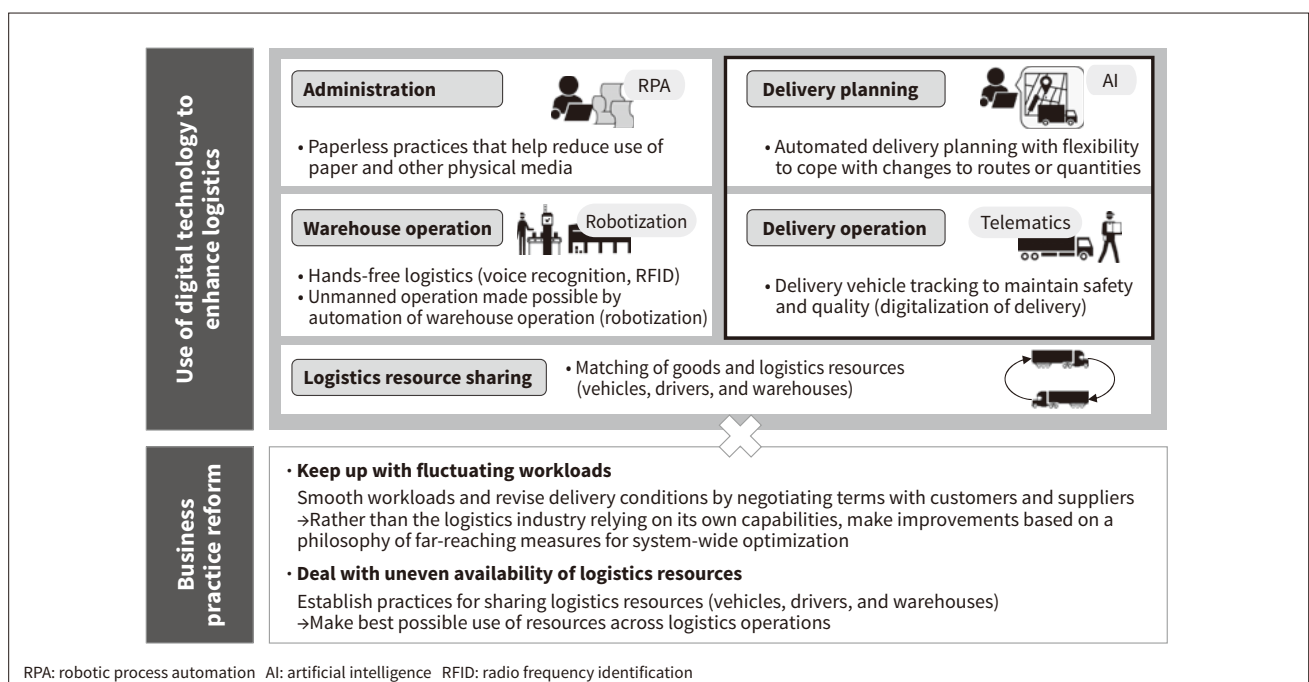
Being heavily dependent on the people involved, the work places high operational demands on staff and this in turn poses an obstacle to efficiency improvement. While there has long been a need to improve logistics performance

by making a rapid transition to digital practices, the current imbalance in supply and demand means that delivery operators already have their hands full just getting through their daily work. As a result, progress on digitalization has been slow. In the coming era of the new normal, however, how to make efficient use of limited resources (vehicles, drivers, and warehouses) while adapting to fluctuating workloads will be key factors for maintaining business viability. Unfortunately, these are not challenges that can be overcome simply through the use of digital technology for delivery planning and operational improvement. To cope with fluctuations in delivery demand, for example, there is a need to smooth workloads and revise delivery conditions by negotiating terms with customers and suppliers. There is also scope for logistics businesses to expand their delivery networks and make the most of finite resources by transferring packages between one another. However, because logistics businesses cannot pursue activities like these solely through their own capabilities, it is important that this be an industry-wide effort that encompasses other participants, such as the companies that are the sources or destinations of goods.

Along with resolving these issues as part of its work on using digital technology to enhance logistics, Hitachi is also taking steps to realize agile logistics by helping to revise the business practices of customers coping with fluctuating workloads or seeking to make the most of finite resources (see **Figure 1**).

Figure 1 — Future Vision for Logistics

The use of digital technology to enhance logistics will allow the industry to adapt to a changing environment. Achieving this, however, will require changes to business practice. This article focuses on those functions in the diagram that are highlighted by the dark line.



Hitachi's Approach to Enhancing Delivery Operations

For the enhancement of delivery operations, Hitachi supplies solutions for both the planning and execution phases. In the former case, Hitachi supplies a delivery optimization service that enables efficient planning and can adapt flexibly to changes in quantities or routes. Similarly, a service for safety, operations, and fleet management is also available for keeping track of delivery operations in the execution phase. The service collects and manages data to maintain operational safety and quality, using Internet of Things (IoT) devices that are installed in vehicles and other equipment. Along with automating operations and enhancing safety through the digitalization of delivery, these solutions also seek to improve customer satisfaction through the digital integration of supply chains.

The following section uses practical examples to describe the challenges these solutions are intended to resolve and the ways in which they will go about this.

3. Digital Technology to Enhance Delivery Operations

In the Hitachi Digital Solution for Logistics, Hitachi has brought together a suite of services for enhancing logistics that support supply chain optimization through the collection, archiving, and analysis of data from customers' logistics

operations. The following services are currently available.

(1) Service for safety, operations, and fleet management

This service enables better and more efficient operations by sharing the operational expertise of experienced staff and providing transparency as to what is happening in the workplace based on an understanding of operational characteristics.

(2) Delivery optimization service

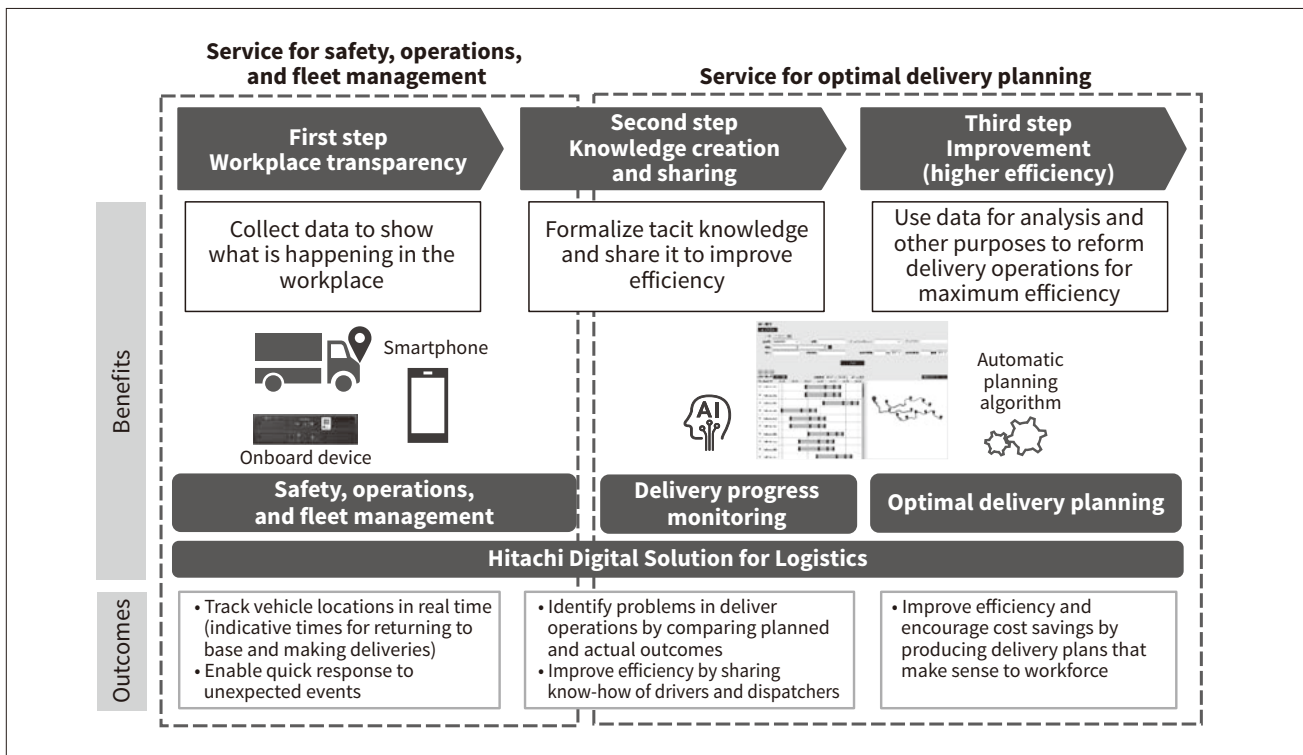
This service enables delivery vehicle automation and greater efficiency by taking over the work of experienced staff to generate efficient delivery plans automatically.

Figure 2 shows three important steps toward improving delivery operations.

The first is to collect data showing what is actually happening in the workplace. This helps to improve service quality by providing real-time tracking, enabling a prompt response to unanticipated events and indicative times as to when vehicles will return to base or make deliveries. The second is to share the know-how of drivers and dispatchers by understanding the operational expertise of experienced staff and the characteristics of the operation. The aim is to improve efficiency by comparing planned and actual outcomes to identify problems in delivery operations. Finally, the third step is to improve efficiency and cut costs by utilizing this accumulated and analyzed data to automatically generate the most efficient possible delivery plans.

Figure 2 — Steps for Enhancing Delivery Operations

The diagram shows the steps to be taken to improve delivery operations using the services for safety, operations, and fleet management and for optimal delivery planning.



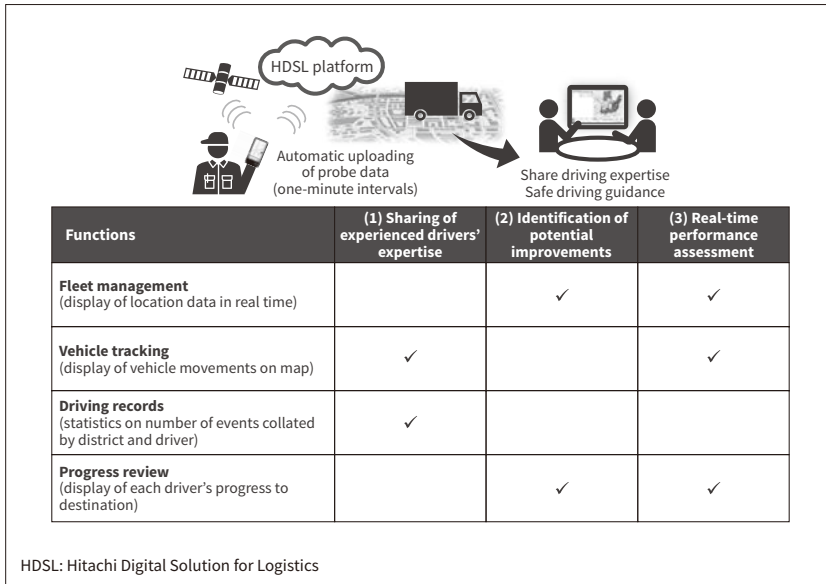


Figure 3—Relationship between Functions and Benefits of Service for Safety, Operations, and Fleet Management

This service is made up of fleet management, vehicle tracking, driving records, and progress review functions. These functions enable the sharing of experienced drivers' expertise, identification of potential improvements, and real-time performance assessment.

3.1

Example Uses of Service for Safety, Operations, and Fleet Management

This service optimizes operations and makes them more efficient by showing what is actually happening in the workplace (see **Figure 3**). For example, giving access to the expertise of experienced staff means that this know-how can be shared by new drivers or support drivers. Similarly, the collection of data provides information about actual driving performance and this can facilitate the provision of more appropriate guidance on safe driving practices by comparing it to that of other staff or to the same driver's historical performance. Furthermore, the use of tracking enables information to be collated in real-time so that the next person in the supply chain can be made aware of what is going on, thereby shortening driver waiting times and preventing delays.

One customer achieved a 30% reduction in accidents

after adopting the service and, by collecting large amounts of data on what was happening across the country, was able to use this as the basis for planning. The maintenance of trust and faith that results from the company going about its business appropriately and without accidents has also helped to maintain corporate value. Whereas in the past there was no way of knowing the movements of drivers after they left the depot, being able to share this information not only adds rigor to guidance on safe driving practices, it also means that work is conducted with a certain level of quality regardless of which driver is involved.

3.2

Hitachi's Approach to Enhancing Delivery Operations

The delivery optimization service helps to automate delivery vehicles and get away from work that relies on specific individuals (see **Figure 4**). The service can also help to improve

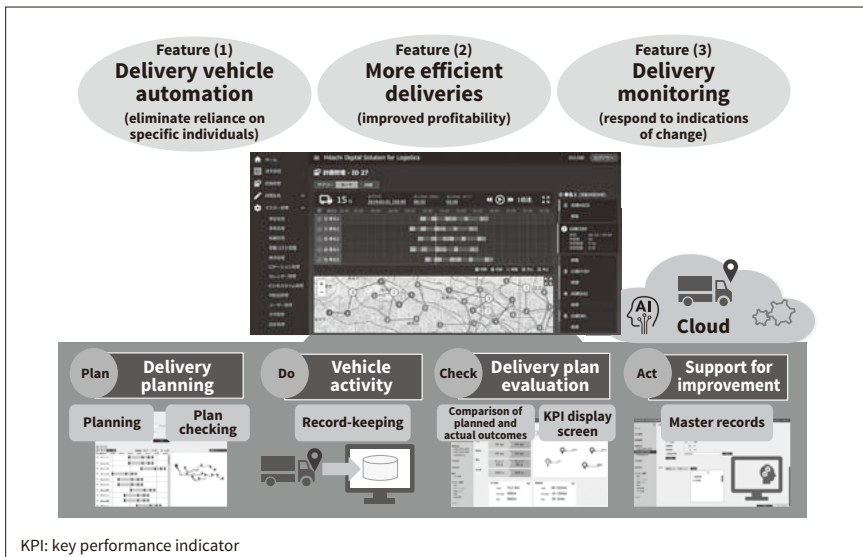


Figure 4—Relationship between Functions and Benefits of Delivery Optimization Service

This service is made up of delivery planning, vehicle activity (record-keeping), delivery plan evaluation, and improvement support functions. These functions enable delivery vehicle automation, more efficient deliveries, and delivery monitoring.

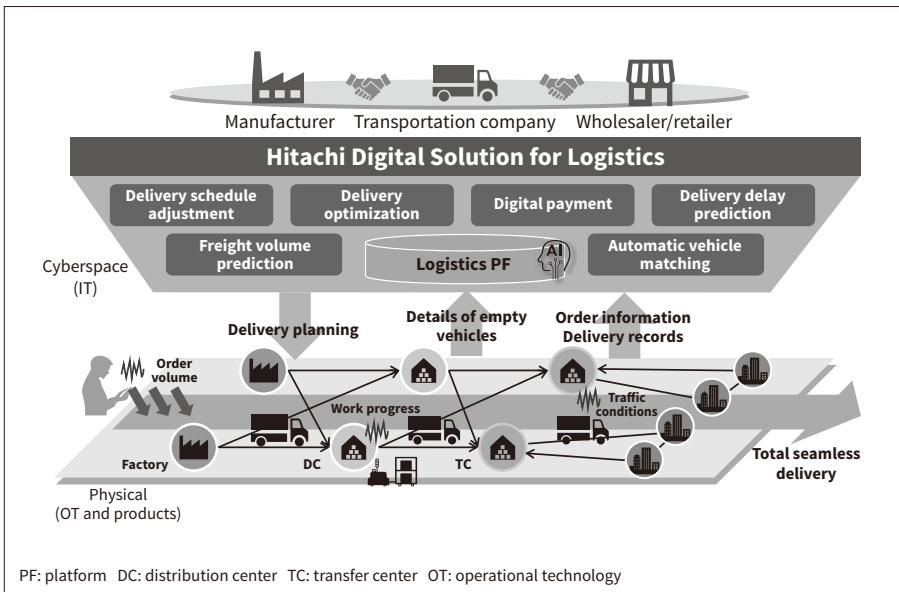


Figure 5 — Overview of Total Seamless Solution Provided by Hitachi Digital Solution for Logistics

The solution provides for the collection of physical data along with analysis and planning in cyberspace. It coordinates warehouse and delivery operations to provide seamless and efficient support for activities on the supply chain.

delivery efficiency and boost profitability by finding good uses for return trips where vehicles currently travel empty, thereby reducing wasted capacity. It can also be used to formulate realistic plans by collecting operational data and comparing planned versus actual outcomes, enabling agile delivery planning that is flexible and responsive.

One customer succeeded in (1) reducing the time taken to produce delivery plans, (2) reducing its truck fleet by up to 10% by increasing capacity utilization, and (3) improving delivery efficiency and cutting its spending on highway tolls through route optimization. They were also able to use the service to improve efficiency across their entire supply chain by sharing with customers the impacts of changes on delivery in terms that loosened delivery time criteria.

4. Conclusions

Through the collection, archiving, and analysis of data, the Hitachi Digital Solution for Logistics offers ways of overcoming the many logistics challenges confronting customers in manufacturing and retailing as well as in the distribution industry. As data from logistics operations is not currently linked together along the supply chain, efforts to improve efficiency run up against a variety of issues. One example is the need for joint control of warehouse and delivery operations, such as by coordinating the loading of goods into delivery trucks with the operation of automated guided vehicles (AGVs) and automated guided forklifts (AGFs) so that they can get started on bringing goods to the dispatch berth while the truck is still approaching the distribution center.

In the future, Hitachi intends to continue its research and development of total seamless solutions that improve efficiency across entire supply chains by seamlessly bridging

the “boundaries” between different activities (see **Figure 5**). Along with its work on drawing in information from operations and putting it to use to optimize planning in pursuit of ideal plans that are both reasonable and free of waste, Hitachi also intends to fill out its portfolio of solutions that help customers expand their businesses in order to enable more agile logistics.

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