

Hitachi Review

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HITACHI
Inspire the Next

IT Services Supporting Global Operations of Social Innovation Business



From the Editor

Hitachi Innovation Forum 2014 Singapore was held in November 2014. While past forums have been held in Japan, this was the first such event to be staged outside of Japan. The number of employees at Hitachi totaled approximately 320,000 as of the end of March 2014, of which roughly 40% were overseas staff. Similarly, approximately 45% of Hitachi sales for FY2013 were from outside of Japan. This shows the steady expansion of Hitachi's business into global markets.

Meanwhile, along with sales of software and other products, there is also growing market demand for the supply of business process services, including operating products on the customer's behalf. Also, information technology (IT) plays a very important role when working with customers to create value jointly from the business planning stage.

This issue of *Hitachi Review* presents examples of the work being undertaken by the information and telecommunications divisions at Hitachi with respect to the terms "global" and "service." This issue's Expert Insights carries an article about the emergence of the service economy, contributed by Professor Yuriko Sawatani of the Center for Research Strategy at Waseda University who specializes in service innovation research. In Technotalk, Kumi Yokoe, a former Senior Visiting Fellow at the Heritage Foundation, where she became an expert on politics and IT, and Setsuo Shibahara, Executive Director and COO, Systems & Services Business at the Information & Telecommunication Systems Company, discuss global services in terms of the significance of, and practical pointers to be gained from, recent examples in the field.

Elsewhere, there are articles that describe the new challenges being taken on by Hitachi in various different parts of the world, from Europe and America to Asia, including initiatives that utilize Hitachi's strength in "operational technology (OT) × IT" in global services and initiatives associated with companies based in specific markets that have been acquired by Hitachi, with a particular emphasis on examples that involve proof of concept (PoC) projects that extend beyond the research stage into practical applications, or that utilize these in the market in the form of services.

One of the key pillars of Hitachi's 2015 Mid-term Management Plan is to achieve innovation through the global operations of its Social Innovation Business and by strengthening its service businesses. In addition to explaining the activities of Hitachi, I hope that this issue of *Hitachi Review* will also lead to the services offered by Hitachi proving to be helpful in the global expansion of your own businesses.

Editorial Coordinator,
IT Services Supporting Global Operations of
Social Innovation Business Issue



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IT Services Supporting Global Operations of Social Innovation Business

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IT Services Supporting Global Operations of Social Innovation Business



Service innovation achieved through the use of information is the key to the future progress of Hitachi's Social Innovation Business, which supplies social infrastructure enhanced by IT throughout the world. Hitachi is confronting the management challenges faced by customers, and accelerating the global deployment of IT services by expanding its upstream business consulting, fee-based services for business operations, and other products that help overcome these challenges. Through its business operations in various regions around the world, Hitachi is supplying new value, creating customer value, and contributing to the resolution of societal issues.



Management consulting for overcoming management challenges (image)



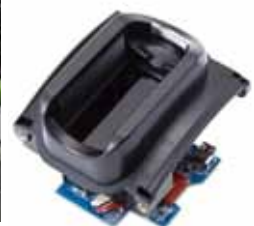
Big data analytics and global service platform business (image)



Finger vein authentication device for Internet banking



Self-service banking system with finger vein authentication





ATM installations supplied by Hitachi Payment Services' ATM service in India



ATM and other automatic systems for global markets



Global logistics service combining procurement, logistics, and information (image)



Cloud service and cost management solution for global manufacturing (image)

Expert Insights

Social Innovation: Pushing the Boundaries for New Value Creation



Yuriko Sawatani, Ph.D.

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Appointed to her current position in April 2013. Part-time lecturer at Tokyo Institute of Technology, The University of Tokyo, Chuo University, and other institutions. Other positions include being a member of the Board of Directors of the Society for Serviceology and The Japan Society for Science Policy and Research Management, and secretary of PICMET Japan.

Her research interests are in R&D management, technology management, service science, and service design.

Economies are becoming increasingly service-based. A situation has arisen in which even traditional manufacturing businesses are being forced to change their business models. The Innovate America report (known colloquially as the Palmisano report) submitted to the Bush administration by the Council on Competitiveness in December 2004 proposed that overcoming this problem would require the establishment of a “service science” through the fusion of different fields. In the same year, S. Vargo and others put forward the idea of “service-dominant logic,” defining a service as transcending the boundaries between industries to achieve the “co-creation of value by customers and providers.” These activities currently involve the world’s researchers and corporate personnel, and are being undertaken with the aim of building a base of knowledge and fostering human resources to support service innovation. The mission of the Social Innovation Business is to establish and commercialize new service systems: service innovation, in other words. Research and development has provided the driving force behind innovation in manufacturing in the past, and it is anticipated that it will also contribute to service innovation. The following points relate to the creation and commercialization of service systems, and the ongoing generation of service innovations.

The first point is “reframing” (Richard Normann, *Reframing Business*, 2008) and relates to the creation of service systems. Reframing, meaning to go beyond boundaries, is essential to the creation of new service systems. Brian Arthur (in *The Nature of Technology*, 2011) defined technology as a system for achieving a goal, including such intangibles as organizations, actions, and logic. Peter Thiel (in *Zero to One*, 2014) pointed out that new or better ways of dealing with things are also technologies. When the concept of technology is expanded to include things like service system design techniques, organization, and pricing strategies, it also expands the scope of subjects for research and development.

The second point relates to the commercialization of new service systems. Achieving this sometimes requires a redesign of the interior and exterior of the organization or changes to its mission. The question goes beyond just devising a new service system, also encompassing how to deal flexibly with creating the organization for its delivery.

Finally, how to manage serendipity is a key to the ongoing generation of service innovations. Encouraging loose coupling, which has attracted interest as a mechanism for value propagation, has the potential to link diverse organizations together and increase the search effects of knowledge. To create the products and services that users genuinely want, multinational corporations that take on challenges with global scale need a forum for the co-creation of value involving open innovation and diverse stakeholders.

For international businesses that operate on a global scale and seek to transform entire societies into systems, the fundamental consideration is that the starting points are human-centric and relationships between people. What is needed from those involved in research and development and other areas of business is to drive social innovation by engaging with a wide range of people and building a future that transcends the boundaries of the past.

Technotalk

Global IT Service Creating New Value from Locally-based Perspective

Kumi Yokoe, Ph.D.
Setsuo Shibahara

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Alongside many other companies that are expanding their operations overseas, Hitachi has embarked on the global rollout of a new IT service business. Rather than simply supplying products as it has in the past, Hitachi's aim for this business is to contribute to society through its activities on a global scale by also combining a high level of technical capabilities in information and telecommunications, and supplying added value throughout the value chain (including B to B to C). The essential requirements for achieving this include having locally-based operations and recruiting and training personnel who are familiar with the culture and practices of their particular regions. Through the rollout of this global IT service, Hitachi intends to propel its Social Innovation Business forward while also creating new value and helping expand customer businesses.

What is the Global IT Service?

Yokoe: The words “global,” “information technology (IT),” and “service” are all in common use, but put them all together and the result is an unfamiliar term. What sort of thing is this global IT service being introduced by Hitachi?

Shibahara: Hitachi has been in business for more than 100 years and, ever since its formation, has defined its mission as being to “contribute to society through the development of superior, original technology and products.” Based on this background, our Information & Telecommunication Systems Company aims to develop its business around a core of IT, treating “global” and “services” as its two indicators.

Here, “global” means operating our business on a worldwide scale, including Japan. “Service,” meanwhile, means supplying added value throughout the value chain, including “business to business to consumer” (B to B to C), rather than simply producing products and supplying them to customers. For example, Hitachi Payment Services Pvt. Ltd., a provider of payment services to financial institutions in India and acquired by Hitachi in 2014, has increased its income from service fees by handling on the customer’s behalf tasks extending from selecting where to site automated teller machines (ATMs) through to their maintenance and management. In this way, rather than merely producing and installing ATM systems, our aim is to create a higher level of added value by providing a total service that extends from cash handling to machine operation and

maintenance, and even encompasses services that our customers supply to end users.

Yokoe: I see. That involves a very broad scope of activities. Rather than just supplying products, it means contributing to society by sowing the seeds of new businesses tied together by IT.

Shibahara: However, when undertaking a venture like this globally, you need to keep in mind that it will be a very long-term exercise. In the case of activities that play a fundamental role in the society of a country or region, one example being the contract for a high-speed railway project that Hitachi won in the UK, the entire process, starting from negotiations with government agencies and culminating in achieving a relationship of trust with customers and acceptance by the public, can take more than a decade.

While the proportion of overseas sales at our Information & Telecommunication Systems Business is currently around 30%, we plan to increase this to 35% in FY2015. With Japan’s population set to fall in the future, I believe the global rollout of our IT service business is essential to the ongoing growth of our business.

Yokoe: Global IT service means the worldwide supply of products and services as a set. Is the supply of services on their own also a viable option?

Shibahara: Both approaches are possible. Whereas the desire to help society with products we made ourselves to reduce dependence on imports is believed to have been a powerful motivating factor when Hitachi was first established, however we are no longer concerned so much about whether we make the products ourselves

as long as we can still provide added-value services. In the case of the IT that ties products and services together, however, Hitachi's own technology is crucial. Furthermore, the people who operate and maintain services are not necessarily Hitachi staff, and the types of services required vary between countries and regions. Accordingly, rather than consisting of Hitachi on its own, the service organizations that undertake this work operate in collaboration with customers and vendors.

Yokoe: Hitachi has a well-established image as a manufacturing company. Within Hitachi, do services make up a growing proportion of your business?

Shibahara: Yes. That said, however, the proportion is still too low. The company-wide target is 40% of sales, and the target for the Information & Telecommunication Systems Business is 65% or more. Even for large IT vendors, we have reached a situation where it is impossible for a business that consists solely of selling products such as storage or computers to survive against intense international competition. In the case of storage, for example, there is a need to provide services that extend to managing data for customers. Doing so enables customers to focus on their primary business. We now live in an era that demands global IT services.

Hitachi's Strengths in Achieving "Products × IT × OT"

Yokoe: While the global IT business has a strong element of contributing to society, I am sure there are also difficulties that come from being a global business. This is because, overseas, it is difficult to become a participant in markets unless you have particular strengths to offer. In this respect, where do Hitachi's strengths lie?

Shibahara: Hitachi supplies many of the products required for the construction of social infrastructure, from

railway systems to electric power generation equipment, water treatment plants, and industrial machinery. A major strength of Hitachi is our ability to supply high-added-value services that fuse these products with IT and operation technology (OT). However, one of the difficulties in achieving this is the need to identify what is required to overcome challenges, while having a front-line presence and maintaining communication with customers in various different countries and regions.

Yokoe: In this sense, a strength of the Information & Telecommunication Systems Company is that you bring a fusion of products, OT, and other elements. That is, you have a particular skill for fusion businesses.

Shibahara: The Information & Telecommunication Systems Company has experience working on system development in close communication with customers through our work utilizing IT for things like boosting productivity, collecting and disseminating information, and managing customers, especially system integration, and I believe that we can take advantage of this experience in our global IT services. In the field of social infrastructure, where Hitachi's strengths lie, I believe our experience can prove extremely valuable, both in emerging economies where the prospect is for the installation of new infrastructure, and in countries such as those of North America where infrastructure is coming due for replacement.

Targeting Win-Win-Win Business

Yokoe: In other words, for a global IT service business that places a priority on communication with the local market, the key to success lies in how well you talk openly with local people and determine their needs. What specific actions are you taking?

Shibahara: One medium- to long-term initiative we are currently launching is the use of big data to supply



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Joined Hitachi, Ltd. in 1982. Appointments have included General Manager of Public Solutions, Government Public Corporation Information Systems Division in 2003, General Manager of Government Public Corporation Information Systems Division in 2007, EVP, Hitachi Information & Telecommunication Systems Global Holding Corporation in 2010, and General Manager of Smart Information Systems Division, Information & Telecommunication Systems Company in 2012 prior to taking up his current position in April 2014.

services for telecommunications, transportation, environmental, and other fields through collaboration between our research and development divisions and subsidiaries such as Hitachi Consulting Corporation and Hitachi Data Systems Corporation. A specific example is a service program we are embarking on with the UK National Health Service (NHS) in the Manchester region for arresting the progression of diabetes in patients with this condition. This project began with our presenting the customer with scenarios that included a vision of what form hospitals and healthcare should take. It is not possible to develop scenarios like this when the idea is simply to supply products that match the customer's requirements.

Yokoe: This seems a perfect example of a win-win-win business that delivers benefits to Hitachi, to Japan, and to the country or region to which it is supplied.

Shibahara: As you say, with regard to its global IT service, the ideal model that Hitachi is aiming for is one that treats being of benefit to society as a prerequisite, with value being derived by providing benefits and this value then being shared among everyone.

Yokoe: However, in the case of B to B to foreign government (FG), it is likely that building a relationship of trust will take time, and when it comes to the use of big data, things like the country's laws on the protection of personal information and security measures will also play a part. Such endeavors are inevitably both circumspect and challenging.

Shibahara: Certainly, because social infrastructure has a close relationship with a country or region's security measures and other policies, these activities can be seen as very challenging. Also, because services do not consist of computers and management alone, with the region's culture and commercial practices also playing a major role, localization is essential. It is necessary to act in good faith and win people's trust by having a base in each market and taking a "local consumption of local production" approach to public relations and other activities.

Accordingly, Hitachi is proceeding rapidly with the establishment of local operations. Of our approximately 320,000 staff (including group companies), around 120,000 are already based overseas. We have also introduced "global grading" with a system for managing staff at the section manager and higher levels based on globally standardized appraisals.

Staff Recruitment and IT-based Support

Yokoe: You are using the global IT service to create

new value through the use of IT to horizontally link organizations, companies, countries, and societies. What are the most important factors in achieving this?

Shibahara: That would be human resources. Ultimately, the source of added value is not IT but people. Accordingly, the key to success lies in how we go about obtaining the people we need.

I also believe that using IT to augment the know-how of skilled workers is important in terms of providing people with support. For example, recognizing the aging of electric power distribution equipment at North American electricity facilities and the retirement of skilled maintenance staff, Hitachi has embarked on a business that develops enterprise asset management (EAM), equipment operation, and other systems in conjunction with Japanese power companies that have operational technology. This seeks to enable efficient maintenance through measures such as identifying signs of potential faults in advance or being able to query an operational knowledge database while performing maintenance work.

With regard to why we should choose to partner with Japanese power companies, this is because, whether it is in relation to the security of electric power supply, to maintenance, or to operation, it is these companies that have built up extensive practical knowledge of power generation, transmission, and distribution. We are not able to provide services with high added value on our own. This means that, in the case of a global business, people with workplace know-how are vital to the operation of service businesses with a scope that extends to consumers, and therefore collaboration with power companies is essential.

The aging of social infrastructure such as tunnels, bridges, and roads is starting to become a problem in Japan as well, and initiatives are already underway that will help improve the efficiency of periodic inspections, part replacement, and other maintenance tasks by using sensors for predictive diagnosis of deterioration. That Japan is adopting such a leading role in taking up the challenge of pre-emptive measures for dealing with aging social infrastructure is extremely significant, not only in the sense just of creating new service businesses, but also with regard to preventing the hollowing out of Japanese industry.

Yokoe: With a shrinking workforce due to our falling population, how to obtain human resources is Japan's biggest problem. The global IT service not only holds the prospects of Hitachi's own growth, it may also serve as a pioneering model for the economic growth and nation-building of Japan as a whole.

How to Contribute to Global Society

Yokoe: You spoke earlier of “local consumption of local production,” and I believe that local recruitment and the recruitment of people with a good knowledge of overseas circumstances are challenges for all companies. How specifically do you go about recruitment and training?

Shibahara: Hitachi is currently engaged in an ongoing program of mergers and acquisitions (M&A) in relation to its Social Innovation Business to make up for gaps in our business portfolio. A particular emphasis is on management consultants who deal with “upstream” processes (the early stages of projects) and have expertise in social infrastructure. Naturally, along with the acquisition of companies, we also recognize the importance of recruiting and training young people. Diversity considerations, including women, the elderly, and people of other nationalities, must also be taken into account when hiring.

First of all, accurately interpreting what customers require, and then reliably operating information systems that exceed these requirements while also fulfilling quality, delivery, and other commitments, can be seen as difficult business challenges, even in Japan. Furthermore, given obstacles such as language and culture, we do not believe it is possible to export the identical IT solution business we operate in Japan to overseas markets. This makes “local consumption of local production” vitally important. Furthermore, Hitachi’s Social Innovation Business can only expand if we have people who understand our corporate culture, know-how, and superior technology. In this sense, coordination with Hitachi Consulting Corporation and Hitachi Data Systems Corporation is essential.

Yokoe: In any case, the Information & Telecommunication Systems Company clearly has a major role to play in the vanguard of service globalization. I have come to appreciate how Hitachi’s global IT service is about presenting a vision, establishing common objectives with the customer, linking things together with IT, creating new value, and contributing to global society. I hold high expectations for future developments.

Overview

Business Strategy for IT Services Supporting Global Operations

Miki Hamano
 Takeshi Miwa
 Junri Ichikawa
 Satoshi Ibaraki

BUSINESS STRATEGY FOR IT SERVICES SUPPORTING GLOBAL OPERATIONS

Emergence of New Competition

ALONG with information technology (IT) vendors such as International Business Machines Corporation (IBM), large electrical equipment manufacturers such as General Electric Company (GE) and Siemens AG are also entering the global IT market.

One aspect of the IT business strategy of GE is that it seeks to use productivity as a way to overcome issues facing society and to create customer value. This approach is described as the “power of 1%,” meaning that improving a customer’s assets by 1% leads to a significant increase in that customer’s annual profit. This contribution to the growth market is called “innovation in society,” and the way to achieve it is the Industrial Internet. Specifically, this strategy seeks

to improve productivity and reduce costs through the use of IT for integrated control of equipment at production plants.

The Industrie 4.0 project in Germany is another such initiative that seeks to optimize asset performance and operation through a fusion of operation technology (OT) and IT by standardizing the interfaces between equipment and IT used in the workplace at all steps, from issuing and receiving orders to production.

Management Vision for Global IT Service Business

Hitachi has chosen a management strategy for its information & telecommunication systems business of “becoming a major global player through the 3Gs: growth, global, and group,” and has set a target for overseas sales of making up 35% of its global business in 2015.

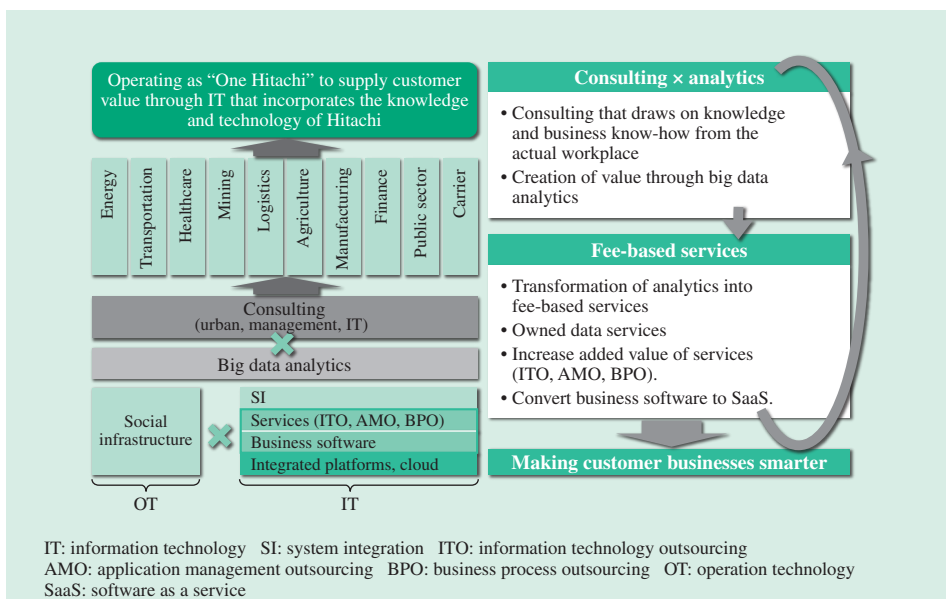


Fig. 1—Structure of Global IT Service Business. The ultimate aim is to make customer businesses smarter through two core businesses: one that resolves customers’ management issues through management consulting and big data analytics, and one that provides operational and other fee-based outsourcing services.

At the core of Hitachi's activities aimed at achieving this target is its Social Innovation Business. By drawing on strengths in both OT and IT that it has built up over its many years as a manufacturer, Hitachi is pursuing social innovations that can overcome a variety of challenges and problems facing society. Its aim is to achieve service innovation through the use of information, to carve out a global IT service business.

Two Core Global IT Service Businesses

Hitachi's global IT services are based around two core businesses. One solves customers' management challenges through management consulting and big data analytics. The other provides fee-based services as an outsourcing provider for business operations and other activities. The ultimate aim is to use these two different approaches to make customer businesses smarter (see Fig. 1). The following sections describe each of these businesses.

MANAGEMENT CONSULTING

Solving Management Challenges

Management consulting is a high-level form of business consulting that involves working alongside the customer's management team to understand the issues they genuinely wish to resolve, and proposing solutions. Because it provides business consulting at a high level, it acts as a starting point that leads to subsequent IT services, such as system integration (SI) and business operations. It is also intended as a way to increase business by acting as an incubator or integrator for supplying Hitachi solutions that overcome challenges.

Workplaces have a large number of problems and challenges that people want to resolve. However, because money and other management resources are finite, it is advisable to prioritize those problems and challenges that ought to be solved first.

In a cost reduction mission, for example, the workplace needs of different departments are often contradictory. This can result in mutually conflicting proposals, such as a system department wanting to adopt simpler systems to reduce maintenance costs while an operational department wants to expand the scope of system support to reduce the number of operational personnel. To resolve this conflict, it is necessary to identify the underlying problems and challenges and to implement solutions from a management perspective.

Accordingly, the management consulting provided by Hitachi Consulting Co., Ltd. identifies the genuine

business issues from the customer's management perspective, and promotes the Social Innovation Business by proposing solutions.

Global Operation as "One Hitachi"

The various solutions that management consulting supplies to resolve issues extend beyond IT to include other products, solutions, and services also offered by Hitachi.

Customer expectations for IT are undergoing a shift, from its use as a way of optimizing operations toward the use of data as a means of resolving business issues, with growing potential seen for IT that contributes to social innovation.

Solutions related to big data have been in demand recently, and in this field in particular, Hitachi is developing and supplying solutions for creating customer value, primarily through HGC-IA^(a).

This issue of *Hitachi Review* contains an article describing Hitachi's strategy for management consulting together with practical examples (see p. 18).

PROVIDING OPERATIONAL SERVICES

Attitudes toward IT are shifting away from ownership and toward renting. This has created a need for operational services that encompass entire information systems, and Hitachi is responding to this demand from society with outsourcing services for OT and IT, two of Hitachi's strengths. The following section gives an overview of these operational services.

Managed Storage Service and Global Service Platform Businesses

Changes in the customer environment, such as the shift in demand from ownership to renting and rising concern about reducing IT asset and operating costs, are creating a need for higher added value in operational services.

To satisfy this demand, Hitachi supplies managed storage solutions (MSSs), an operational service that installs Hitachi-owned storage at customer sites and outsources storage operations to Hitachi (including products from other vendors).

(a) HGC-IA

Abbreviation of Hitachi Global Center for Innovative Analytics. Hitachi established HGC-IA in 2013 as an organization dedicated to promoting big data analytics businesses throughout the world. It develops big data analytics solutions aimed at resolving issues faced by customers by linking sites in America, the UK, Asia, and elsewhere to bring together research and operational departments for the consolidation and sharing of personnel, technology, and development capabilities.

Whereas the focus in the past was on the supply and maintenance of storage products, an MSS expands the scope of the service to include system design, implementation, and operation of storage products in particular.

Furthermore, to expand the business into higher level operational services, Hitachi also supplies big data analytics platforms (global service platforms) designed for particular applications.

This issue contains an article about Hitachi's business strategy for MSSs and global service platforms (see p. 23).

Expansion of Services beyond Maintenance and Operation

Hitachi Payment Services Pvt. Ltd. provides an automated teller machine (ATM) operation service for financial institutions in India. Its Independent ATM Deployment service makes up a large proportion of this business, and by combining this and other Hitachi solutions, Hitachi Payment Services is planning to further extend the services it offers and the range of industries it serves.

One measure being taken for expanding services is to enhance ATM operation, including working in collaboration with Hitachi-Omron Terminal Solutions, Corp. to integrate its supplied solutions, and making use of Hitachi-Omron Terminal Solutions' know-how for predicting transaction volume.

Another measure being taken is to integrate with payment solutions for different industries. The aim is to expand the business by using Hitachi Payment Services' payment service as a base and linking it together with other payment services belonging to Hitachi. Specifically, Hitachi aims to deploy advanced services globally through integration with electronic money in a transportation card solution and with a points management solution (see p. 27).

Smarter ATM Operation

The number of ATMs operating in China has reached 200,000, similar to the number in Japan, and this growth trend is set to continue. However, this increase in the number of ATMs is also driving a relentless rise in the cost to banks of ATM operation, creating a major problem for bank management.

To solve this problem, Hitachi has developed its smart cash stream solutions. These include solutions for cash demand forecasting in order to make efficient use of money, and for route optimization to improve productivity for the filling of ATM cash cassettes.

These solutions are provided as an operations service in conjunction with ATM maintenance. An article in this issue describes the solutions and supporting technologies (see p. 32).

Expansion of IT Business Base in India

Hitachi Systems, Ltd. established Hitachi Systems Micro Clinic Pvt. Ltd. (HISYS-MC) in India to expand its global business by establishing a presence in that country, which is recognized for the size of its market and its growth prospects.

While IT infrastructure services are currently the main business of HISYS-MC, it also intends to grow its business in the future by expanding the scope of its services to include data center monitoring and operation services and the outsourcing of security monitoring and operation, which are strengths of HISYS-MC (see p. 38).

Marketing of Security Products to Europe and America and their Delivery as Services

Finger vein authentication is a proprietary technology developed by Hitachi, and is expanding in Japanese and overseas markets along with the growth of the security and biometric authentication market. Interest in biometric authentication is high among overseas financial institutions, particularly in Europe and America.

This issue contains an article about the technology and available solutions for finger vein authentication in the form of biometric authentication solutions, including examples of overseas applications.

In the future, Hitachi will proceed with establishing a business for the issuing (online and offline) and management of electronic signatures to offer comprehensive security operations in the form of a service based around finger vein authentication (see p. 43).

Smarter Logistics

Progress is being made in using big data to make logistics smarter, and Hitachi is engaged in such initiatives in China.

The cost of logistics as a proportion of gross domestic product (GDP) in the emerging economies of Asia is high, with an urgent need for efficiency improvements and ways of dealing with rapid increases in the volume of goods and rising service quality requirements.

In response to this challenge for society, Hitachi is solving the management issues faced by customers

through a three-way integration model of procurement, logistics, and information by providing services from the perspective of overall optimization.

A demonstration project for this service at plants in China confirmed its ability to help reduce procurement and logistics costs, minimize inventory, cut procurement workloads, and improve logistics quality.

In addition to deploying this service model beyond China and into Southeast Asia, Hitachi intends to expand it into a service for supporting global logistics strategies by supplying services with high added value through the use, analysis, and evaluation of big data.

An article in this issue describes the service, the results of the demonstration project, and how Hitachi plans to expand the service based on these results (see p. 48).

Services for Global Manufacturers

In response to factors such as demand that fluctuates on a global scale and the intensification of price competition, the establishment of global development, production, and supply capabilities has become an urgent task for Japanese manufacturers. Accordingly, there is a need for a wide variety of service solutions, including those that can improve profitability or quality through global operations, entry into new industries, and a fusion of operations and IT that utilizes such technologies as M2M^(b) and IoT^(c). To satisfy this need, Hitachi supplies services that provide global support for the activities of manufacturers, from design to maintenance, in the form of total supply chain management (TSCM).

There are many examples of manufacturers with factories operating throughout the world who are finding it difficult to maintain work quality at a level similar to that of Japanese plants, with staff recruitment and training unable to keep up with the rapid startup of overseas plants. In response, for the operations of supply and demand assessment and coordination of global procurement, delivery, and sales, and of local design, quality assurance, and design workload reduction, Hitachi supplies an IT platform as a cloud service that enables sites in Japan to determine the

situation at other sites, and to coordinate and instruct their activities.

An article in this issue describes details of this service and the technologies used to implement it (see p. 54).

Global Cost Management Solution

One of the above solutions for TSCM is a cost management solution that Hitachi supplies to support business planning, product profit planning, and target costing in ways that take account of the benefits of regional strategy, technology strategy, and product strategy.

This is because of the importance of managing cost planning and activities aimed at manufacturing at a particular cost, which are effective at maintaining product profitability.

An article in this issue provides an overview of this solution and describes its features and example applications (see p. 60).

CONTRIBUTING TO THE WORLD THROUGH EXPANSION OF GLOBAL IT SERVICE BUSINESS

This article has defined Hitachi's Social Innovation Business and provided an overview of its strategies for management consulting and operational services, the two core activities of Hitachi's global IT services that form part of this business, including example applications.

In the future, Hitachi aims to expand its global IT service business by enhancing its services based on these strategies, and to achieve social innovation and contribute to the world.

(b) M2M

Abbreviation of "machine-to-machine." It refers to the achievement of a high level of autonomous control and operation through the exchange of information between machines via a network.

(c) IoT

Abbreviation of "Internet of things." The connection to the Internet of various devices that in the past were not connected to networks so that they can exchange information, thereby enabling functions such as automatically recognizing each other and performing cooperative control.

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Featured Articles

How can Hitachi's Management Consulting Practice Help Realize Social Innovation?

Patrik Sjöstedt
Hans Lindeman
Iben Mollerup Skov

OVERVIEW: Hitachi, Ltd.'s commitment to and strategic focus on Social Innovation Business presents great opportunities for Hitachi Group companies. It provides a platform for Hitachi businesses to collectively develop strong and differentiated technology capabilities and services that provide targeted solutions to clients in an innovative and integrated fashion. To help accelerate the Social Innovation Business, Hitachi Consulting's Management Consulting practice is keen to take on a role as solution integrator and business incubator. This article discusses the ramifications and the opportunities of such an approach.

HITACHI CONSULTING MANAGEMENT CONSULTING

HITACHI Consulting Corporation's Management Consulting (HCMC) practice carries more than 25 years' experience in working with large, international companies, helping them realize their business visions. HCMC delivers positive and sustainable change for the world's leading companies in chemicals, consumer, energy, industrials, life sciences and metals and mining industries.

HCMC experience covers the entire spectrum of operations management with a core focus on performance improvements, behavioral change management, and strategy development. Its capabilities span end-to-end operations to address specific performance challenges across the supply chain, manufacturing, research and development (R&D), sales, services and administration.

Assessed by external, international analysts, HCMC is rated amongst the best Business Operations Consultancy Practices in the world*.

Turning Complexity into Opportunity

In a world where 75% of all change programs fail, 95% of HCMC's change programs succeed. And its clients call it "money well spent." The difference lies in one core value: humility. True transformation does not come from consultants. It is guided by consultants, HCMC's subject matter experts who – with experience

from industry and specialty knowledge within supply chain optimization, asset management, maintenance operations and production environments – join the clients' subject matter experts on their premises to establish a common vision for future operations. Based on deep insight and experience from more than 2,000 projects across the world, the most important lesson is that consultants must truly engage with clients in order to achieve outstanding results. It is not the other way around. Every client is unique and every project needs to be treated as a partnership. This approach enables consultants to identify high-value opportunities and unlock hidden potential.

The 5-Box Model

In every project HCMC seeks to improve performance radically. A framework called the 5-Box Model (see Fig. 1) shows how processes and the management system have to be improved in combination with their vital human interfaces in order to achieve real behavioral change. And only through real behavior change can sustainable improvements be delivered.

HCMC uses this framework to understand, identify, develop, and implement solutions aligned to the strategic objectives of the client's business.

The goal is to make improvements sustainable. To achieve this, the starting point is firstly to understand the processes that add value for clients' customers. Secondly, to identify the critical management and control points that drive process performance. And thirdly, to assess how the organization is shaped around these processes to ensure results.

* Source: Gartner, Inc. and Kennedy Consulting Research & Advisory

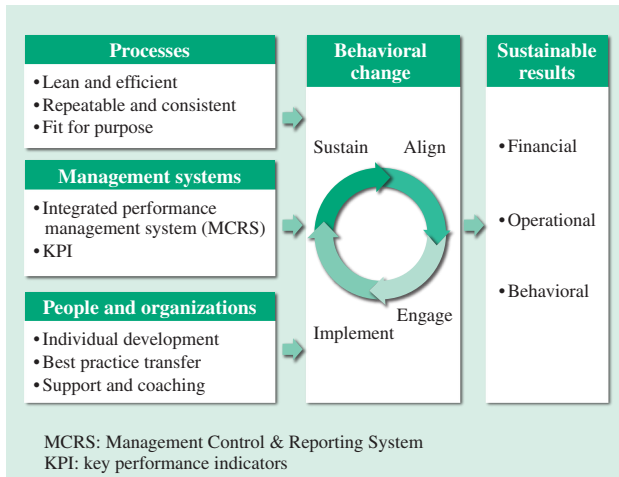


Fig. 1—Hitachi Consulting's 5-Box Model.
The 5-Box Model's key elements link business strategy to capabilities and ultimately to business results.

Sustainable results are only achieved through effective behavior change – and people will not truly change their beliefs and habits unless they can actually see the benefit and understand how to incorporate the changes into their daily work routines. Experience has shown that reducing complexity, clarifying roles and responsibilities, and installing effective performance management are critical for efficient decision making and increasing the effectiveness of any organization.

The Closework approach is HCMC's proven method for achieving sustainable behavior change. Working closely with people at the heart of the client's business, walking side by side, and "getting their hands dirty," enables consultants to understand how people can work better. Involving the client in the process of change is the way HCMC ensures that behavioral change is permanent, and does not end the moment consultants leave the premises. This leaves a legacy of measurable benefits. Hitachi Consulting's Closework approach ensures that consultants sit on the same side of the desk, working side-by-side with the clients' organization to help eliminate the obstacles, both large and small, that impede performance improvement.

Four basic phases are followed:

- (1) Analyze and Align. Get buy-in for the change that needs to happen in the organization through effective and sustained communication from leadership.
- (2) Engage and Design. Get commitment from the organization and formalize it through setting targets and key performance indicators (KPIs).
- (3) Implement. Make it happen by developing rigorous plans, installing effective governance structures, and

getting expert input on managing change to ensure the program runs smoothly and at pace.

(4) Sustain. To make the change stick, clients will need to work differently, which requires training and coaching on what different behaviors are now required.

This holistic and integrated approach makes change happen quickly and effectively.

Every project is customized and typically follows a phased approach:

- (1) Scoping – this is where HCMC works with the client to gain an insightful understanding of performance in the organization. The objective is to assess opportunities.
- (2) Analysis – this phase is a deep dive into the organization to quantify and qualify the business case.
- (3) Implementation – realizing the business opportunities through a thorough process of design, install and coaching the new ways of working.

All projects are designed to deliver substantial results. Financial and operational results are measured via results plans and a robust evaluation methodology. Behavioral assessment tools are used to evaluate, monitor, and drive performance-enhancing behaviors across all levels of the organization.

CASE STUDY

One of the world's largest confectionery companies had invested heavily in new technologies and reconfigured their supply chain. Management wanted to double its historical 1.5 to 2.0% annual rate of productivity improvement. The project goal was to deliver \$130 million in improved margin across 45 plants over the course of three years.

Working closely with a small client team, HCMC co-designed a 12-month program with multiple waves.

In wave 1, driven by HCMC, sites were selected to enable rapid geographic rollout and to support in-year delivery of benefits. In wave 2, HCMC stepped back into a supporting role. 73 practitioners from 32 sites were each trained for an average of five months to enable them to lead the transformation program at each site. In wave 3, the client teams assumed full responsibility with no HCMC support.

Each site undertook a two-phased approach beginning with a five-week diagnostic aimed at establishing a case for change, specified financial and operational targets, which were agreed to by local management, and a project plan with resources and milestones. The second phase was a 32-week implementation designed to deliver project improvements, train continuous improvement practitioners, and install the new capabilities.

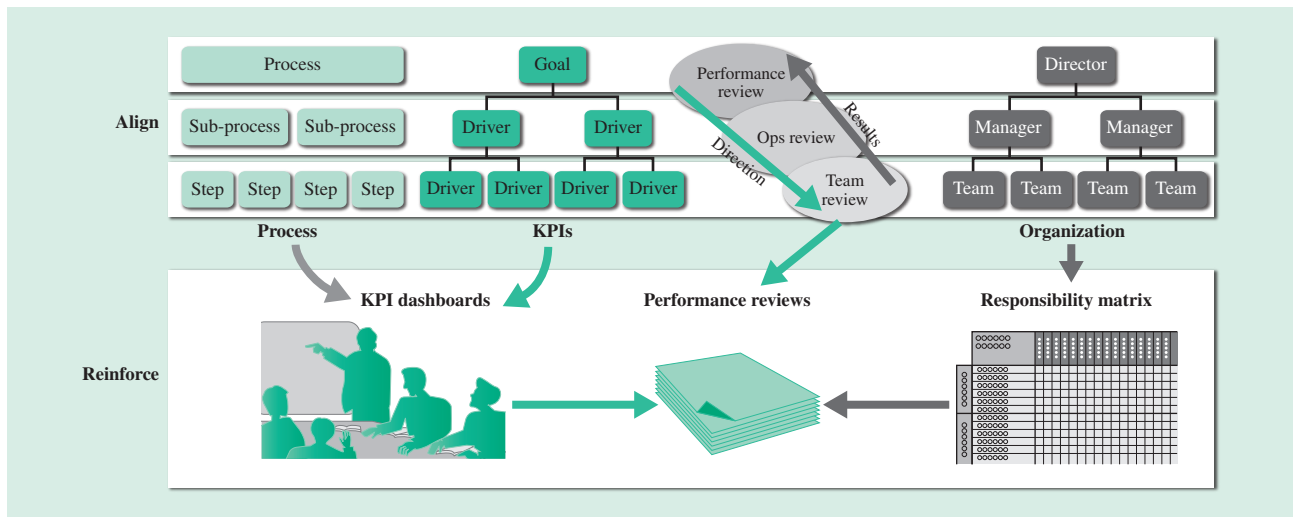


Fig. 2—Hitachi Consulting’s Management Control & Reporting Systems (MCRS). A holistic approach which in a closed-loop system comprise of information, documents and meetings used to (a) ensure accountability for the execution of business plans and (b) deliver sustained performance improvements via the right behaviors.

One of the key elements of the approach was to make performance – via Hitachi Consulting’s robust Management Control & Reporting System (MCRS) framework (see Fig. 2) designed globally and fit for local purposes – fully transparent and comparable. Step-back meetings were held periodically to share lessons learned, promote best practices, and ensure a common language and consistency of approach where appropriate.

After 12 months, the program was on track and had delivered cumulative and cashed benefits of \$20 million from just four sites. Annualized run-rate savings were at \$31 million and growing. Additional sites were expected to deliver significant improvement towards the overall three-year target.

“This program has been great at delivering results in engagement, acceptance and technique. It has developed a group of people who understand the links between programs, systems and execution – and that 80% of success is through influencing and changing behaviors.” Client Manufacturing Manager

EMPOWER THE ORGANIZATION

Capturing the Management System

A critical component to successful change is to understand how performance is driven within the organization. A starting point is to capture the “as is” management system – from visual boards to management reports, review meetings, KPIs and action logs. HCMC has a unique framework, called MCRS.

In workshops with leaders, this methodology is used to evaluate and identify areas that help drive performance improvement.

One major cause of reduced performance is a management system that does not empower the people best placed to make decisions and take direct corrective actions. By understanding this reality, it is possible to define and install a new management control and reporting system framework that gets the organization working at the correct level.

Pioneer of Value-based Consulting Model

\$60 million in realized benefits, 15% reduction in total costs, 25% increase in sales, 28% more production output – these are merely snapshots of typical results achieved in HCMC projects. HCMC is founded on the philosophy that delivering results must be an obsession. The obsession is deeply rooted into everything its consultants do and is directly reflected in its pricing model. Every project is assessed based on its ability to create value for its clients and its clients’ clients. Clearly-articulated targets are defined together with the client and a shared ownership of delivering quantifiable results is established. This forms the basis for any engagement and will directly impact the way each project is remunerated – HCMC pioneered value-based consulting, and through specific risk-sharing components, the contracts are closely linked to the realization of results.

Shared ambitions, clearly-articulated targets and agreed methods of tracking results throughout the client engagement is at the heart of HCMC’s way of

working. Any HCMC project seeks rapid return on investment. In the words of a client: “At nearly a 3 to 1 payback, you can’t go wrong.” Plant Manager, Honeywell International Inc.

REDEFINING OPERATIONAL EXCELLENCE IN A DIGITAL AGE

HCMC has had unprecedented success with its consulting model, and in helping its clients realize value through custom-designed implementation programs. Currently Operational Excellence is at a stage, where improvements that were once difficult or impossible to realize, can now be delivered through integrating operational technology with information technology (IT).

Technological improvements can have a tremendous impact on manufacturing. Overall, the ability to manage the supply chain of an organization has increased. Connectivity and data from point-of-sales or from client transactions can now be communicated instantaneously throughout the organization. Supply and demand can be managed in real time. The organizations ability to handle problems in the supply chain can be done with much greater speed and accuracy than was possible just five years ago.

However, the adoption of many of these tools has been slow or the implementation of them has been poorly executed. Overall supply chain planning continues to be an area that has not yet taken full advantage of Machine-to-Machine communication technologies or the advancement of visualization technologies. Use of these tools can significantly increase an organization’s ability to troubleshoot, reduce waste in both materials and time, and in general increase the flexibility of the supply chain.

HCMC believes that increased communication, integration and visualization can dramatically reduce the need for specialized resources, tasked with solving problems or managing large groups of operators. In the future, the tasks of prioritization and supervision will in general be handled by a much more integrated and automated IT platform. This platform will be able to pinpoint necessary interventions and activities more efficiently, and without the same level of manual human involvement, through simulations and more total supply chain connectivity. HCMC believes that initially, it will provide predictive solutions that gradually become more prescriptive in nature.

However, most important to the development of digital manufacturing, is the ability to harvest and use

vast quantities of data – or Big Data as it is commonly referred to.

Most manufacturing organizations have invested heavily in robotics and other types of automation that have taken over many of the manual processes that were earlier performed by operators. Simultaneously, sensor technology has been developed and deployed across an ever increasing part of the supply chain. These sensors can take the form of measurement sensors, registration sensors, video feeds, etc. And all of these technologies produce vast quantities of data that are fed into both centralized and decentralized repositories. HCMC believes that it is this data that will drive the most significant improvements in industry in the future.

On the other hand, even though most businesses register and save data at an increasing rate and speed in their supply chains, many of these organizations have yet to begin to understand how valuable proper analysis of this data can be. By combining its understanding of Analytics and Big Data with its experience and knowledge of Operational Excellence, HCMC can help take clients’ organizations to a different level of productivity and efficiency in the future.

HCMC is starting to see that by taking advantage of increasingly integrated supply chains, connectivity improvements, and its ability to analyze and understand the Big Data ecosystem, asset productivity gains and supply chain improvements will be transformational rather than incremental in the near future.

COLLABORATION AND ANALYTICS IS THE FUTURE

Digital manufacturing is a concept and a methodology that HCMC is now in the process of bringing to market. The first part of this program will involve sharing experiences and embarking on an ambitious training program of resources of Hitachi Consulting, Co., Ltd. in Japan (HCJ) as well as some of the researchers from Yokohama Research Laboratory (YRL) of Hitachi, Ltd. By doing this, HCMC and HCJ will expand their global capacity and at the same time learn from each other. Ultimately, this will also allow HCMC to take best practices developed on client assignments in the USA and Europe and transfer these to Japanese clients, and vice versa.

The second part of this program will be to start delivering this common approach to internal Hitachi, Ltd. clients as well as external clients in Japan, South East Asia, Europe and the USA. This will be closely

linked to the training, and will allow HCMC not only to pass on critical tools and methodologies, but also to coach and train people in real life situations.

The third step of the program will be to introduce Big Data technologies to the joint analysis and implementation processes. This will be done in close collaboration with the Hitachi Global Center for Innovative Analytics (HGC-IA), YRL and other Hitachi group companies focusing on the development of Big Data technology.

To prepare for the launch of these solutions, HCMC has for the past 18 months worked closely with HGC-IA to develop different proofs of concept that will now be integrated into the overall solutions. As an example, HCMC is currently working on assisting Hitachi Rail Europe Ltd. with a predictive maintenance solution. This program combines HCMC's understanding of Operational Excellence, Hitachi Consulting's IT systems and planning capabilities, and Hitachi, Ltd.'s ability to construct predictive decision systems from Big Data. This will result in improved reliability and availability of trains, reduced maintenance costs, improved passenger experience, improved safety, and reduced inventories.

CONCLUSIONS

Competitiveness in what has been called the 4th Industrial revolution will require a combination of a number of different capabilities that all need to be brought together in large transformation programs.

To begin with, the ability to understand a customer's industry and its specific processes is critical, and a starting point for any improvement program. However, the capacity to develop new and innovative business models is even more important in the new competitive landscape that is emerging. The convergence of industries and the disruption of existing business models will be common place, and an ability to see around the corner is essential.

Furthermore, a deep knowledge of both information and operational technology as a driver for step change improvements in performance is another key requirement. The pace of digitization of companies and industries will continue to speed up as technologies mature. Being at the forefront of all of this rapid development is absolutely critical.

Finally, effective transformations do not happen in a vacuum, they require leadership and experience as well as tools and methodologies to effectively move an organization through periods of transformational change.

At the end of the day, it is not one or the other of these capabilities that will determine success, it is the right mix of strategic insight, technological skills, and a passion for change that will drive results in the future.

At Hitachi's Management Consulting, all of these ingredients come together. It is committed to helping its clients develop their businesses to new levels of competitiveness and success, and to jointly redefine Operational Excellence in the Digital Age.

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Featured Articles

Marrying IoT and Big Data: Are You Ready?

Nick Chang

***OVERVIEW:** The Internet of Things (IoT) is expected to give organizations much more information about their products and services, as well as about how their customers are doing using those offerings. Innovative companies will take advantage of the rich and realtime data IoT offers. They will analyze data to derive actionable business intelligence upon which to make smarter decisions that benefit the organization and its customers. To address the challenges of IoT, Hitachi Data Systems introduces Hitachi Live Insight Center of Excellence. This strategic organization delivers a combination of people, processes, services, and solutions to help clients confidently deploy innovative analytics solutions to support new business paradigms and to accelerate time to value. This center of excellence provides a dedicated framework to help evaluate, prioritize, deploy, and leverage the benefits of new social innovation approaches and solutions. The first offerings will focus on telecommunications and healthcare.*

INTRODUCTION

MOST organizations are excited about using the vast amounts of new data available and soon to become available from diverse sources such as social media, wearable devices, smart sensors, and Internet of things (IoT) devices (see Fig. 1). The intent is that by using this data and rapidly analyzing it, the organization will be able to make more insightful decisions and use the information in a more targeted way to deliver better service, improve business processes, increase operational efficiencies, and grow revenues.

However, to realize these benefits requires tight integration of vastly disparate systems. In particular, the data from individual devices must be securely captured, economically stored, and quickly analyzed, and the results easily shared. For most organizations, the time, expertise, and cost of undertaking such initiatives can make these ventures impractical. In most cases, organizations can benefit by using the services of a 3rd party that provides deep industry knowledge, the ability to integrated different technologies, and best practices and methodologies.

Other issues that Hitachi Live Insight Center of Excellence (CoE) can address:

- (1) Strategically match business needs to technology capabilities. Realize solution potential most efficiently.
- (2) Design and build. There are many considerations to make when designing a new solution – especially

when it comes to providing insight to a company. Services experts are adept at building such solutions based on business requirements.

- (3) Provide project management – failure rates for these types of deployments are high given the expertise involved. Failure could be defined as “not optimized to potential.”

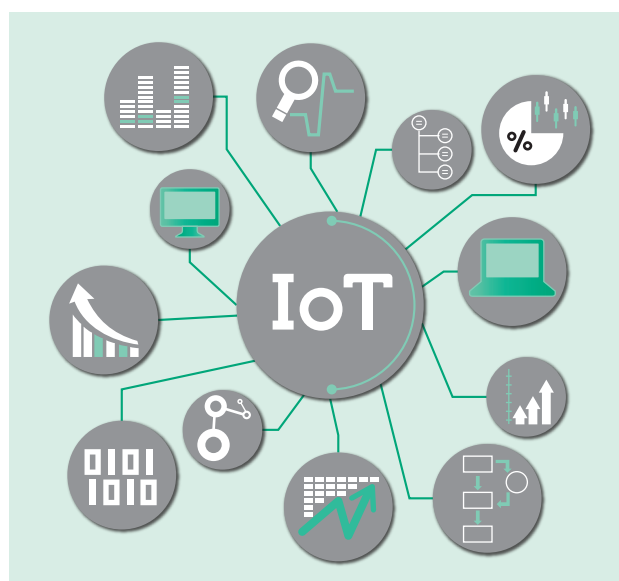


Fig. 1—Internet of Things (IoT).

The IoT interconnects computing devices from personal computers and mobile devices to smart objects and embedded sensors.

(4) Reduce risk (risk management) of new offerings. What risks does the company have of not executing flawlessly or of taking too long to execute internally? Services experts have frameworks and delivery models that make deployments risk-free.

THE PROMISE OF IOT

Organizations today are at a point of inflection. They are enticed by results from early big data initiatives using new data sources. From social media streams to the added granularity and richness of data from smartphones, wearables, and IoT devices, organizations are seeing the potential to revolutionize operations and improve many common business processes.

In 2015, 4.9 billion connected “things” will be in use, up 30% from 2014⁽¹⁾. Innovative organizations are already starting to take advantage of IoT to enhance their offerings and improve service. The potential benefits of using IoT are unlimited. Examples include:

- (1) A manufacturer could collect information about usage of its products in the field to spot and fix potential problems before they become critical, or the information might help identify areas where new revenue generating features or services might be offered in future models.
- (2) A city could use information gathered from smart devices in automobiles and roadways to optimally route emergency responders to their destination or dynamically adjust traffic signals to reduce congestion.
- (3) A retailer using location-based information from a customer’s smartphone and analysis of the customer’s shopping history could deliver realtime promotions and ads when the customer is near a store.

THE CHALLENGES

To realize the potential benefits of the new technologies, organizations must overcome some sizeable obstacles.

To start, an organization must have some idea of what is even possible. Given that the combination of IoT with big data analytics is a new approach to business, many organizations find it difficult to fully comprehend and capitalize on new initiatives.

Once an idea is conceived, any project will involve the integration of many different technologies. The required computational muscle must be provided, as well as capabilities for managing large and highly variable volumes of data, and high-speed analytics are needed to convert that data into information on which the company can take action in realtime.

The costs for undertaking an IoT project can be unpredictable and high. Organizations will need to factor in the labor and capital equipment costs to start the project, as well as the operational costs to keep the project running over time. The labor costs can be particularly high since there is a need for high-level expertise to incorporate the different data sources and then make sense of the large volumes of data involved.

An additional potential deterrent is the time from inception to results. Organizations will need to move fast given the dynamic nature of the marketplace. Traditional approaches to information technology (IT) and application development may prove to be too slow, leading to missed opportunities or concession of a market to a competitor.

Lastly, IoT projects will typically have highly variable requirements. Results may depend on a certain event (for example, a surge in product or service demand, a customer entering an establishment, an anomalous set of transactions on a network, or a patient experiencing a medical incident). This variability requires many different systems and solutions to be in place and then to quickly ramp up when an event happens.

AVOIDING AND REMOVING OBSTACLES

Every one of these challenges can be overcome with the help of services from a suitable 3rd party. Even with the diversity of IoT use cases, services must address some fairly common elements by providing:

- (1) Industry expertise: For many companies the undertakings are their first endeavors to tap into the potential of social innovation and realtime big data analytics and as such they need help from someone who has been there, done that. In particular, they need deep industry knowledge about what is possible, best practices, methodologies, and suitable tools.
- (2) Technical expertise: Most efforts require the use of new technologies and the integration and optimization of a wide variety of technologies and systems.
- (3) Speed to results: Opportunities change rapidly and competitors are likely to be trying to use the same technologies to their advantage. A service offering could help reduce the time required to implement solutions.

HITACHI LIVE INSIGHT CENTER OF EXCELLENCE

IoT combined with the speed, variety, and importance of analyzing data fuels change by providing the ability

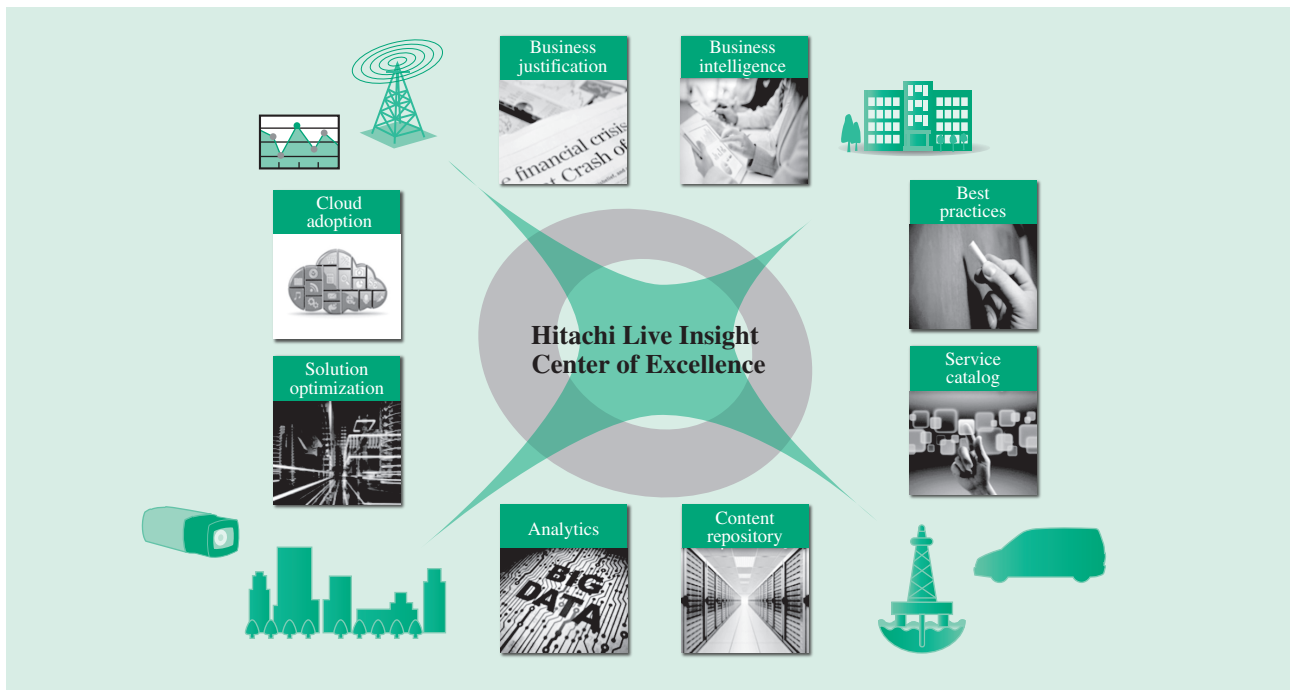


Fig. 2—Hitachi Live Insight Center of Excellence (CoE).

This CoE combines strategic planning with broad analytics expertise and resources, tailored to deliver industry specific solutions.

to process big data to find patterns and insights for making better decisions. Improved decision-making, when joined with deep contextual expertise, is accelerating organizations towards more predictive realtime intelligence that is focused on bigger insights for bigger social and business outcomes: social innovation.

This inflection point, where IoT and big data feed off each other is creating many new opportunities and new challenges. To help organizations achieve the full extent of their social innovation potential, the Hitachi approach is to focus on those IoT connected objects that will have the broadest impact: Hitachi looks for impact in areas such as communications, healthcare, business analytics, public safety, energy, and transportation. Additionally, Hitachi brings together a broader, more holistic perspective when it comes to IoT and big data analytics.

Specifically, Hitachi leverages its work in 3 areas which:

- (1) Build many of the sensors and the intelligent devices, like medical scanners, that generate data and are the basis of IoT that matter
- (2) Provide and manage IT hardware and software to 83% of the Fortune Global 100; capture, manage, and analyze big data
- (3) Deliver deep expertise in analytics innovation through its big data labs and consulting practices.

Based on this work, this CoE offers expertise and services that can be delivered to any organization (see Fig. 2). Using these services, an organization gains deep industry knowledge, best practices and methodologies, integration of the required technologies, and fast time to results. Furthermore, in using a service, organizations have the ability to quickly try projects without incurring the large expense normally associated with such efforts.

Trying new analytics ideas with confidence or accelerating their competitive edge are two key benefits that customers will gain by partnering with Hitachi Live Insight Center of Excellence.

This Hitachi CoE leverages a common advanced analytics framework that integrates technologies for correlation, intelligence, extraction, and analysis. Reusable solution components and best practices are customized for a specific industry and specific organization's needs. Each solution resides on Hitachi IT infrastructure for big data storage and computing with intelligent content management and high-speed processing. Together, these comprehensive solutions combine realtime analytics with historical analysis and machine learning to turn observations into predictions and prescriptive actions.

This center of excellence will offer services for all industries, but has started with efforts in healthcare and telecommunications. Early use case examples

illustrate the types of solutions that are possible and the potential benefits they can deliver.

For example, Hitachi Data Systems Corporation (HDS) connected healthcare offerings are working to get doctors and patients in touch regardless of the situation; patient information is made securely accessible anywhere, on any device.

Chronic diseases such as heart disease and diabetes are the leading causes of death in the world. Hitachi Clinical Repository is a secure clinical data platform with enriched metadata and workflows designed for more meaningful patient interaction and near-ubiquitous data access. These capabilities support better patient outcomes, reduced healthcare costs, and, most importantly, a reduction in deaths from chronic disease.

With communications, solutions can help large service providers sort through an information glut to improve operations. For instance, a large provider might measure 30 billion network data points per hour making it difficult to quickly sift out important information. Hitachi Live Insight for Telecom, announced in April 2015, provides realtime streaming analysis and subsecond granularity. Along with its adaptability and openness, this solution dramatically improves network visibility and efficiency, increases services assurance and quality, and helps create new revenue streams.

To meet the demands of this emerging and rapidly growing market, Hitachi plans several steps. First, Hitachi Live Insight Center of Excellence will grow internally by bringing in additional industry expertise. Second, this center of excellence will take advantage of the entire Hitachi ecosystem (for example, Hitachi Medical Systems). Additionally, this CoE will develop key partnerships to build a complete ecosystem.

CONCLUSIONS

IoT is expected to be perhaps the largest technology wave of the past 50 years. By infusing sensors,

processors, and software and applying analytics, organizations can change how they operate and interact with customers. Services that support IoT will amount to a US\$69.5 billion industry this year⁽²⁾.

That is why Hitachi Live Insight Center of Excellence is essential to organizations that seek to try new analytics ideas or gain assistance to drive higher success rates for business analytics deployments. Partnering with Hitachi allows organizations to drive tangible results, maximize quality and efficiency across all lines of businesses, and reduces the gap between the business and IT.

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Featured Articles

Operation of Payment Service Business Based in India

Osamu Okuzawa
Akemi Komura
Jayant D'Mello
Tiju Easow

OVERVIEW: As part of its global deployment of financial channel solutions, Hitachi, Ltd. added Prizm Payment Services Pvt. Ltd. of India to its portfolio of subsidiaries in March 2014 and is utilizing the business platform it provides to accelerate Hitachi's global expansion. Hitachi Payment Services (formerly Prizm Payment Services) provides payment services using ATM and POS systems, primarily in India. These services are supplied mainly to financial institutions, utilizing a co-creation model that incorporates proprietary data analysis techniques and know-how developed through past experience while also maintaining profitability and efficiency. In the future, Hitachi aims to supply services globally and through a variety of different channels by utilizing its customer base and associated technologies.

INTRODUCTION

AS part of its global operations in the field of financial services, Hitachi, Ltd. is seeking to expand its services based on channels such as automated teller machines (ATMs) and the Internet. A central pillar of these operations was its entry into the payment services market in India through the acquisition in March

2014 of Prizm Payment Services Pvt. Ltd., which supplies payment services that include ATM and point of sale (POS) system outsourcing, primarily in India. Prizm Payment Services Pvt. Ltd. changed its name to Hitachi Payment Services Pvt. Ltd. in April 2015.

As its economy develops and incomes grow, the demand for banking services in India is expanding beyond the wealthy to also include the middle classes,

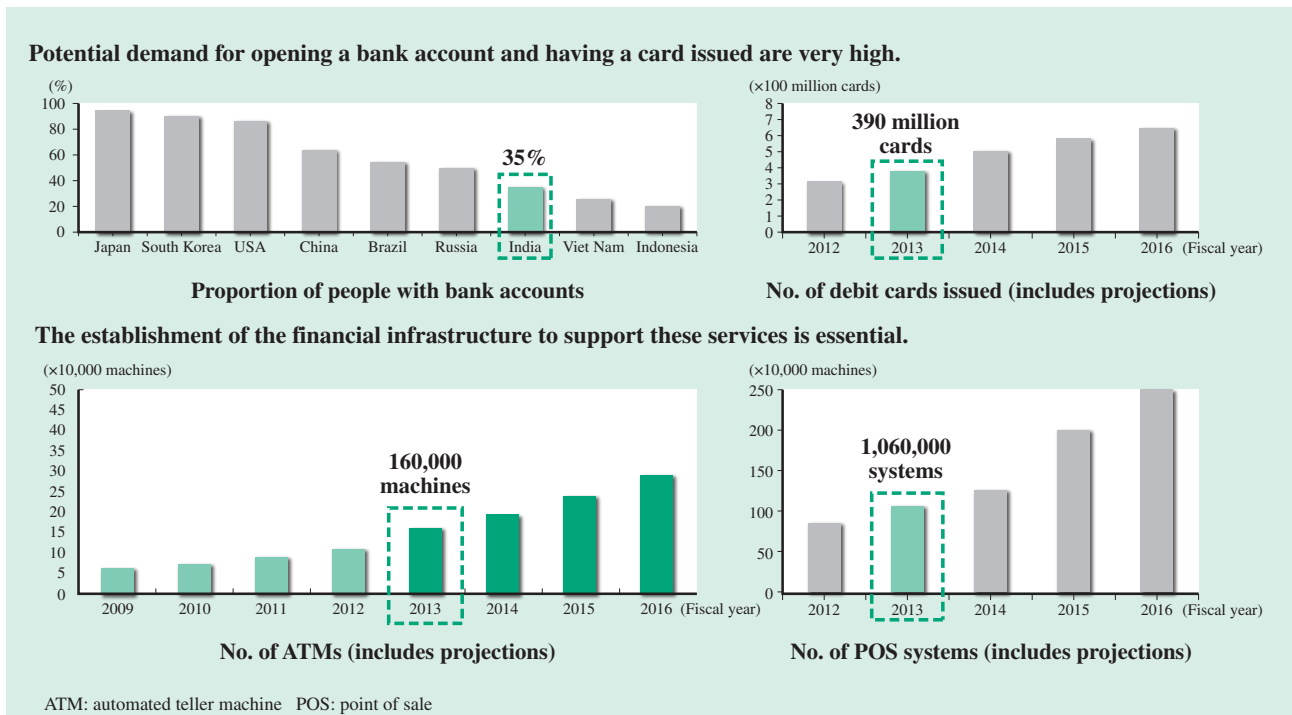


Fig. 1—Financial Services in India.

Compared to developed economies, the proportion of people with bank accounts and the number of cards in use are low. It is anticipated that the number of ATM and POS systems will grow dramatically as banking becomes more widely adopted.

creating an urgent need for the provision of financial and payment infrastructure (see Fig. 1). Currently, only about 35% of the population has a bank account (compared to more than 90% in Japan), and the total number of ATMs at the end of FY2013 (approximately 160,000) was less than one-tenth that of Japan on a per capita basis. Consequently, strong future growth is anticipated.

The Reserve Bank of India (RBI), India’s central bank, has set “financial inclusion” as a policy objective since 2005, and is implementing policies for extending financial services throughout the country, including to rural villages, to increase the proportion of people with bank accounts and the number of ATMs. Recently, rapid progress has been made on establishing a large number of accounts over a short period of time through the Prime Minister’s People Money Scheme [the Pradhan Mantri Jan-Dhan Yojana (PMJDY)] announced in August 2014.

This article describes the services of Hitachi Payment Services, which plays a central role in the global deployment of payment services, and the future outlook for the company.

Its main business consists of ATM and POS system outsourcing services for financial institutions, and it has the top market share for ATMs, with the approximately 35,000 it operates representing about 20% of all ATMs in India. It also operates over 190,000 POS and over 20,000 mobile POS (mPOS) systems, nearly 20% of the market (all figures are as of March 2015 and are based on research by Hitachi Payment Services). The system that links ATM and POS systems to the various bank systems operates from Hitachi Payment Services’ data center.

The RBI’s policy of “financial inclusion” permits the installation and operation by non-banking companies of “White Label ATMs” (WLAs), and Hitachi Payment Services is authorized to participate in this business.

By supplying WLAs and bank ATM services through its Indian service network, Hitachi Payment Services is undertaking a “Social Innovation Business” that contributes to the wider adoption of financial services in India. This is also an essential business for other emerging economies where financial services are underdeveloped, and can be thought of as a social innovation that can be introduced globally.

OVERVIEW OF HITACHI PAYMENT SERVICES

Hitachi Payment Services is a payment service provider that was established in March 2008 and has its headquarters in Chennai, India. It has approximately 1,200 employees (as of March 2015). In addition to its headquarters, it also has a sales center in Mumbai and over 12 offices around India. The company has built up a strong customer base in India based on the extensive experience of its founding management team in financial services, providing services nationwide, primarily to major Indian banks.

FEATURES OF HITACHI PAYMENT SERVICES

Service Model

The ATM services that Hitachi Payment Services supplies take on five different forms depending on the terms of the contract with the customer (see Fig. 2).

The vertical axis in the figure represents progressively higher service levels, with the bottom-most level being a Maintenance Service contract for maintaining a bank’s ATMs. The level above that is the Managed Service contract for handling the day-to-day operation of bank ATMs as well as maintenance. The third level, called the

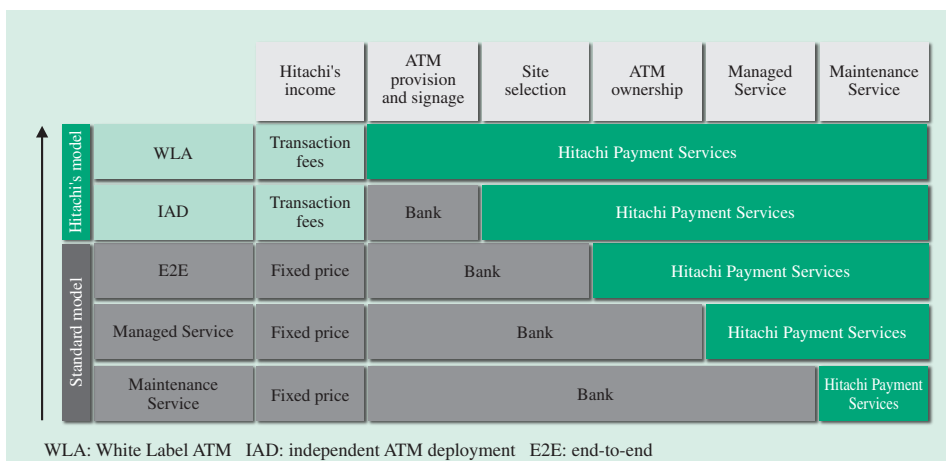


Fig. 2—Hitachi Payment Services ATM Services. Services are offered on a number of levels with different roles for Hitachi Payment Services and the customer (bank). Each of these has a different revenue model.

End-to-End (E2E) contract, involves Hitachi Payment Services owning the ATM assets as well as providing the Managed Service. Level four, Independent ATM Deployment (IAD), is like E2E in that it provides services on the bank's behalf, but in addition to Hitachi Payment Services owning the ATMs, it also selects where to site them. This approach is based on a pay-per-use contract in which income depends on the volume of transactions, such that service income is increased by locating ATMs where they will attract the most transactions. Level 5 corresponds to WLAs for which there is no contract with a bank. These ATMs are installed and operated under Hitachi Payment Services' own brand and generate income by charging transaction fees.

The business consists primarily of operation services in which operation is outsourced to the ATM vendor and maintenance services, which in Japan are usually handled by the financial institution.

Service Strengths

Among the strengths of Hitachi Payment Services' services are its selection of ATM sites and their performance optimization (see Fig. 3).

Hitachi Payment Services' services include the IAD model and WLAs in which it selects the ATM sites for itself and optimizes their performance.

Site selection is performed on a work bench management system (WBMS) using the following procedure.

(1) Hitachi Payment Services' analysis division analyzes the movements of people based on information about transportation, shopping, and other facilities around the location of interest.

(2) In addition to the above analysis, Hitachi Payment Services selects potential sites with reference to what other ATMs are installed nearby and their available transactions (host/competing bank classification, number of transactions, and so on), and posts these on the WBMS.

(3) Intermediaries based throughout India survey their respective districts and register potential candidates. The candidate details, contract conditions, infrastructure, and other factors are confirmed and provided to Hitachi Payment Services through the WBMS.

(4) Hitachi Payment Services assesses these and initiates an installation project for those candidate sites that pass assessment.

After installation, Hitachi Payment Services undertakes a "performance improvement program" (PIP) that applies the following procedure to all ATMs to optimize their performance.

(5) A profit calculation is performed by calculating daily and monthly sales (fee income) and costs for each ATM.

(6) Error information (symptoms and cause) from each ATM is collected at a center. The information is classified based on whether or not errors are the responsibility of Hitachi Payment Services and the corresponding downtimes are calculated.

(7) ATMs in need of improvement actions are identified from the above profit and downtime information.

(8) The person assigned the job of improving an ATM visits the site to assess the situation.

(9) Improvement actions are determined and then implemented. These may include changes to the external appearance such as labeling or signage, infrastructural improvements such as the installation of a solar panel or uninterruptible power supply (UPS), cost savings such as renegotiating rent, or security improvements.

(10) Performance is monitored after the actions are implemented. If no improvement is achieved, the ATM is moved or taken away.

In this way, service profitability and availability are improved by utilizing data analysis and the nationwide service network and working through a plan, do, check, and act (PDCA) cycle for selecting ATM sites and improving performance.

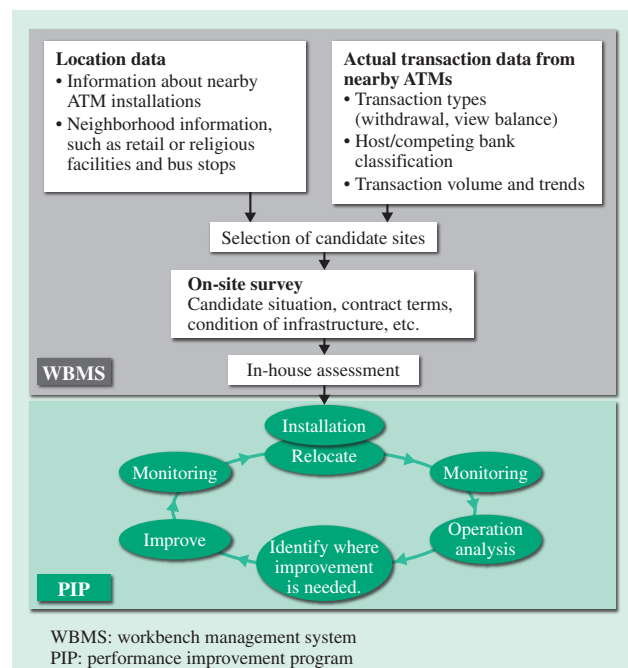


Fig. 3—ATM Site Selection and Performance Optimization. Hitachi Payment Services uses data analysis to determine where to site ATMs, and performs ongoing monitoring after installation to improve performance.

SERVICE DEPLOYMENT PLAN

Deployment Outside India

Expansions in financial services such as payments and transfers are currently also occurring in such places as Southeast Asia and the Middle East. Meanwhile, there is also demand from financial institutions for system outsourcing to cut costs. Accordingly, Hitachi Payment Services is considering expanding its business model for ATM services and POS system services to other countries in the future.

Because business conditions such as market size and regulations vary from country to country in relation to such things as how to enter the market and the choice of partners, it is essential to proceed in a way that is appropriate to the new market. Hitachi Payment Services is also looking to partner with other businesses from outside the financial sector.

Synergies with Hitachi

(1) Cash recycling ATM installation and improvements to operation processes

While cash recycling ATMs that can accept and dispense cash are common in Japan, overseas, the term ATM typically refers to cash dispensers (CDs).

Hitachi has the leading share (as of December 2013, based on research by Retail Banking Research) of the Chinese market for cash recycling ATMs, a technology that was pioneered in Japan, and is also seeking to expand its markets and the scale of its business in other countries.

The benefits of making greater use of cash recycling ATMs include making efficient use of banknotes by dispensing deposited notes, and the consequent savings on operating costs. The key to increased use lies in the effective application of the operational know-how that has been built up in Japan and China. In the Indian market, the installation of cash deposit machines* (CDMs) is anticipated to increase rapidly for the time being as a result of RBI security measures, with a subsequent move to cash recycling ATMs anticipated to follow in the future. To facilitate the introduction and wider use of cash recycling ATMs, studies of a system suitable for use with Hitachi Payment Services' services and an operations business were launched in June 2014.

In terms of the system, a study has commenced into infrastructure that is suitable for delivering both solutions and services based on the integration of

an existing system from Hitachi-Omron Terminal Solutions, Corp. with the Hitachi Payment Services system. With regard to service delivery in particular, this will be structured so as to include support for automated equipment from other vendors (including CDs, CDMs, and cash recycling ATMs).

The operation study will include plans for revisions to cash counting and reconciliation practices, and more advanced functions for predicting transaction volume through a switch from CDs to cash recycling ATMs. Because advanced banknote recognition technology and banknote feeding technology are required to use the cash recycling operation (dispensing of deposited notes), particularly in countries with a high risk of counterfeit banknotes or deliberately altered banknotes, and countries with a large number of worn banknotes, the plan is to establish an effective operating model that incorporates the technologies and know-how of Hitachi-Omron Terminal Solutions.

This enables the establishment of a business that can cover all aspects of ATM use, combining the business of Hitachi-Omron Terminal Solutions, which seeks to increase sales of cash recycling ATMs and offer solutions in addition to equipment sales, with the business of Hitachi Payment Services, which purchases machines and offers services across their entire life cycle. From this platform, Hitachi will achieve the business expansion that formed part of its initial plans and involves extending operations overseas from the base in India.

(2) Coordination with payment solutions from other industries

Hitachi is considering seeking to make a further contribution to social innovation and expand operations by using Hitachi Payment Services' payment service as a base and incorporating other payment solutions from within Hitachi (see Fig. 4).

One example is a card-based ticketing solution for public transportation⁽²⁾.

Emerging economies such as India are building public infrastructure such as railways, airports, and roads. In India in particular, the construction of metro lines is planned or has already commenced in numerous cities, and this includes the introduction of new payment methods such as smartcards. For the electronic money market, the aim is to combine Hitachi Payment Services' payment service platform with Hitachi's electronic money solutions (including a smartcard transportation ticketing system) to implement electronic money services in emerging economies. Because the issuing of electronic money

* Use of a cash recycling ATM for deposits only.

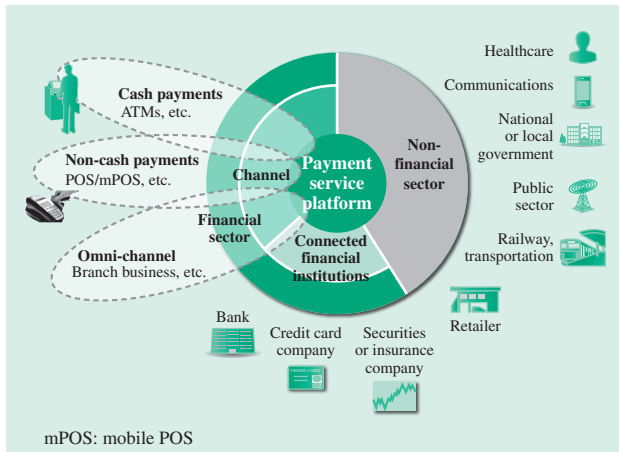


Fig. 4—Spread of Payment Services.
Hitachi anticipates that payment services will expand from the ATM and POS/mPOS services currently provided by Hitachi Payment Services to include collaboration with financial institution branches, retail, transportation, government and various other sectors.

involves financial institutions, it is closely related to Hitachi Payment Services' past business activities and its customer base.

The second example is a loyalty program.

Already in use in Japan, the loyalty program solution⁽³⁾ from Hitachi Solutions, Ltd. is both a tool for offering promotions to end users and a marketing tool for retailers. Use of loyalty programs is becoming more widespread in India, creating a need for systems that are easy for both users and loyalty program administrators to use. Through integration with this solution, it is possible to offer loyalty programs, such as for encouraging ATM use or for retailers that use

POS systems, by utilizing Hitachi Payment Services' payment platform to collate and manage loyalty program points.

By combining these highly reliable systems built by Hitachi with services already in practical use in India, the aim is to deploy solutions globally.

CONCLUSIONS

This article has given an overview and described the features of the payment services provided by Hitachi Payment Services, an Indian company that is playing a major role in the global deployment of financial channel solutions.

Through collaboration with different parts of Hitachi, the aim is to make services deeper and broader, and to expand operations not only in India but throughout the world. In this way, Hitachi intends to contribute to social innovation by implementing payment services that offer seamless payments through a variety of channels, including other industries such as retail or transportation.

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Featured Articles

Smart Cash Stream Solution for More Efficient and Tightly-controlled Cash Management

Hidefumi Hamada
Ke Jiang
Hisao Ogata
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OVERVIEW: The use of automated cash handling machines is spreading rapidly in China, with the number of such machines continuing to rise, having already reached more than 200,000, similar to the total number in Japan. On the other hand, this rise in the number of machines has led to ongoing increases in the cost to banks of their operation, causing a major problem for bank management. Hitachi has been supplying cash recycling ATMs that enable efficient operation by re-using deposited banknotes in China and the rest of the world. In the future, Hitachi also plans to supply solutions that provide further operational efficiencies beyond what can be achieved using cash recycling ATMs alone. As a first step, it has launched the smart cash stream solution, which improves both the efficiency and rigor of cash management at cash handling centers.

INTRODUCTION

HITACHI first began selling cash recycling ATMs that can re-use deposited banknotes in China in 2000, with a cumulative total of more than 100,000 such machines having entered service by 2014. Meanwhile the total number of automated teller machines (ATMs) of all types in China continues to increase, having already surpassed 200,000 machines.

To improve customer service by ensuring that ATMs operate reliably, Chinese banks are placing an emphasis on equipment availability. Through fault monitoring, maintenance, and preventive maintenance of ATMs, they strive to provide reliable customer service by minimizing the amount of time ATMs are unavailable due to such problems as equipment faults or running out of banknotes. This desire to make efficient use of money and minimize the amount of time ATMs are unavailable due to running out or being full of banknotes is part of the background to why it is cash recycling ATMs rather than other types of ATMs, such as cash dispensers or cash deposit machines, that are so prevalent in China.

Activities performed by the cash handling centers that fill, collect, and replenish banknotes in ATMs include managing cash-on-hand, formulating plans for supplying banknotes to ATMs, and performing the actual supply and collection work. It is anticipated that their workload will expand considerably in the future as the number of ATMs increases.

Hitachi, which has a large share of the market for cash recycling ATMs in China, has responded to this situation by developing the smart cash stream solution, which relieves the workload of cash handling centers as the number of ATMs rises, combining greater efficiency with tighter control of cash. This article describes a solution to the problems faced by cash handling centers, and the technologies that underpin this solution.

CURRENT CHALLENGES FACING CASH HANDLING CENTERS

Current State of Cash Handling Centers

While large banks operate their own cash handling centers, this is not possible for small- to medium-sized banks who instead outsource this work to the central bank or a large bank. Additionally, the cash handling centers themselves come in a range of sizes, both small and large. In the case of large banks, while some cash handling centers may handle as many as 1,000 ATMs, others may handle less than 100.

Fig. 1 shows an overview of the operations of a cash handling center. This shows how, along with the delivery of cash cassettes loaded with a number of banknotes determined separately for each ATM, the center also counts and sorts the banknotes from collected cash cassettes and uses those that are reusable to fill the next lot of cassettes.

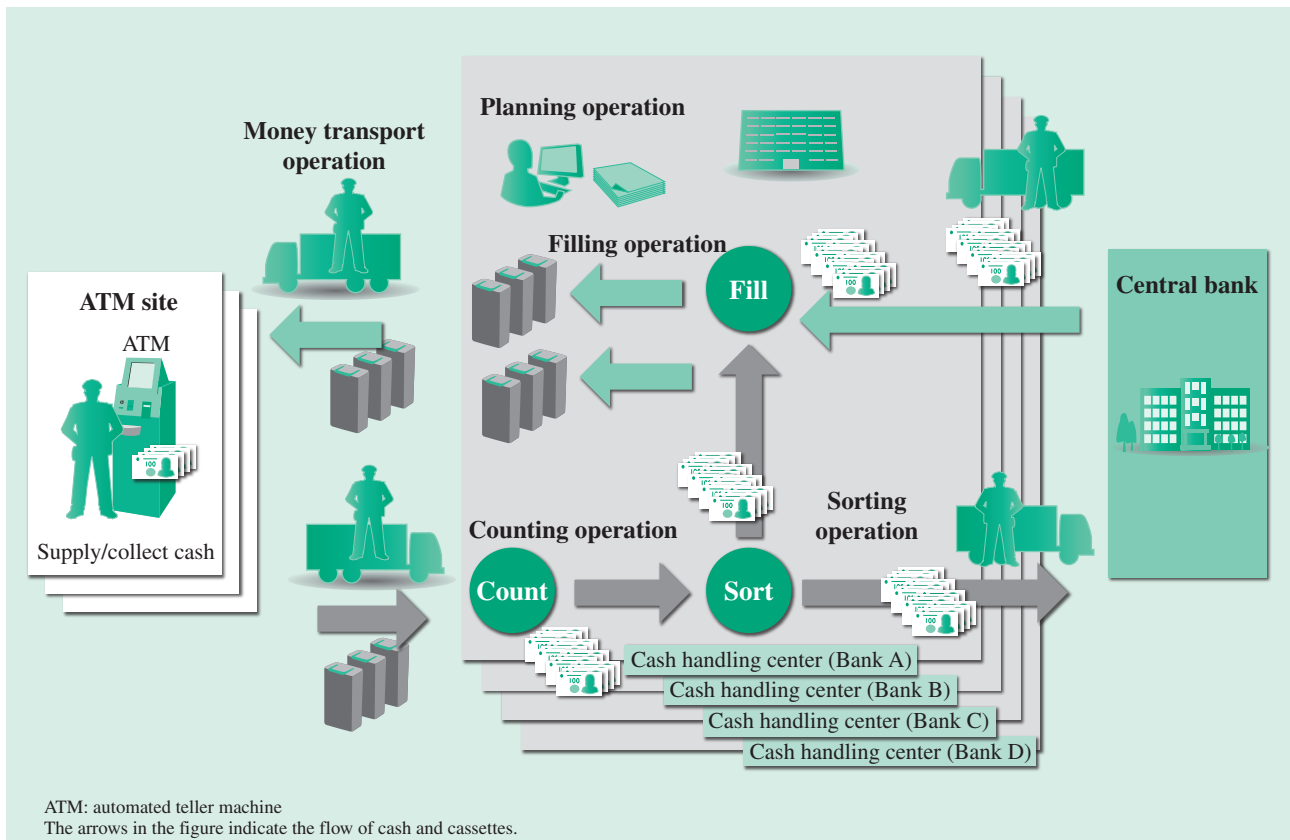


Fig. 1—Overview of Cash Handling Center Operations.

The figure shows the sequence of steps whereby money is received from the central bank and supplied to ATMs, and collected cash is returned to the central bank, as well as the role of the cash handling center in this process.

The plan prepared for banknote filling stipulates how many banknotes to supply to each ATM, determining the number of banknotes to load into cash cassettes and the route that the security van is to take to visit each ATM location. Filling consists of counting out the number of banknotes specified by the plan for each ATM and inserting them into cash cassettes. Transporting the banknotes consists of visiting ATMs to load the cash cassettes prepared in (delivered from) the cash handling center and collect the ones slipped into the ATM.

The first step in the counting process is to count the banknotes from the collected cash cassettes. This is followed by a reconciliation step in which the totals are compared against the ATM balances recorded in the accounting host computer to confirm that they match. Finally, there is the sorting step, which includes separating the collected banknotes into those that can be used again to fill ATMs on the following day and those that are to be returned to the central bank as damaged notes. The final sorting of the banknotes includes making sure they are all oriented the same way and collecting them into bundles of 100. Cash

handling centers repeat these tasks several times a day, with each task needing to be performed accurately despite the time constraints.

Obstacles to Achieving More Efficient Cash Management

The following lists six obstacles to making the cash handling center tasks described above more efficient.

- (1) Forecasting demand for cash is one of the difficulties of ATM operation, meaning it is necessary to predetermine the number of banknotes to supply when filling an ATM, or else to supply significantly more than what will be needed.
- (2) The more ATMs there are, the longer it takes to produce a filling plan.
- (3) While it is desirable to visit only the bare minimum of locations when filling ATMs and collecting cash, the difficulty is that, for security reasons, the route needs to be different each day.
- (4) The more ATMs there are, the greater the number of security vans and the higher the transportation costs.
- (5) Higher banknote handling volumes result in higher labor costs for sorting.

(6) Efficiency is low because each bank in a region operates its own cash handling center and performs its own filling and collection.

Obstacles to Maintaining Tighter Control of Cash Management

The following lists four obstacles to achieving tighter control over cash management.

(7) Inability to monitor the supply and collection of cash cassettes in ATMs and how staff go about their work.

(8) No records to trace what happens when cash cassettes or banknotes go missing.

(9) Investigating claims relating to ATM banknote deposits and withdrawals is time consuming.

(10) When reconciliation finds a mismatch between the counted number of banknotes and the balance recorded in the host computer, investigating the cause is time consuming.

Because cash handling centers face these obstacles to achieving more efficient and tightly controlled cash management, they place a large burden on the banks that operate them.

SOLUTIONS FOR OVERCOMING OBSTACLES

Not all of the above problems faced by cash handling centers can be overcome by installing cash recycling ATMs. Accordingly, Hitachi decided to augment the benefits of cash recycling ATMs and develop ATM functions and cash handling center solution tools that could overcome the above problems. Table 1 lists the obstacles and corresponding solutions.

Making More Efficient Use of Money

Cash recycling ATMs work by reusing deposited banknotes for withdrawals, thereby using cash more efficiently by reducing the frequency with which banknotes need to be supplied and collected from the ATM.

Further improvements in cash efficiency can be made using a cash demand forecasting tool. This tool forecasts how many banknotes need to be supplied to an ATM on the following day based on past ATM transactions. Many banks in China still do this manually based on past experience.

Forecasting how much money cash recycling ATMs will require is generally very difficult. The number of banknotes in a cash recycling ATM varies not only due to the relative proportions of deposits and withdrawals, but also due to the different timings of peaks in

TABLE 1. Obstacles and Corresponding Solutions
This table lists the problems faced by cash handling centers and their solutions.

	Category	Obstacle	Solution
(1)	Efficiency	It is difficult to forecast how many banknotes to supply.	Recycle function
(2)		Planning the cash filling operation takes time.	Automatic reconciliation
(3)		It is difficult to change cash delivery routes.	Cash demand forecasting
(4)		Increased costs and number of vans	Delivery plan
(5)		Increased sorting volumes	Filling and collecting banknotes
(6)		Each bank has its own cash handling centers.	Cassette management
(7)	Control	It is difficult to monitor cassette filling and collection and work progress.	Cassette management
(8)		Cassettes and banknotes, etc. cannot be tracked.	Serial number management
(9)		Investigating claims takes time.	
(10)		Investigating out-of-balance reconciliation takes time.	

deposits and withdrawals. It is this that makes demand forecasting more difficult than it is for cash dispensers (where the number of banknotes steadily reduces) or cash deposit machines (where the number of banknotes steadily increases), with the added complication that the number of transactions per day is significantly higher in China than it is for typical ATMs in Japan.

The cash demand forecasting tool that has resolved this problem makes it possible to operate ATMs with the minimum amount of cash needed to ensure they never run out. This not only reduces the interest from the central bank associated with ATM servicing, it also helps minimize workloads, as described in the next section, by reducing the number of banknotes that need to be counted.

Minimizing Workloads

Cash recycling ATMs supplied by Hitachi have an automatic reconciliation function. Here, “reconciliation” means the task of comparing the number of banknotes in the ATM against the ATM transaction data recorded in the accounting host computer to confirm that the numbers match. In the past, this required that the cash cassette be removed from the ATM and taken to a cash handling center. In contrast, the automatic reconciliation function verifies the number of banknotes in an ATM by feeding out the banknotes from its cassette and having the machine count them itself.

Because reconciliation can be performed without needing to collect banknotes from the ATM, this minimizes the workload associated with collecting cash cassettes and counting banknotes at the cash handling center.

Hitachi also provides effective tools that reduce workloads for routine tasks performed at cash handling centers. Planning the filling of ATMs has in the past been performed manually on the day when cash cassettes are to be delivered to ATMs by determining for each ATM whether or not filling and collection are required and, if required, how many banknotes to supply. When the cash demand forecasting tool is used, this is performed automatically at the click of a button, taking only a few seconds and producing a schedule sheet. It can also produce plans that are more detailed and use fewer banknotes than those determined based on a planner's experience.

The delivery planning tool, meanwhile, can reduce the number of security vans needed by determining the appropriate number to use to perform cash filling and collection for a different set of ATMs each day.

The banknote filling and collection tool is used to fill cassettes with the number of banknotes specified in the filling plan (which is different for each ATM). It reads the radio-frequency identification (RFID) tag attached to each cash cassette to identify which ATM it is to be supplied to, and in which order it is to be loaded, and a sorter (a device that automatically counts and sorts banknotes) is used to automatically issue the required number of banknotes. As a result, all the worker needs to do is take the banknotes issued by the sorter and load them into the cassette.

Tighter Control

Keeping track of cash cassettes is one of the requirements for tighter control, and Hitachi supplies a cassette management tool for this purpose. Workers are able to scan the RFID tag attached to each cassette in the workplace. By tracking the ID information read from the RFID tags, the cassette management tool keeps track of where each cassette is currently located through each step, including taking the cassette from the depository, loading it into a security van, and loading it into an ATM. This enables continuous monitoring of the location and status of all cassettes.

The same tracking can also be performed for banknotes. Each banknote has a printed serial number for identification. This serial number is read and recorded each time a banknote is counted in the sorter or deposited or dispensed in a cash recycling ATM.

Hitachi supplies a serial number management tool that manages and tracks these recorded serial numbers and is useful for investigations such as customer inquiries about banknotes or when totals cannot be balanced in reconciliation.

Information Linking

Each of the above tools can be used on its own. However, further efficiency improvements can be made by linking information together, using the output of one tool as the input to another (see Fig. 2).

The system is based around a central management server to which management terminals, counters, and other devices are connected, controlled, and interlinked. Currently, no such system is available that provides integrated management across all cash handling center activities. So, deploying this system in a cash handling center would enable it to operate with greater operational efficiency and tighter control.

Through efficiency measures like this, it is possible to increase the volume of work that a cash handling center can process. In this way, even more efficient operation could be achieved by consolidating at a regional level the cash handling centers currently operated separately by each bank to save them from duplicating the same tasks and delivering cash along similar routes.

TECHNOLOGIES UNDERPINNING THE SOLUTIONS

Cash Demand Forecasting Technique

Because cash recycling ATMs reuse deposited banknotes, the number of banknotes in an ATM's cash cassettes will fluctuate up and down throughout

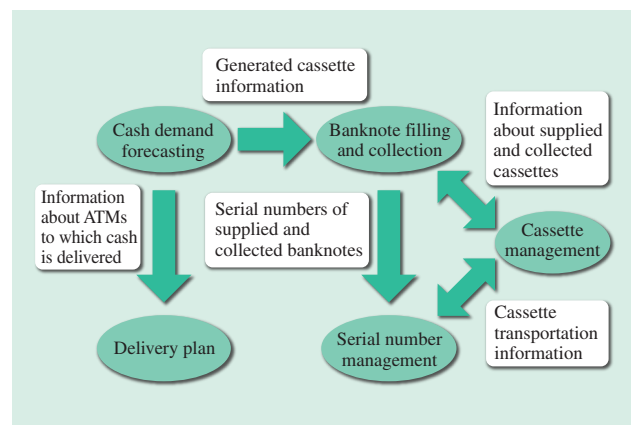


Fig. 2—Tool Outputs and Overview of Integration.

The linking of information is achieved by using the output of one tool as the input to another.

the day. This behavior is significantly different to the case when the number of banknotes in a cassette only decreases (as in a cash dispenser) or only increases (as in a cash deposit machine), making cash demand forecasting more difficult.

While cash demand forecasting for cash recycling ATMs is used widely in Japan, reusing the same techniques without modification is not viable in China where the volumes of deposits and withdrawals from cash recycling ATMs are much larger and more dynamic. Furthermore, while it is possible to apply learning techniques to records of past ATM deposit and withdrawal transactions and use this as the basis for forecasting future demand for money, operational constraints mean it is not always possible to obtain a sufficient quantity of past data from financial institutions.

It is common with forecasting techniques that, whereas forecast accuracy is enhanced by using a more complex forecast model, a lack of learning data leads to poorer accuracy. Accordingly, Hitachi chose to adopt a hybrid approach whereby it produced a number of forecast models of varying complexity which are combined in the way that provides the best possible forecast accuracy given the quantity of transaction records available for learning at any given time. If combining forecast models fails to provide sufficient accuracy, practical cash demand forecasting techniques are implemented that modify operating practices to augment the accuracy. Because of this flexibility, the demand forecasting technique developed by Hitachi can also be used to forecast cash demand at a bank’s branches and at its major customers (see Fig. 3).

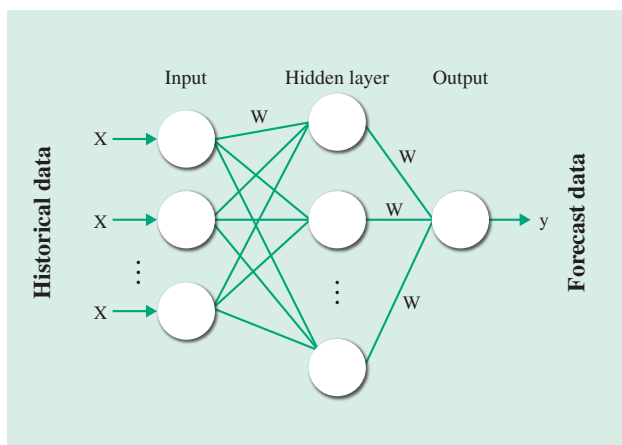


Fig. 3—Example Forecast Model (Neural Network). The model uses a neural network to forecast upcoming demand for money from records of past requirements.

Delivery Route Optimization Technique

Even once the amounts of cash to load into the cash cassettes for each ATM have been determined based on the cash demand forecasts, the cost of delivery for cash handling centers can vary widely because the number of ATMs to visit also varies depending on the cash demand forecasts, with the number of security vans required to deliver the cassettes being significantly different depending on the sequence in which these ATMs are visited. In response, Hitachi has developed a new technique for optimizing delivery routes. Taking account of how much time is to be spent at each ATM, the technique searches for the route that can visit the greatest number of ATMs within the maximum permitted time between departing the cash handling center and returning. The technique can also optimize the routes when the ATM visits are performed by a number of security vans. The newly developed technique can also be used to optimize routes for visiting bank branches and major customers as well as ATMs (see Fig. 4).

PLANNED FUTURE SOLUTIONS

Since it first started selling cash recycling ATMs in China in 2000, Hitachi has supplied more than 100,000 machines to date.

Cash recycling ATMs are not yet widely used in the rural and inland areas of China, where cash dispensers account for more than half of all ATMs. Along with replacing these with more efficient cash recycling ATMs, the demand for replacing old cash recycling ATMs that have been in service for eight years or more means that the cash recycling ATM



Fig. 4—Example of Delivery Route Optimization. The technique automatically searches for the optimal (quickest) route for visiting each site.

business can be expected to continue to grow in the future.

With the increasing number of cash recycling ATMs, Hitachi is focusing system development on improving operational efficiency and tightening control at cash handling centers. Other activities relating to the operation of cash recycling ATMs include equipment monitoring and maintenance.

In the future, Hitachi aims to achieve even greater efficiencies by expanding the scope of its solutions to incorporate monitoring, maintenance, and other tasks at central management servers. Examples include use of the electronic journals that record transactions at ATMs to progressively improve the accuracy of cash demand forecasting, or the collection of information such as monitoring data and cash recycling ATM equipment logs to perform preventive maintenance. These efficiency-enhancing solutions will lead to future businesses that can provide ATM operation services.

CONCLUSIONS

This article has given an overview of solutions for improving the efficiency of cash handling center operation and tightening control of cash management in China, and described the technologies that underpin these solutions.

By improving the operation of cash handling centers and reducing the workload associated with operating ATMs, these technologies and solutions enable banks to focus more on their core financial activities. Hitachi believes it can provide solutions that contribute to bank management.

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 Kazuma Miyamoto
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OVERVIEW: With India expected to experience strong growth in its IT market, Hitachi Systems, Ltd. sees the country as a strategic base and, in March 2014, acquired Micro Clinic India Pvt. Ltd. and re-established it as Hitachi Systems Micro Clinic Pvt. Ltd. Using the company as a base, Hitachi intends to expand its business in India by enlarging the scope of its operations, taking steps to increase its sales to both local customers and Japanese-owned businesses, and by developing new businesses through collaboration with data center operators. It is also increasing its revenues by seeking to expand its fee-based service businesses.

INTRODUCTION

HAVING specified a target “global ratio” of 10% in its mid-term management plan, Hitachi Systems, Ltd. has formulated and is implementing an overseas business strategy. Along with an accelerating trend toward the “China plus one” strategy, and taking account of trends in Japanese customers establishing overseas operations and in the growth prospects of information technology (IT) markets, Hitachi is focusing on Southeast Asia when choosing which markets to enter. In FY2013, Hitachi established a joint venture together with Sunway Technology Sdn. Bhd. The new company, Hitachi Sunway Information Systems is headquartered in Malaysia and operates businesses in the nations of Southeast Asia. Following on from this, Hitachi has chosen India as a strategic base for an IT infrastructure because of the country’s large IT market relative to the rest of Asia, and because it is expected to enjoy strong ongoing growth. To enter the Indian market, Hitachi acquired Micro Clinic India Pvt. Ltd. and re-established it as Hitachi Systems Micro Clinic Pvt. Ltd. (HISYS-MC) in March 2014. Micro Clinic listed leading companies among its customers, and had an affinity with the business of Hitachi Systems in terms of its strong technical capabilities in network and system implementation, and excellent customer marketing capabilities.

This article describes HISYS-MC’s regional business strategies in India, how it integrates into Hitachi’s business, and the synergy benefits it provides.

OVERVIEW OF HISYS-MC’s BUSINESS

HISYS-MC operates throughout India, with 16 business offices, including its New Delhi headquarters. It has approximately 1,000 staff members (as of November 2014) (see Fig. 1). Its predecessor, Micro Clinic, was established in 1993. HISYS-MC supplies a wide range of IT services, with more than 200 customers from a variety of businesses, including finance, manufacturing, and the public sector, and

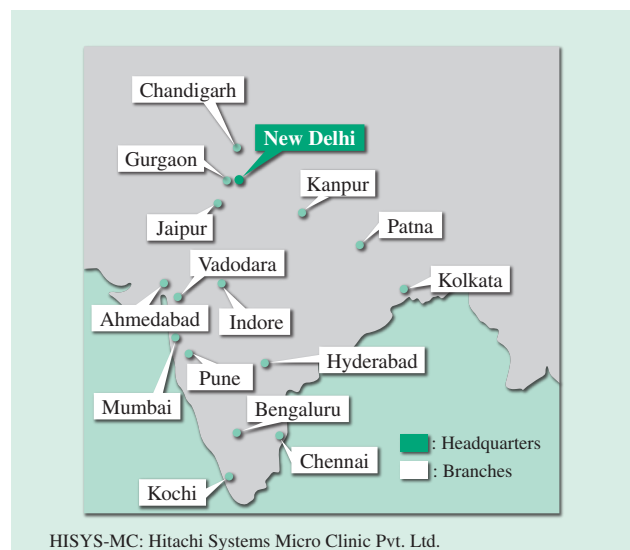


Fig. 1—Indian Operations of HISYS-MC. HISYS-MC’s business operates from 16 business offices that provide nationwide coverage, including its New Delhi headquarters, with staff on-site at more than 150 customer premises.

partnerships with numerous IT vendors, including hardware manufacturers and security software vendors.

Micro Clinic Prior to Acquisition by Hitachi

Unlike the mature IT market in Japan, market penetration for IT in India remains low and there is an expectation for the market to grow strongly in the future. In particular, annual growth of more than 15% is forecast for the IT services sector⁽¹⁾. However, customers are cost-sensitive and prefer the latest advanced technology.

With 21 years of business experience in this Indian market, Micro Clinic earned a high level of trust from customers for satisfying both their cost and technology requirements by utilizing staff with a high level of skills and technical capabilities and by building strong relationships with IT vendors.

HISYS-MC now mainly operates in the following four areas, supplying customers with end-to-end IT services.

(1) Information infrastructure

Sales, design, and implementation of hardware and software for networks, servers, personal computers (PCs), storage, and operating systems (OSs)

(2) Information security

Sales, design, and implementation of hardware and software for firewall, anti-virus, information security countermeasures, and other security products

(3) Information availability

Sales, design, and implementation of high-availability products, including storage (clustering, backup and recovery) and virtualization

(4) Services & solutions

Maintenance services, desk support (including help desks that use tools developed in-house), and operational support

Benefits of the Acquisition

The acquisition of Micro Clinic by Hitachi Systems means that HISYS-MC can look forward to strong growth. Among the factors expected to make a positive contribution to growth are use of the Hitachi brand to gain greater recognition from customers, better contract terms with hardware and software vendors, recruitment of quality staff, and greater financial trustworthiness.

Along with these benefits, other benefits of the acquisition have also manifested through the commencement of new business with multinationals and large Indian companies.

In addition to existing businesses, HISYS-MC is investigating how to make a contribution to the “Social Innovation Business” targeted by Hitachi, including power systems, urban management, and the monitoring and operation of healthcare systems.

While it currently supplies services throughout India, HISYS-MC also aims to grow into a company that operates in global markets by acquiring international customers and expanding the scope of its services.

HISYS-MC'S BUSINESS STRATEGY

In addition to the benefits of acquisition described above, HISYS-MC is pursuing four business strategies to expand its business further and accelerate synergies.

(1) Regional strategy

Expand business in the west of India, where the finance industry is concentrated, and in southern India, where there is a large automotive industry, from its business operations centered in India's north where government agencies and small- and medium-sized businesses (SMBs) are concentrated.

(2) Shift to fee-based business

Focus on the rapidly growing and high-margin IT service sector and increase the proportion of fee-based business.

(3) Deploy Japanese businesses

Extend services and enlarge the scope of the business by deploying managed services (a strength of Hitachi Systems) in India.

(4) Strengthen sales

Increase sales to Japanese companies and local customers through collaboration with Hitachi companies.

The following sections describe each of these strategies.

Regional Strategy

While HISYS-MC's business operations have been centered in Delhi, in FY2013 it also strengthened its sales capabilities and technical capabilities in relation to security and availability in western regions centered around the financial center of Mumbai. In FY2014, the company strengthened its sales capabilities in southern regions centered around Chennai, Hyderabad, and Bengaluru, where there has been notable activity in the establishment of operations by automotive and other manufacturers. As a result, sales in western and southern regions are growing. India is characterized by differences in the concentration

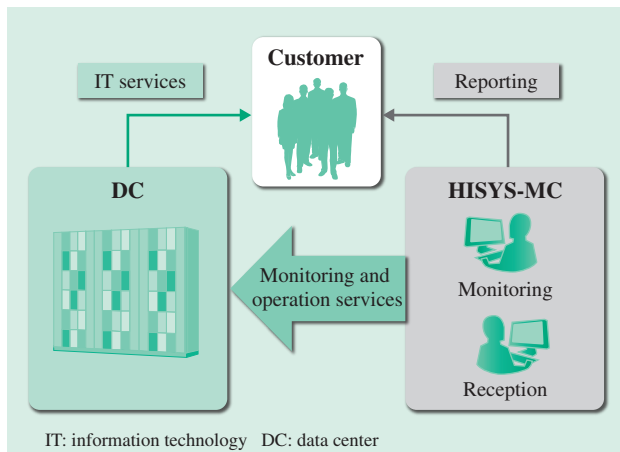


Fig. 2—DC Services Overview.

With demand for DCs in India forecast to grow, HISYS-MC supplies services for monitoring and operating customer IT assets at DCs.

of industries in different regions, and the Modi administration is promoting manufacturing under the slogan, “Make in India,” taking active steps to attract manufacturing to places such as the western state of Gujarat. Taking note of this industrial policy of the government, HISYS-MC is continuing to strengthen its organization in order to grow from a company that is strong in particular regions to one that has a nationwide presence.

Shift to Fee-based Business

India is experiencing strong growth in IT services, a sector where margins are higher than they are in hardware and software sales or in design and implementation. Although HISYS-MC already provides maintenance services for IT infrastructure, such as PCs and servers, as a fee-based business, it is seeking to expand its fee-based business by adding to its existing services data center (DC) services and security operations services that utilize the accumulated knowledge, experience, and technical capabilities of Hitachi Systems.

(1) DC services

These services draw on Hitachi Systems’ DC operating experience, technical capabilities, and track record of supplying various managed services to monitor and operate customers’ IT assets (see Fig. 2).

By outsourcing their IT, customers are freed up to concentrate on their core business.

Demand for DCs is believed to be rising in India based on a background of weak infrastructure that includes frequent power outages and unreliable telecommunication services, with growing

requirements for monitoring and operation services for equipment at DCs, and disaster recovery measures to support backup and other business continuity planning (BCP) needs.

The shift from ownership to renting is also strong in India, meaning that IT infrastructure is utilized when and as needed, instead of owning it.

Among multinationals, meanwhile, examples of companies operating the IT infrastructure for sites in other countries from India continue to increase as they take advantage of the ease with which IT staff can be recruited in India, as well as its staffing and other cost advantages.

In this way, along with supplying the experience and technical capabilities of Japan to customers in India, where demand is rising, development is proceeding with a view toward globalizing the operations of IT infrastructure.

(2) Strengthening of security services

Development is proceeding on services that can deal with the rise of Internet businesses that demand a high level of security in India, and the growing demand for outsourcing the operation and management of security products that require complex configuration and operation.

Hitachi is investigating services that monitor and operate customer equipment, including firewalls and other security products as well as servers, and that provide monitoring and analysis by specialists who check for signs of unauthorized external access or other problems and implement countermeasures when an incident is identified.

Security monitoring requires a high level of technology, and provides customers with benefits that include lower security risks and improved awareness of compliance (see Fig. 3).

Deployment of Japanese Businesses

The intention is to launch DC services and security service businesses through the transfer of technology in the form of operational knowledge and experience held by Hitachi Systems.

The plan is to begin by providing services that include a point of contact for customer inquiries, providing replies based on existing knowledge, and routine operational tasks, and then subsequently grow gradually into an organization capable of supplying advanced services.

After that, the plan is to increase the size and quality of the operation so that it can supply services to overseas customers as well as those in India. In

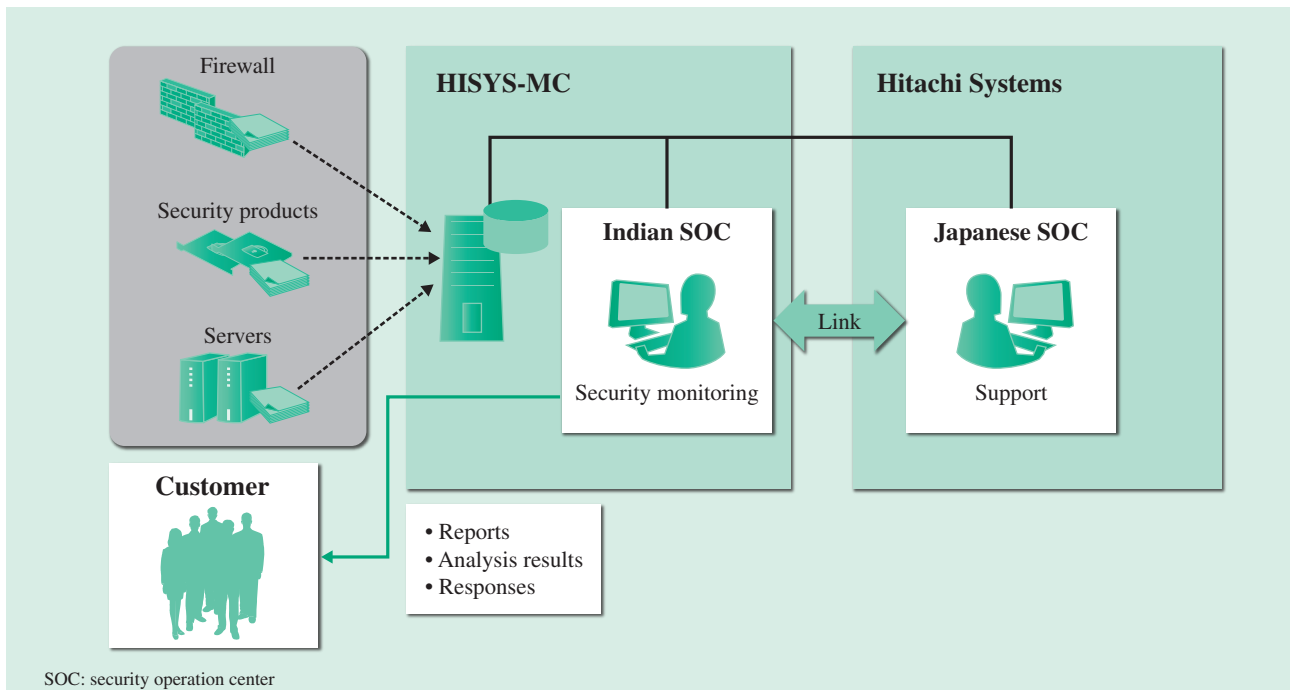


Fig. 3—Security Services Overview.

In collaboration with a Japanese SOC, the services monitor for unauthorized external access and provide operation and management of security products.

this way, it will also contribute to the globalization of Hitachi Systems' DC services and security services.

Although the DC services and security services of Hitachi Systems have mainly been provided to customers in Japan, it is increasingly important to support customers establishing operations overseas and to expand businesses targeting regions where emerging nations are experiencing ongoing economic growth. It is planned that HISYS-MC will also contribute to this by operating as a base for the overseas deployment of Japanese services.

Strengthening of Sales

To strengthen sales to Japanese companies and local customers, Hitachi intends to seek new business by encouraging collaboration with other Hitachi companies and Japanese partners.

(1) Collaboration with Hitachi Data Systems Corporation

Hitachi Data Systems Corporation (HDS) has a strong product range centered around storage equipment. HISYS-MC has gained partner certification by training sales and technical staff for HDS products. It also provides customer support that includes the design and implementation of HDS products and the provision of maintenance services. Having already won large orders through collaboration with HDS,

the company intends to continue to strengthen its collaboration with HDS and increase sales.

(2) Collaboration with other Hitachi companies

By providing IT support in collaboration with Hitachi India Pvt. Ltd., Hitachi's regional headquarters in India, HISYS-MC helps Hitachi companies establish and expand their operations in India.

It is also seeking to strengthen sales by cooperating with Hitachi Sunway Information Systems, Hitachi Systems' subsidiary in Southeast Asia, to expand the scope of their joint business and complement each other's strengths.

(3) Example sales activities targeting Japanese companies

The following describes two examples of sales activities that target Japanese companies.

Dating back since prior to its acquisition by Hitachi, HISYS-MC has been dealing with a large Japanese manufacturer for more than a decade, providing end-to-end IT support that includes the supply of IT infrastructure, backup and recovery and security products, and maintenance services. It has earned the customer's confidence through its nationwide support network in India and its work on proposing improvements. Having become part of Hitachi, HISYS-MC is seeking to contribute to the expansion of the customer's operations and win

more business through the expectation of providing further quality improvements and best practices as a multinational company.

The second example involves a joint venture with a Japanese company. HISYS-MC is part of a joint venture with a Japanese system implementation company that is proceeding with marketing activities that take advantage of their respective customer bases among Japanese companies and of HISYS-MC’s service capabilities for providing IT infrastructure. The benefits of the joint venture are already apparent, with orders having been won to supply IT infrastructure and implementation services that include the supply of servers and configuration of mail servers at Japanese companies. In the future, they intend to continue winning more orders through collaborations that draw on their respective strengths.

CONCLUSIONS

This article has described HISYS-MC’s regional business strategies in India, how it integrates into Hitachi’s business, and the synergy benefits it provides.

By pursuing and implementing the business strategies described in this article, HISYS-MC is seeking to continue growing by cultivating its existing businesses and expanding its synergies with Hitachi.

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Featured Articles

Trends in Finger Vein Authentication and Deployment in Europe

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OVERVIEW: As the need for IT security grows, finger vein authentication technology developed by Hitachi is being adopted in markets throughout the world. Through improvements in authentication and operational technology, this use is spreading beyond security to also encompass applications where the technology provides greater convenience. In the UK, Barclays has adopted the technology for use in biometric authentication, providing a convenient way to reliably verify individuals when they make payments via corporate Internet banking.

INTRODUCTION

WITH the rise over recent years in the number of criminal acts such as terrorist attacks in cyberspace, information leaks due to unauthorized actions by insiders, and fraudulent funds transfers via Internet banking, people are increasingly looking to find more reliable forms of personal identification.

Furthermore, it is common for users to reuse the same ID and password when this method of identification is adopted, meaning that if the password to one service is stolen it opens up the risk of unauthorized access to other services as well. This poses a challenge to the prevention of identity fraud.

Biometric authentication, on the other hand, identifies people from their biological characteristics, with features including being less prone to identification being forgotten or stolen. It is used at companies and at public facilities such as airports in a wide range of applications, including control of arriving and departing passengers, system login authentication, attendance management, and time-clocking.

In addition to preventing identity fraud, attention in recent years has also been directed at such objectives as improving convenience by eliminating the need for entering passwords and reducing the cost of cards and other consumables, with potential being seen for biometric techniques to be utilized as a method of identification on network-delivered services in fields such as the public sector, logistics, healthcare, welfare, education, and finance.

FINGER VEIN AUTHENTICATION

Principles of Finger Vein Authentication

Biometric authentication techniques include the use of fingerprints, faces, veins, and irises. Compared

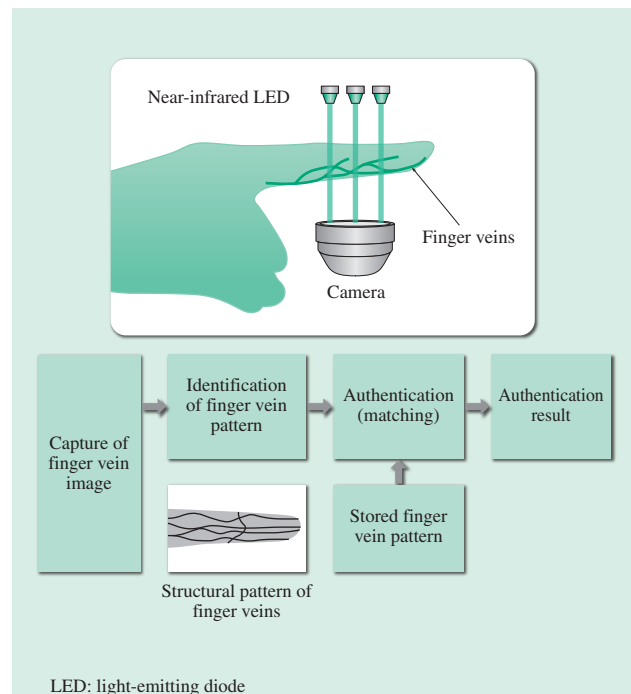


Fig. 1—Overview of Finger Vein Pattern Acquisition and Authentication Process.

The finger vein pattern is identified by finding the location of the veins in the finger vein image and then the individual's identity is authenticated by comparing (matching) this pattern with the one on file.

to other biometric features, veins are recognized as being less prone to changing with growth and age. It is also known that everyone's veins are different, and that the hemoglobin carried in veins absorbs near-infrared light.

Hitachi's finger vein authentication technology identifies people from the pattern of their finger veins obtained by passing near-infrared light through their fingers. The finger vein pattern is obtained by finding the location of veins in the finger vein image and the individual's identity is then authenticated by comparing (matching) this pattern with the one on file (see Fig. 1).

Features of Finger Vein Authentication

Finger vein authentication has the following features.

- (1) The data used for authentication is obtained from the finger veins in a person's body, and the difficulty of stealing this finger vein pattern makes identity fraud difficult.
- (2) The technique has sufficient complexity and is highly accurate.
- (3) Improvements to the algorithm provide fast authentication speed, and the technique is easy to use because it only requires the person to place their finger over a reader.

Compared to fingerprint recognition, another widely used biometric authentication technique, finger vein authentication has the following advantages.

- (1) A high degree of repeatability between recording the initial pattern and subsequent checking because the condition of the finger surface (moisture or dryness, etc.) has little influence.
- (2) Unlike people's fingerprints, which can be replicated from marks they leave behind, counterfeiting someone's finger vein pattern is difficult.
- (3) Authentication can be performed without touching the sensor unit, meaning that the technique is not significantly influenced by dirt or scratching on the reader sensor.

History of Technique's Development as a Proprietary Hitachi Technology

Hitachi commenced basic research into finger vein authentication in 1997, and started selling it in products for the physical access control (PAC) market in Japan in 2002. Since then, it has also been used in financial applications such as automated teller machines (ATMs) and counter terminals, and information technology (IT) security applications such as personal computer (PC) login authentication.

Finger vein authentication readers for embedded use in other equipment have also been used in a variety of applications beyond bank ATMs and PAC devices, including key lockers and drug cabinets.

Overseas, Hitachi supplies solutions that are designed to suit specific regions in collaboration with various regional partners. In addition to such applications as PAC systems and attendance management, the technology is used for things like preventing duplication in administrative services or tracing healthcare measures in countries that lack a residential registration system.

In addition to corporate internal security, the technology is currently also used for things like locker locks and data management at fitness centers, and work is progressing on its adoption as a security platform for such applications as attendance management for preventing overwork or as a means of personal identification in Internet banking or e-learning for gaining qualifications (see Fig. 2).

LATEST TECHNICAL TRENDS IN BIOMETRIC AUTHENTICATION IN JAPAN

Empty-handed Authentication (1:N Authentication)

Over the last few years, Hitachi has been responding to demand for large membership management and PAC systems that use biometric authentication. Identification by finger vein authentication readers can be performed in two different ways: 1:1 authentication, in which the person's finger is compared with their data on file after they have first swiped a card or otherwise identified themselves, and 1:N authentication, in which the person only has to have their finger scanned and then is identified from the data on file (here, N is the population parameter). "Empty-handed" 1:N authentication is very convenient because users do not have to carry a card or other form of identification. However, because there is an inverse relationship between accuracy and the number of comparisons (N), the following measures are needed in large membership applications to minimize the maximum value of N .

Use in Combination with Reservation Systems

When used to identify users who have a reservation, the reservation system for a membership application can use its reservation data to minimize the number of comparisons required, thereby increasing the authentication throughput. This method is used in the following situations.

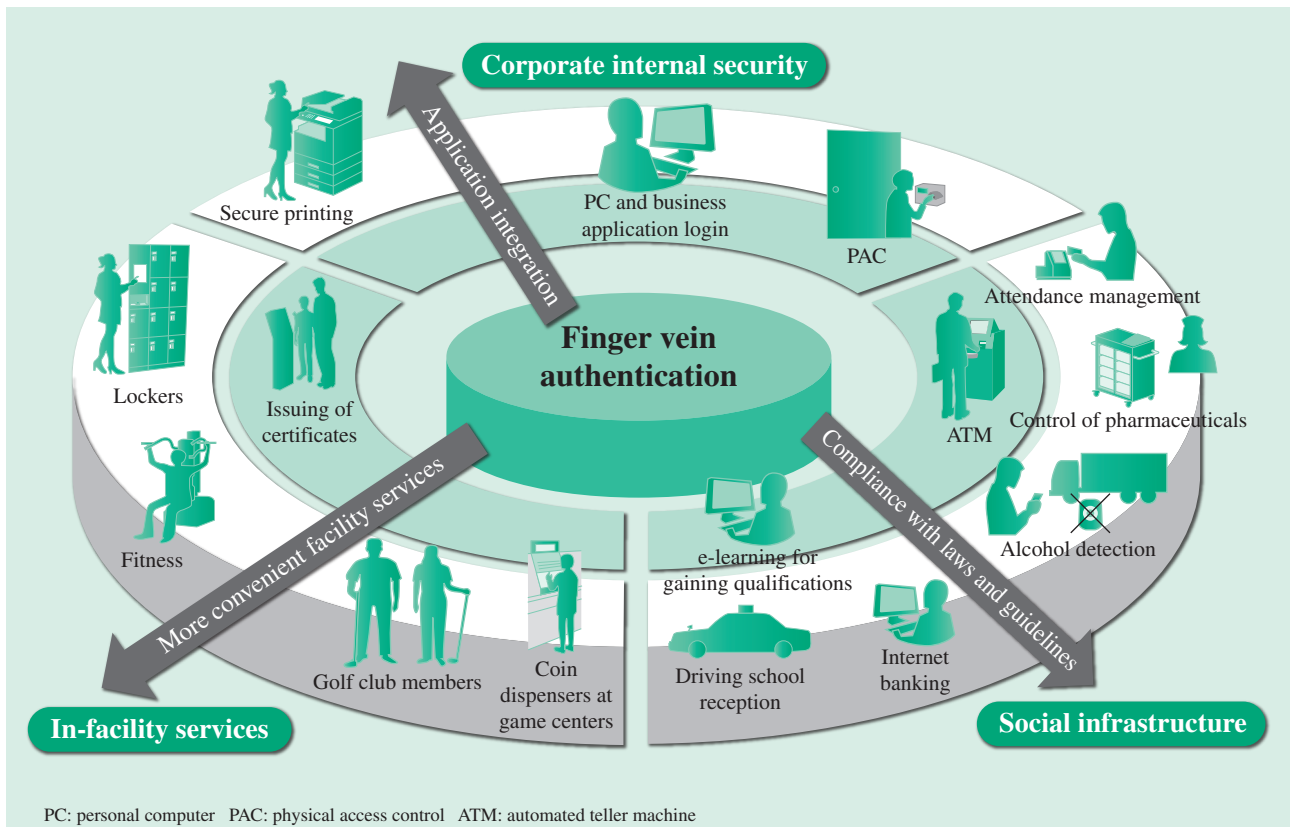


Fig. 2—Applications for Finger Vein Authentication Solutions.

Finger vein authentication solutions have applications in various fields, such as corporate internal security, in-facility services, and social infrastructure.

- (1) fitness clubs
- (2) golf clubs
- (3) theaters or concert halls
- (4) sport stadiums (football, baseball, skating)

Because the reservation holders are known in advance, this involves use of 1:N authentication from within this smaller population. In the case of fitness or golf clubs, Hitachi finger vein authentication systems have already been installed at more than 100 sites around Japan, where they have gained a reputation for improving both security and convenience.

In the case of theaters or sports venues, numerous companies are investigating the use of similar systems for upcoming major events.

Use in Combination with Passwords and Date of Birth or Other Identifiers

One way to reduce N is to use identifiers such as date of birth, address (region), or occupation, and such systems are starting to be adopted in healthcare and financial payment applications. Specifically, systems have been, or are expected to be, installed for the following applications.

- (5) radiation therapy systems
- (6) blood donation systems

- (7) ATMs
- (8) canteen and other retail payments
- (9) evacuee registration systems

Common practice is to minimize the number of comparisons needed when performing authentication by inputting the user's date of birth or password by some means.

In the radiation therapy and blood donation healthcare applications, Hitachi's finger vein authentication is helping prevent misidentifications and manage medical data appropriately.

Empty-handed Payments (Large-scale 1:N Authentication)

Empty-handed payment methods (large-scale 1:N authentication) are seen as having future applications in business. As the name suggests, this system enables users to make payments simply by scanning their fingers with a finger vein authentication reader, without needing to carry their wallet or electronic money (cards). Hitachi has already trialed empty-handed payment at staff canteens and retail stores. Work is also starting on finger vein authentication systems for payments at sites such as student cafeterias

at universities or staff canteens at companies from 2015 onward. Because it eliminates the use of cash or vouchers and enables users to visit a canteen without bringing anything with them, the system is hygienic and leads to greater customer satisfaction.

In order to implement large empty-handed payment systems in the future, it will be necessary to enhance the technology to the point where it can perform 1: N authentication with values of N in the tens of thousands or more.

Sequential Fusion Authentication and Multi-modal Techniques

Potential ways of performing authentication with values of N in the tens of thousands or more include using more than one finger or more than one form of biometric identification. Performing authentication on a number of fingers in turn is called sequential fusion authentication, and a method that uses two or more forms of biometric identification at the same time to identify a person is called a multi-modal technique. As an advanced form of sequential fusion authentication, Hitachi has devised a technique for scanning a number of fingers simultaneously and is working on its development with the aim of commercializing the technique in the near future. Once a device (gate) equipped with this technique becomes commercially available, its potential applications will include use at major events and concert venues.

EXAMPLES FROM EUROPE

Finger Vein Authentication Reader for Barclays in the UK

The financial sector is recognized as one area in which the adoption of biometric authentication techniques offers major advantages. With electronic payments and electronic transaction processing (such as Internet banking) becoming widespread, identity verification is becoming increasingly important. Finger vein authentication suits this application, which requires a high level of accuracy and security.

Hitachi started marketing finger vein authentication readers outside Japan in 2006, and has expanded the range of applications to include PAC systems, incorporation into ATMs, and PC login. Barclays Bank PLC, a large financial institution in the UK, is known for actively seeking to introduce customers to innovative technologies. Barclays and Hitachi have been working on the development of a new application for finger vein authentication in corporate Internet banking.

Barclays' corporate customers can access bank systems via a web portal to make or authorize funds transfers and other banking transactions.

A new finger vein authentication system jointly announced with Barclays in September 2014 enhances the trustworthiness of Internet banking by using finger vein authentication readers supplied by Hitachi to capture images of users' distinctive finger vein patterns and only issue a digital signature if they pass verification. Barclays' customers can complete procedures in a few seconds because they only need to place their finger over the reader to open an online connection to their accounts, without needing to use a password or similar. Barclays is able to provide robust security to its customers without keeping copies of their users' actual finger vein data.

Hitachi's finger vein authentication is already being used by banks in Japan and elsewhere as a substitute for passwords, for single sign-on (SSO) authentication, and in ATMs. The new finger vein authentication system developed by Hitachi and Barclays in collaboration combines finger vein authentication with a highly secure electronic signature technique, and the readers used by the system incorporate a function for reading encrypted subscriber identity module (SIM) cards and biometric authentication. This allows the use of public key infrastructure (PKI) to settle banking transactions using electronic authentication and signatures via the Internet. By storing the user's finger vein authentication data on the encrypted SIM card, the data can be used to make payments more secure. This is a new initiative for the financial sector that has never been used before, even in Japan. Creating the specification for this corporate solution involved working closely with Barclays over a long period of time, and Hitachi now supplies the hardware and software.

Because many financial institutions from around the world, not just Barclays, face difficulties with Internet banking that include login and payment processing, Hitachi is looking to deploy this solution not only in the UK, but also globally.

Other Applications for Finger Vein Authentication Readers in Europe

Hitachi began marketing finger vein authentication readers for ATMs in FY2006 in Europe, where they are becoming more widely adopted. In a recent example, Hitachi worked jointly with Wincor Nixdorf to supply and commission virtual teller machines (VTMs) (self-service banking systems) with finger vein

authentication at Getin Bank, the retail arm of Getin Noble Bank, a major Polish bank, in February 2014. Hitachi also received an order from ITCARD S.A., a major operator of ATMs, in May 2014 for a large number of finger vein authentication readers for use in ATMs, and plans to supply the devices progressively.

CONCLUSIONS

In the future, Hitachi is planning the global deployment of the technology in the form of a new service model that includes the (online/offline) issuing and management of digital signatures based on finger vein authentication readers built into SIM-based smartcard reader/writers. In addition to acting as a one-stop provider of biometric authentication, PKI authentication, and the associated operation and management systems, and preventing identity fraud and other misuse through the sharing of identity devices (a problem for PKI authentication), Hitachi will also contribute to the comprehensive provision

of safe, secure, and convenient information security platforms that provide simple ways for anyone to implement or use robust authentication.

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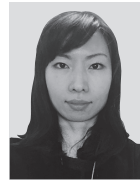
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Featured Articles

Use of Smarter Distribution for Global Logistics Service

—High Added Value Service Achieved through Integration of Procurement, Logistics, and Information—

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 Masashi Suezaki
 Hisaya Ishibashi
 Nobuaki Takahashi
 Atsushi Nabeshima
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OVERVIEW: Among the challenges facing the emerging economies of Asia are how to deal with high logistics costs, inefficient logistics operations, rapid increases in the volume of goods, and rising expectations for service quality. Of particular note is that management costs make up a high proportion of logistics costs in China, indicating that there are problems with logistics operations. In response, Hitachi has devised a service model that considers optimization across the entire supply chain and overcomes customer problems through the integrated provision of procurement, logistics, and information. To trial this service model, Hitachi has undertaken an in-house demonstration project to verify and assess its benefits, and based on the results, has deployed it from Japanese corporations based in China to Southeast Asia. In the future, Hitachi plans to expand the service into one that will support its logistics strategy through the utilization, analysis, and evaluation of big data to supply services with high added value.

INTRODUCTION

AS a proportion of gross domestic product (GDP), the cost of logistics in the emerging economies of Asia is more than double that in developed economies. This indicates that logistics in these economies are less efficient than in developed economies. Also in urgent need of attention are the rapid increases in the volume of goods resulting from surging production, and rising expectations for service quality.

Among Asian emerging economies, logistics costs in China, the world’s second largest economy by GDP, are considerably higher as a proportion of GDP than those in Japan (17 to 18% in China compared to 8.6% in Japan). Of particular note is that management costs make up a higher proportion of logistics costs in China (13% in China compared to 4% in Japan), indicating that there are problems with logistics operations.

In response to these problems, Hitachi provides services with high added value that consider optimization across the entire supply chain through the integration of procurement, logistics, and information. Hitachi’s initial aim is to overcome the logistical problems faced by manufacturers in particular, targeting China where these problems are clearly evident.

OVERVIEW OF GLOBAL LOGISTICS SERVICE

Service Model

Fig. 1 shows the service model for Intelligent Operations for Logistics, Hitachi’s global logistics service.

This integrated service to manufacturers combines parts procurement (procurement), distribution and

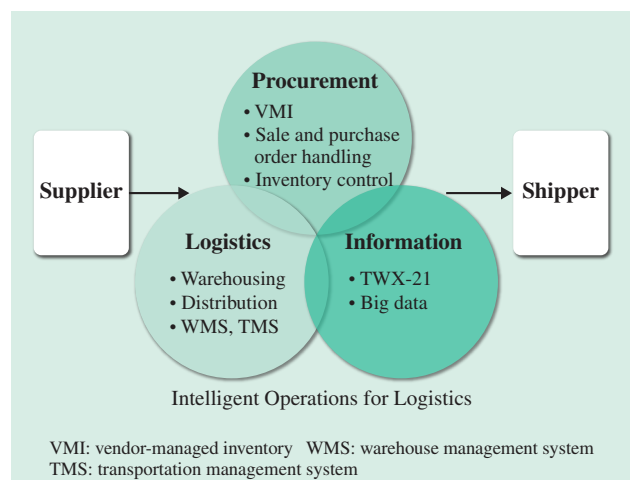


Fig. 1—Service Model.

Hitachi provides a service to manufacturers that integrates procurement, logistics, and information.

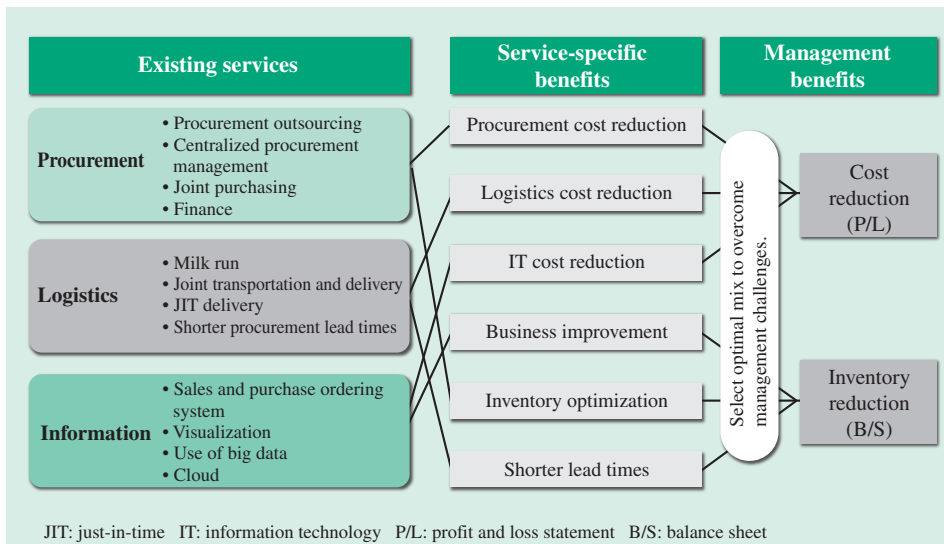


Fig. 2—Anticipated Service Benefits. This overcomes business challenges by selecting the optimal combination of existing services.

warehousing (logistics), and information technology (IT) (information).

Anticipated Service Benefits

As described above, the service is provided by combining different services from across Hitachi. Along with the specific benefits provided by each service, this should also provide management benefits that solve the more complex management problems that customers face. Two particular management benefits are as follows (see Fig. 2).

(1) Cost reduction [affecting the profit and loss statement (P/L)]

Procurement cost reduction, logistics cost reduction, IT cost reduction

(2) Smaller inventory [affecting the balance sheet (B/S)]

Business improvement, inventory optimization, shorter lead times

Service Organization

In order to provide the best possible service after conducting a preliminary evaluation, this service includes organizational infrastructure to handle each phase (see Fig. 3).

(1) Planning phase

Formulating ways of improving logistics, consulting on how to optimize locations of sites in different parts of the world

(2) Design and development phase

Logistics model, information system design and development

(3) Operation phase

Logistics, trading, IT services

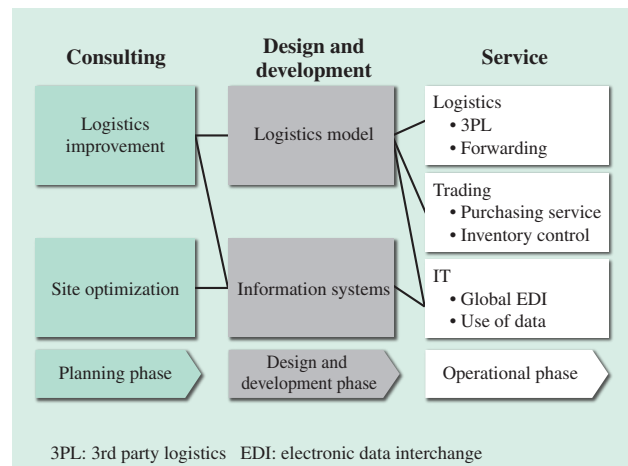


Fig. 3—Service Organization.

After conducting a preliminary evaluation, services are provided for each phase.

DEMONSTRATION PROJECT TO TRIAL THE SERVICE MODEL

Demonstration Project Model

A demonstration project involving the Chinese plants of Hitachi companies was conducted to verify the benefits of adopting the global logistics service (see Fig. 4).

The demonstration project was conducted in conjunction with the trial introduction of a “milk run service”^{*1} for three Chinese domestic suppliers (operated jointly with adjacent plants belonging to seven existing companies), and involved monitoring the status of goods received before and after adopting the service and collecting logistics information to estimate the benefits. Also, procurement data from

*1 A round-trip service in which a vehicle visits a number of sites in turn to collect goods.

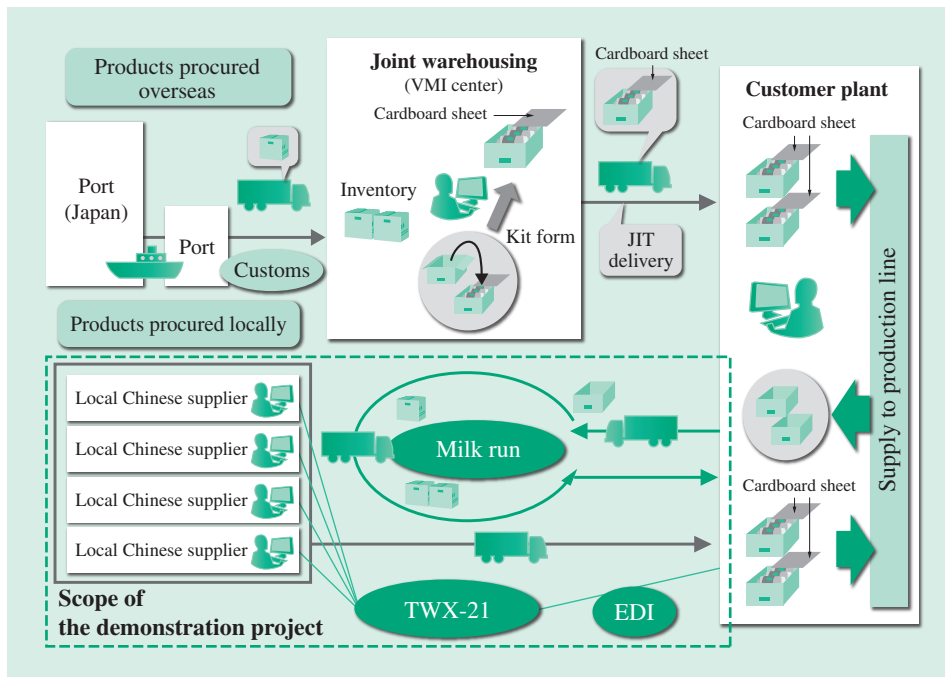


Fig. 4—Demonstration Project Model.
The diagram shows the scope of the demonstration project in terms of the three-way integrated service model.

the trial was entered into TWX-21*² and a simulation performed to assess the benefits of adopting electronic data interchange (EDI). The project also sought to identify issues for the future through consultations, etc. with customers about their inventory visualization needs (during September 2014).

Trial Results

The demonstration project identified the following benefits.

It demonstrated that using a milk run service both reduces the cost of procurement logistics and improves logistics quality. Similarly, the simulation indicated a reduction in inventory amounts.

The simulation of the benefits of adopting TWX-21 also indicated that a reduction could be anticipated in the amount of work-hours required for procurement. In numeric terms, the specific benefits are as follows.

(1) P/L benefits

(a) Reduction in procurement logistics costs

Sharing a milk run to the suppliers of the three new companies and seven existing companies with neighboring plants reduced logistics costs by 12.7%.

(b) Reduction in work-hours required for procurement

The estimated savings in work-hours for tasks such as purchasing and warehousing resulting from the adoption of EDI for procurement (simulation of 40 existing suppliers) was 17.1%.

(2) B/S benefits

(a) Reduction in inventory amounts

A simulation estimated that having neighboring plants share a milk run provides a 22.4% reduction in the amount of inventory due to more frequent deliveries made possible by the higher total volume of goods.

(3) Quality benefits

(a) Increased proportion of goods delivered on time

Switching from delivering directly from the supplier to a milk run operated by a logistics company increased the proportion of goods delivered on time from 50% to 77.7%.

(b) Lower rate of carton damage

The proportion of cartons arriving with damage fell from 12.5% to 4.3%.

Evaluation and Issues

While the fact that the demonstration project achieved logistics cost savings in excess of the 10% that had been anticipated is significant, Hitachi also recognizes that the following issues will need to be dealt with in order to operate the service business.

The milk run was the only part of the demonstration project implemented in practice, with EDI being assessed by simulation in a test environment. Furthermore, the scope of the project did not include vendor-managed inventory (VMI), meaning things like procurement outsourcing or just-in-time (JIT) delivery. In terms of assessing the service's three-way integration model, these remain as issues for the future.

*2 A business application service that Hitachi supplies globally via the Internet. TWX-21 is a trademark of Hitachi, Ltd.

Also, the benefits from the milk run applied to a subset of suppliers. The goal this service should be aiming at is to consider all suppliers and identify which operations should be included in the milk run to achieve maximum benefits, and which operations are better served by adopting VMI, and then to offer overall optimization that combines both approaches. The necessary ongoing verification work for achieving this needs to continue.

In the future, Hitachi intends to investigate and prepare for the commercial operation of high-added-value logistics services that can support business reforms involving smarter logistics, such as analysis and evaluation functions that use big data.

FUTURE DIRECTIONS

Future Activities Directed at Global Markets

The global logistics service described in this article has (from FY2015) already started supplying services to Hitachi and other Japanese companies that manufacture products such as transportation equipment, electrical machinery, and components in the Chinese market that will help improve operations outsourcing, such as warehouse management, transportation, and procurement outsourcing, and operational management such as the presentation of procurement and logistics information, and make it more efficient. Hitachi intends to expand this business from FY2016 by extending it to other industries. From

FY2017 onward, Hitachi intends to extend and expand the service to emerging economies in Southeast Asia and elsewhere along with the global operations of its customers.

Establishment of IT Service Platform

To provide an IT service platform to underpin this service, Hitachi has extended the information collection layer to include production planning and other production management information and sale and purchase ordering information, expanding the collection of logistics-related data to build an integrated logistics information database, and using the EDI functions that handle the exchange of data as a base. It will use this information as a basis for offering analytical services for logistics, such as inventory analysis and logistics cost analysis. The ultimate aim is to provide information that supports logistics strategies that are based on business strategy, including optimization of things like global inventory and the location of operations (see Fig. 5).

High-added-value Services

Along with establishing an IT service platform, Hitachi is also considering the use of big data for analysis and evaluation to supply high-added-value services. The following are three examples of this work.
(1) Inventory analysis service

This service improves customers' production management by determining best practices for things

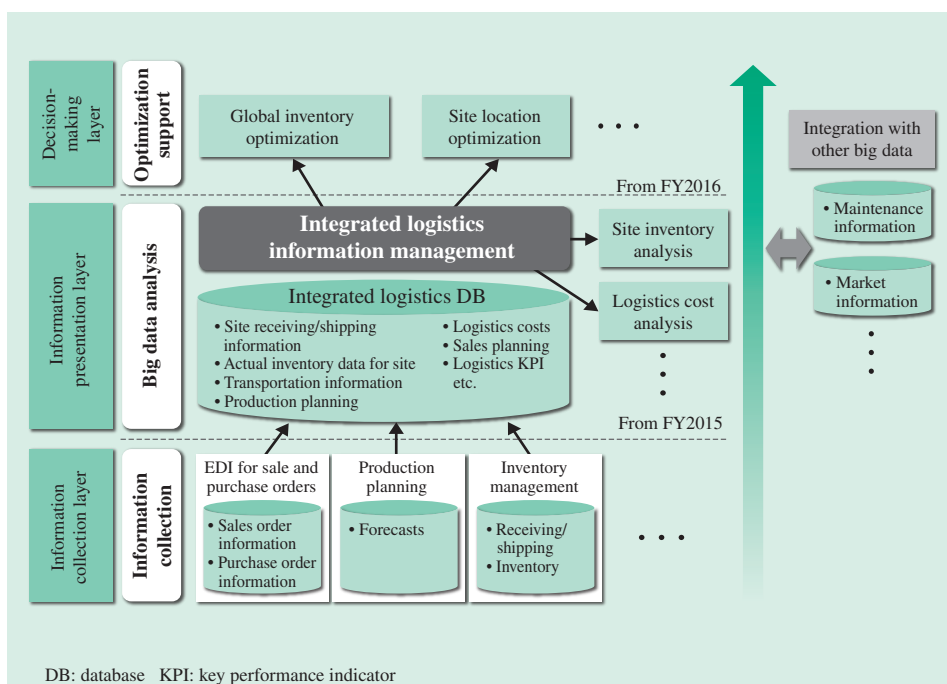


Fig. 5—IT Service Platform. From its use for information collection, the service will be further developed to use the information for analysis, and subsequently to become a service platform for providing information to support management strategy.

like safe inventory levels and order points for the inventory information stored in the integrated logistics database.

The service uses order information, production information, inventory information, and inventory simulations to provide the following inventory analysis reports.

(a) Inventory trend analysis: Identifies inventory trends for each product.

(b) Emergency transportation analysis: Identifies trends in emergency transportation for each product.

(c) Safe inventory level analysis: Identifies the appropriate safe inventory levels for each product based on demand fluctuations.

(2) Supplier assessment service

This service improves supplier management by analyzing supplier-specific trends in orders received, forecasts, and other supplier information handled by customers.

The service uses supplier information to provide the following supplier analysis reports based on quality, cost, and delivery (QCD).

(a) Quality analysis: Identifies trends in defects for each product.

(b) Cost analysis: Identifies supplier-specific cost trends for each product.

(c) Delivery time analysis: Identifies trends in proportion of on-time delivery for each product.

(3) Site location optimization service

This service is used to identify which of a number of candidate cities is the lowest-cost option for production, warehousing, and other facilities when a customer makes changes to their supply chain.

The inputs to the service are the candidate sites; actual data on things like sales, production, and inventory volumes; and management indicators

(for maximizing revenue), and it uses mathematical optimization techniques to rapidly search through site location plans. Providing a number of potential location plans that maximize revenue enables the customer ultimately to narrow-down the possibilities. This optimizes the customer's supply chain costs to support their global operations.

In the future, Hitachi intends to realize these proposals for consideration in accordance with market needs.

CONCLUSIONS

This article has described a global logistics service for manufacturers operating throughout the world that contributes to the reform of logistics through the integration of procurement, logistics, and information. With logistics markets in emerging economies, particularly in Asia, being forecast to experience rapid growth, leading to an ongoing expansion in demand for ways of making logistics more efficient, Hitachi sees this as a field where it can make good use of its strengths in both operations and IT.

In the future, Hitachi intends to expand the service into one that supports customers' logistics strategies by creating new services that have never existed before, such as cross-industry coordination and high-added-value services that use big data on logistics collected from this service.

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Featured Articles

TSCM Cloud Services for Implementing the Global Mother Factory Center Concept

Hirota Morita
Shigenori Tanaka
Yoshimitsu Hiro
Manabu Naganuma

OVERVIEW: In the midst of proposed initiatives for new approaches to how manufacturers operate that aim to implement intelligent production systems able to collect and store a variety of information automatically so that it can be processed, analyzed, and used, Hitachi is working on measures that utilize its in-house manufacturing technologies and know-how along with IT solutions, sensors, and other technology. As part of this, and with greater use being made of overseas production, Hitachi has proposed what it calls the global mother factory center concept for optimizing the entire value chain using TSCM, which encompasses design and development, production management, production technology, and quality management, and is seeking to develop and strengthen the TSCM cloud services that support this.

INTRODUCTION

CONCEPTS such as Industrie 4.0 and the Industrial Internet have for some years been put forward as initiatives aimed at establishing new ways of undertaking manufacturing^{(1), (2)}. Across design, production, sales, and operations, these concepts involve seeking to implement intelligent production systems that use sensor network technology to collect and store data from production equipment automatically and use big data for the analysis, processing, and use of information. This is seen as a new industrial revolution that will provide manufacturers with enhanced competitiveness. Along with these background trends, there is also considerable activity in the reviewing of information systems for the collection, storage, analysis, processing, and use of data.

Recognizing these trends, Hitachi has proposed its global mother factory center concept, which optimizes the entire manufacturing value chain with the aim of creating a new approach to manufacturing, and is proceeding to implement the cloud services that will support this concept. This article describes these initiatives.

GLOBAL MOTHER FACTORY CENTER CONCEPT

Current Situation for Global Manufacturers

Prompted by the expansion of markets in emerging

economies and the intensification of global competition, an increasing number of manufacturers are seeking to establish manufacturing capabilities based on a “local production for local consumption” model in which products tailored to a particular market are produced and supplied from a location close to that market. Accordingly, there is growing demand for the supply on a global scale of information technology (IT) systems that support design and development, production management, production technology, and quality control (QC).

For new overseas plants, many Japanese manufacturers in the past have chosen deployment and implementation based on the operational support IT systems from their plants in Japan. However, as the commissioning of new plants becomes more frequent due to the transition to a production model based on “local production for local consumption,” the horizontal deployment of IT systems by a limited number of staff with knowledge of company operations has led to the problem of operation commencing without sufficient skills transfer and other training having been completed. This has led to a capability gap between existing Japanese plants and new plants in the areas of work quality, product quality, and design quality.

Capability Gap between Plants

The capability gap between existing Japanese plants and new plants is creating the sort of problems described below.

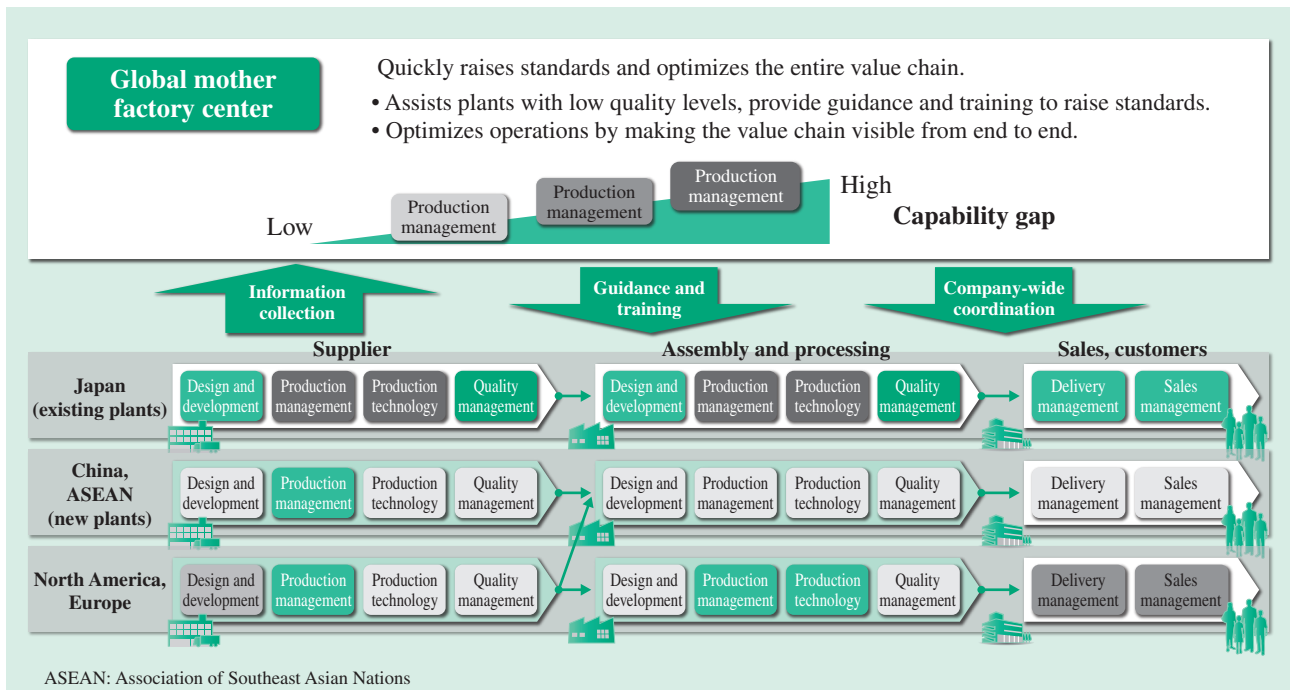


Fig. 1—Global Mother Factory Center Concept.

Global mother factory centers seek to raise overall standards by eliminating capability gaps between existing and new plants and by providing supervisory management aimed at company-wide optimization.

One manufacturer of precision components was unable to respond to fluctuations in demand from customers and only discovered at the last minute that its production plans were not workable, a situation that arose because production plans for its overseas plants were produced infrequently. As a result, it suffered significant financial losses, being forced to switch production back to Japan and frequently needing to resort to emergency airfreight delivery to avoid delays to customer production.

At another manufacturer of precision products, problems with worker proficiency due to high staff turnover led to frequent instances of poor workmanship at a new overseas plant, which unlike plants in Japan used a mixture of automated production lines and manual labor. This included a case in which a problem occurring in production led to a major recall involving wide-ranging product inspections because of a lack of work behavior monitoring and no way of linking product defects resulting from poor workmanship to particular lots. Also, despite increasing use of local design as part of a production model based on “local production for local consumption,” there were no processes for sharing design information with existing Japanese plants, managing customization, or using analysis tools to improve design productivity. This led to

rework at the prototype development stage and delays in the release of new products.

Global Mother Factory Center Concept

In seeking to raise the overall standard of its operations, Hitachi has formulated the global mother factory center concept for optimizing the entire value chain by eliminating the gap between existing Japanese plants and new plants in the areas of work quality, product quality, and design quality, and has embarked on steps aimed at implementing the concept in practice (see Fig. 1). A global mother factory center carries out the following three missions for a number of manufacturing sites.

- (1) Standardization of operational and IT systems
- (2) Visualization and sharing of information
- (3) Automation and optimization of operations

In addition to observing and reviewing the operations of new plants where operational quality is low, a global mother factory center provides guidance and other training on how to raise standards in order to augment plant operations. It also optimizes operations by making the value chain visible from end to end and coordinating the overall production plan, which is not possible to achieve at the individual plant level.

To realize this global mother factory center concept, Hitachi has started supplying cloud-based

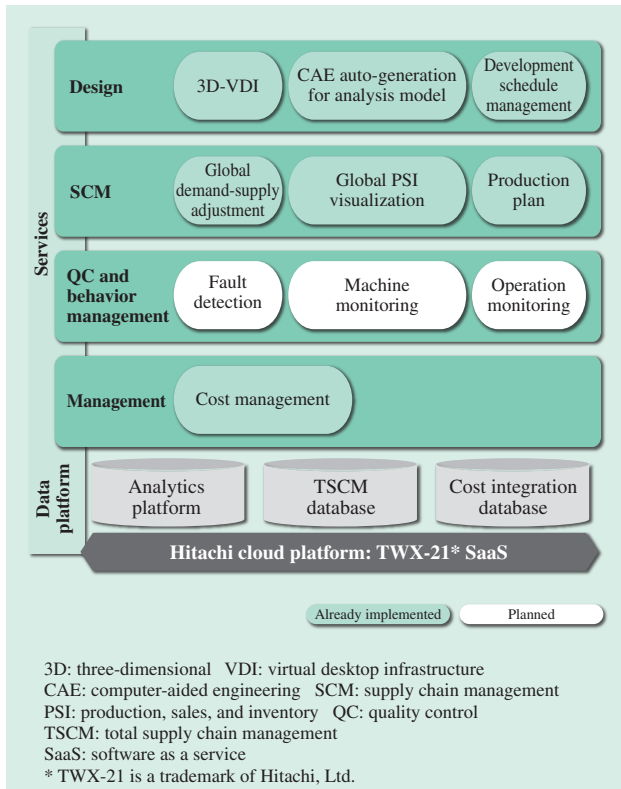


Fig. 2—Overview of TSCM Cloud Services.
 Hitachi aims to provide services that support operations from design, SCM, and QC and monitoring to management, and that can be used globally.

services that enable the service functions that support design and development, production, and QC and monitoring to be used at a global level, in a timely

manner, at low cost, and with flexibility. The following sections describe these services.

TSCM CLOUD SERVICES

Hitachi is progressively launching total supply chain management (TSCM) cloud services that support the operations of the global mother factory center.

Fig. 2 shows an overview of these TSCM cloud services. The figure includes services that have already been deployed and those that are under consideration. They provide service functions that cover the support of design work as well as supply chain management (SCM), QC and monitoring, and management; TSCM and other databases collected from the use of these service functions; and an analytics platform for the analysis of data used in the service functions and information collected and stored in databases. User companies are able to automate and optimize operations by deploying these services at the global mother factory center for design, production, and sales sites that are dispersed based on the “local production for local consumption” model. The following sections describe cloud services for specific types of work.

SCM Cloud Service

With multi-site deployment based on local production for local consumption, differences between sites manifest in areas like the accuracy of production planning and ratio of plan achievement, making it

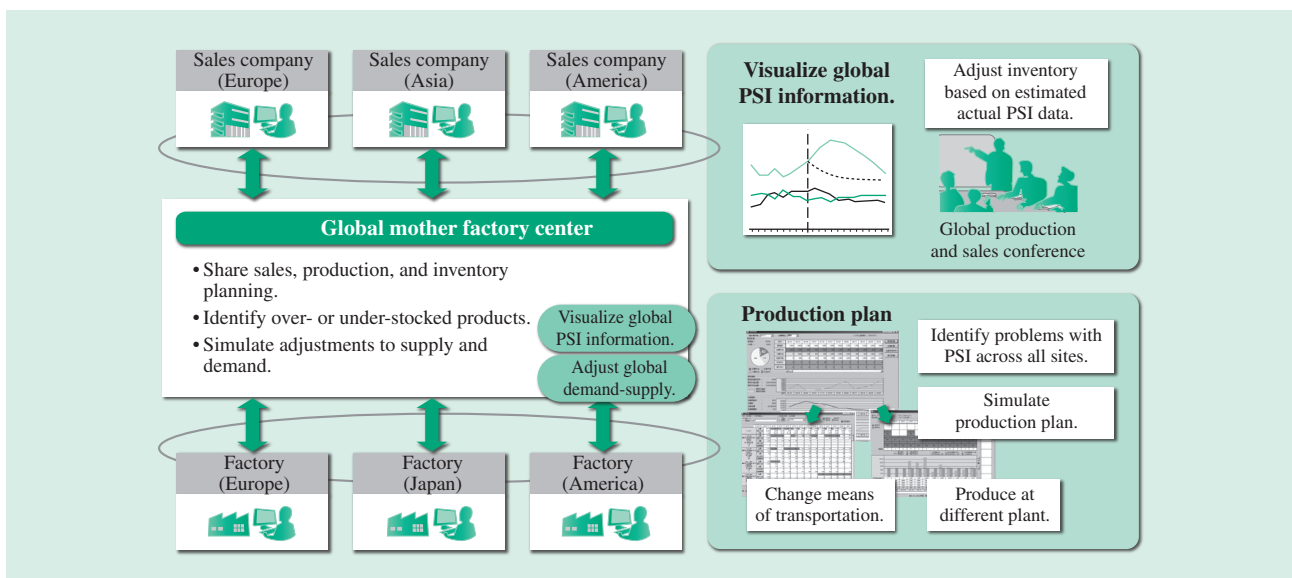


Fig. 3—SCM Cloud Service.
 The service makes available global PSI information and production plans for each plant, and adjusts global demand-supply when a problem occurs to keep to delivery schedules, reduce inventory, and minimize loss costs.

difficult to respond to variations in demand at individual plants. The SCM cloud service not only encourages global standardization of operations through the centralized management of data and systems for each business process, from sales to design, production, and procurement, it also enables appropriate decision-making at the global mother factory center (see Fig. 3). The main features are as follows.

(1) Global production, sales, and inventory (PSI) visualization feature

This feature integrates past, present, and future PSI information for each site and shares information between manufacturing and sales.

(2) Production plan formulation and revision feature

Identifies instances where parts, production capacity, or other resources do not match what is required to achieve a plant's production plan and provides a feature for revising the plan to make it achievable.

(3) Supply and demand adjustment feature

This is used at the global mother factory center to issue instructions to each site to change their production plans if a problem arises that a site cannot resolve on its own. This is done with reference to PSI information from throughout the world and the plans for each production site by running instantaneous simulations of supply and demand across different sites, making changes such as using a different means of transportation or shifting production to a different plant.

These features enable preemptive measures to be taken throughout the global supply chain to prevent problems such as delivery delays or excess inventory.

Design Cloud Service

A common practice for developing products that suit the requirements of the places where they will be used is for the global mother factory center and the local site to collaborate on development. The design cloud service provides functions for resolving issues such as how to share design information, maintain design quality, and maintain security (see Fig. 4).

A virtual desktop infrastructure (VDI) for three-dimensional (3D) computer-aided design (CAD) enables the sharing of 3D-CAD data, the most important part of the design information, in a secure environment. A design environment that uses a VDI for 3D-CAD enables the secure sharing and use of design information, eliminating the need to implement and operate a product data management (PDM) system at each design office. This allows the supervisory management of information such as

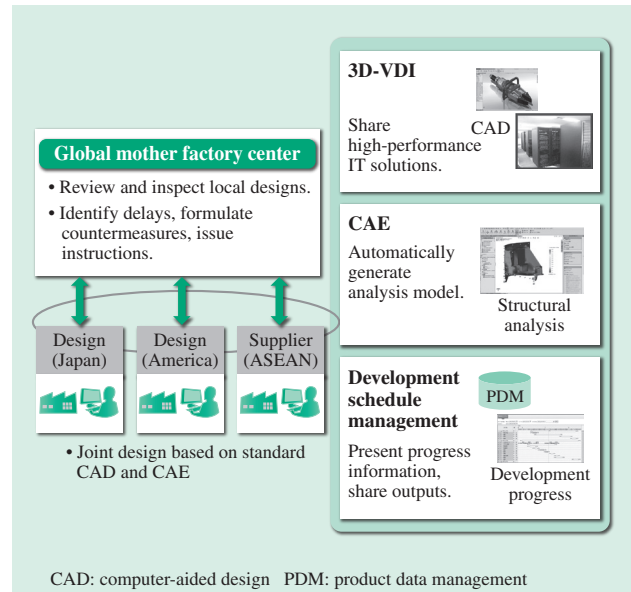


Fig. 4—Design Cloud Service.

This service improves quality and shortens design times by standardizing CAD and CAE practices and performing design jointly with suppliers.

designs and development schedules and facilitates the global maintenance of design quality. When creating analysis models for computer-aided engineering (CAE), detailed mesh models take a long time to build and require specialist know-how. This service enables rapid automatic generation by giving access to past analysis model information accumulated in Japan. Using this technique improves the design quality of design departments in Japan and overseas. Using the service at the global mother factory center and at development centers in destination markets enables the consolidation, sharing, and use of design data spread across different sites, while expanding access to include suppliers enables supervision of design quality for the entire product.

Cloud Service for Quality and Behavior Management

As local production for local consumption has been expanded globally, quality improvement of locally made products is becoming an urgent issue. New assembly and processing plants built in emerging economies have a relatively high number of people at the production site across all processes compared to plants in Japan that make use of advanced automation and robotics. Despite human-resource-based efforts to reduce operational errors in the workplace, it is not possible to eliminate defects entirely. Also, support from the “mother factory” in Japan to instruct and

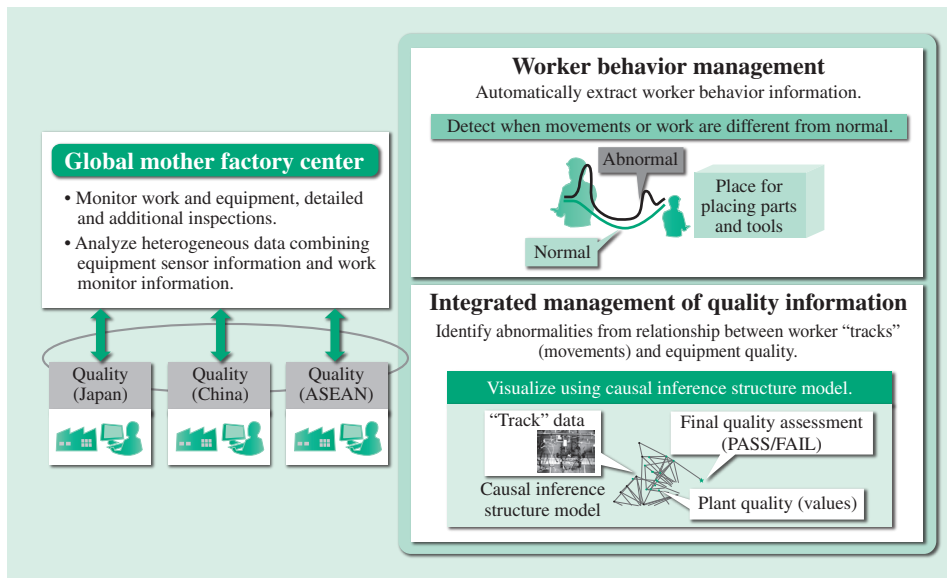


Fig. 5—Cloud Service for QC and Behavior Management. This service minimizes quality dispersion between sites and improves quality by performing monitoring and remote management of what is happening at overseas plants.

monitor local factory workers (training and skills transfer) has not been enough and what local staff members can do by themselves has been very limited. As a result, the error detection rate in local factories has been low and quality gaps have remained in areas such as manufacturing practices and products.

To resolve these issues, Hitachi is preparing to provide ways of minimizing quality dispersion between sites and improving quality by performing monitoring and remote management of what is happening at overseas plants and other sites through the cloud service for quality and behavior management (see Fig. 5).

Hitachi’s proposed method to achieve quality improvement is the automatic extracting of “track” patterns (people’s movements) that influence quality to identify the relationships between faults and people’s movements, and designating these as things to look for in fault detection. When an abnormal track is identified, special checks are conducted before the product leaves the factory to preemptively prevent defects from reaching the market. For worker track patterns, the tracks are analyzed using information from images captured by fixed cameras located around the workplace. However, it is not possible to capture adequate images of the work using external cameras in situations where something passes between the fixed camera and worker to block its view. Accordingly, the next step will be to install 3D cameras at appropriate locations for work processes to capture not only the workers’ tracks but also to acquire their operations and actions from the images and to monitor them as part of fault detection. In this way, information will

be collected and analyzed to make further quality improvements.

Furthermore, Hitachi will provide services for achieving high-quality manufacturing at any site by using a causal inference structure model to infer the relationship between track data and quality data measured by the equipment, and by identifying abnormalities and performing integrated management of quality information so that it can be used as quality information (traceability).

CONCLUSIONS

This article has described the global mother factory center concept, a form of future global manufacturing, and the TSCM cloud services that support it.

While these services are currently being deployed mainly within Hitachi, in the future Hitachi intends to continue developing leading-edge technologies that nobody else can achieve, and to supply services through collaboration with leading companies both inside and outside of Hitachi.

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Featured Articles

Global Cost Management Solution Supporting Business Strategy

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OVERVIEW: In response to factors such as demand that fluctuates on a global scale and the intensification of price competition, the establishment of development, production, and supply capabilities based on a globally optimized production model has become an urgent task for Japanese manufacturers in recent years. There is also a need to further improve competitiveness and formulate and implement plans that can effectively deliver increased revenue and long-term growth. One of the ways Hitachi can contribute to management in this era of global business is by supplying a cost management solution that supports target costing, business planning, and product profit planning in ways that take account of the benefits of regional strategy, technology strategy, and product strategy.

INTRODUCTION

IN response to factors such as demand that fluctuates on a global scale and the intensification of price competition, Japanese manufacturers have in recent years shifted away from pursuing a business model based on domestic production and exports to overseas markets to instead adopt globally optimized production models. As production is increasingly shifted overseas, there have also been moves to reassess manufacturing in Japan prompted by the end of the strong Yen and increasing production costs at overseas sites due to rapidly rising labor costs. Each company needs to undertake planning against the background of a dynamic business environment based on strategies that take account of factors such as their respective product characteristics, production circumstances, and market competitiveness.

Companies have been slow to adopt information technology (IT) for this work, and for the many companies that rely on the skills and experience of expert staff using information from core business systems and specific documents, it is difficult to formulate plans for dealing with demand in Japan and elsewhere that combine a wide range of factors, including global supply infrastructure, market movements, and the level of competition.

This article provides an overview, describes the features, and presents case studies of a cost management solution that supports target costing, business planning,

and product profit planning in ways that take account of the benefits of regional strategy, technology strategy, and product strategy as a means of contributing to managing a business so that it will thrive amid global competition.

OVERVIEW OF GLOBAL COST MANAGEMENT

The management strategy of manufacturers has shifted away from “making a living by selling what you build,” based on a model of making products in Japan and exporting them overseas, and toward a globally optimized production model of “making a living by building what you can sell.” In this environment, it is important to have product plans for developing products in demand from world markets that are characterized by different levels of economic strength, culture, and infrastructure, and then producing and selling these products at a competitive price. Hitachi proposes cost management based around product profit planning as a solution.

Target Businesses and Requirements

Strategy formulation and planning are among the challenges of management. This includes determining from a profitability perspective which products should be marketed in which regions, calculating expected product profitability, optimizing the supply chain to maximize profitability, and achieving target costs in order to be cost-competitive.

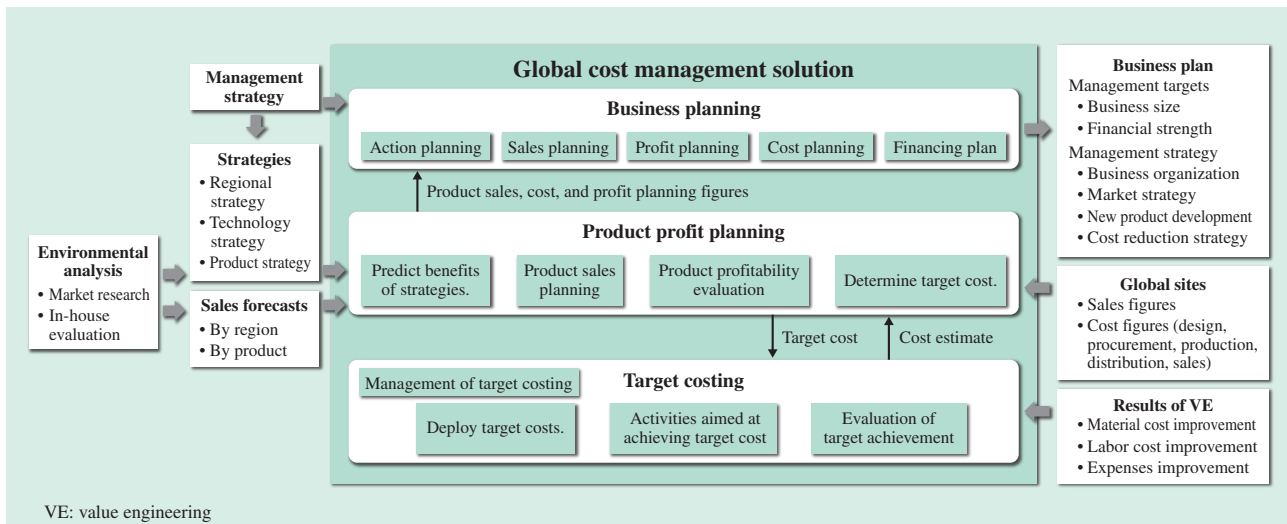


Fig. 1—Overview of Global Cost Management.

At manufacturers that operate a globally optimized production model, the management of cost planning and activities aimed at achieving a target cost are effective at maintaining product profitability. A global cost management solution that performs integrated management of business planning, product profit planning, and target costing contributes to managing the business so that it can thrive amid global competition.

Cost management is an effective way to overcome these challenges. This article gives an overview of the business planning, product profit planning, and target costing aspects of cost management, and describes how these relate to each other (see Fig. 1).

Overview of Cost Management Solution

(1) Business planning

Business planning requires specific “action planning” for implementing strategies based on the management strategy, “sales planning” determined by itemizing the company’s sales and conducting environmental analysis and action planning, “profit planning” for determining target profitability that considers the profit the company wants to achieve and is capable of achieving, “cost planning” for itemizing costs and determining the cost of each cost expense item, and the formulation of a “financing plan” for investigating financing based on sales planning and cost planning to formulate a funding and repayment plan. The challenge for planning based on a globally optimized production model is to bring together the data for coordinating product profit planning and business site profit planning.

The cost management solution sets up sales, cost, and profit planning by region and by product as part of product profit planning and, at the same time, sets up sales planning, cost planning, and profit planning for business planning by collating data for each business site. This method is designed to shorten planning times

and improve data accuracy. It enables managers to contribute their ideas and provide convincing plans by presenting graphs of planned figures at review meetings and using in-meeting simulations of different figures when reporting to coordination meetings between headquarters departments and other sites, operational department managers, the management board, and others.

(2) Product profit planning

Product profit planning involves sales planning and determining target costs for each product to calculate profitability. The challenges lie in adding up costs at global production sites where material costs, labor costs, expenses, currencies, and management granularity are different even for the same product; rationally allocating the cost of non-manufacturing expenses that cannot be attributed to specific products; and figuring out how to incorporate into product profit planning the strategy effects set as measures for increasing profit, such as by reorganizing production sites.

Basic sales planning data entered into the cost management solution consists of product-specific and region-specific sales forecasts that incorporate the results of environmental analyses such as market research or in-house analysis. The target cost is determined with reference to a product’s target profit and market price. Product profitability is calculated from forecast sales and cost estimates tabulated in cost tables for each site and assessed in terms of management indicators such as operating

profit, marginal profit, and break-even point. Next, profitability improvement measures such as increasing sales or reducing costs are entered as strategies and a simulation of product profit planning for each fiscal year is performed incorporating the relevant amounts for each period to finalize product profit planning.

(3) Target costing

Target costing supports activities aimed at achieving the target cost specified by product profit planning, and provides cost estimates as feedback for product profit planning. Target costing is something that many companies have conventionally performed as part of activities aimed at achieving a particular manufacturing cost during the planning and development stages. However, in addition to problems such as the fact that cost improvement know-how varies from person to person, which prevents organizations from making use of empirical values; costing calculations taking up time that could have been spent working on improvements; and the inability to link the results of activities straight back to product profit planning; there are also difficulties associated with a global era, including demand fluctuations, local production, variations in material costs, and exchange rate fluctuations.

The cost management solution provides a framework with the functions required for the business processes used in target costing. The target costing activity management function enables realtime sharing of information about things like activity progress and the achievement of target costs. The plan conceptualization stage support function enables a cost evaluation to be conducted prior to starting design by

breaking down the target costs based on functional blocks and other units that make up the product and utilizing data on similar components to calculate the product cost. The development stage support function calculates a cost estimate by specifying areas for improvement in functional blocks, units, and individual parts and materials together with the schedule for when the improvements are to be made, their difficulty, and adding up the financial benefits. It also provides functions for global design and production that include multi-currency data entry, automatic conversion to the master currency, and exchange rate simulation.

Features of the Cost Management Solution

(1) Integration of multiple data sources linked to products

Product profit is calculated by subtracting costs from sales. The challenges lie in adding up the production costs and allocating the cost of non-manufacturing expenses. While production costs are obtained by multiplying the quantity and unit price of each cost expense item, because the quantity, unit price, and currency are different for each production site, and even for the same product, this poses a problem in terms of how to manage data sources in order to achieve simple data manipulation.

In the cost management solution, production cost data management focuses on the parts list management method used in product design. It uses a tree structure in which the product is the root and the cost expense items are the branches, and enables production cost management that can perform simulations using the

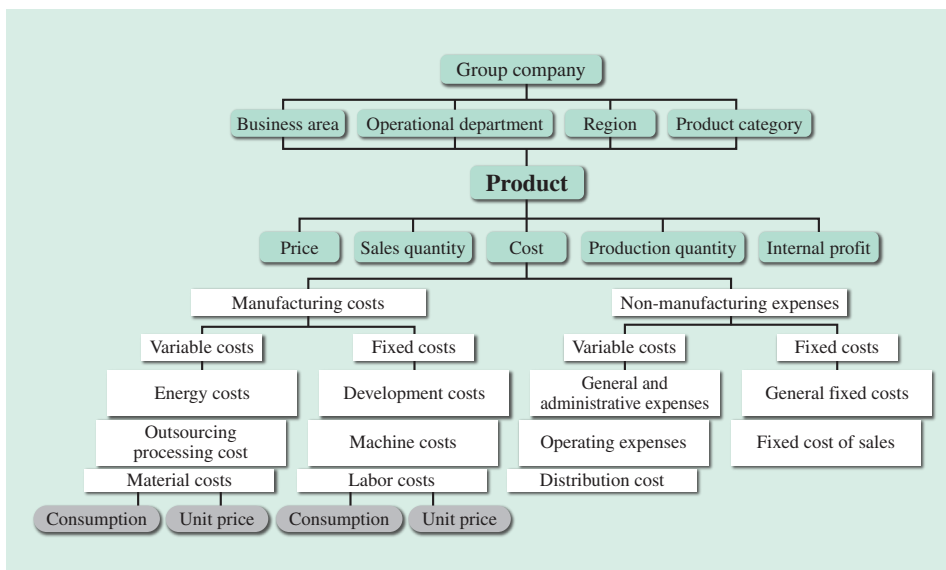


Fig. 2—Structure of Product Data for Cost Management. Cost management requires the manipulation of various data linked to products. Hitachi has built an easy-to-use solution by adopting its own unique data model.

cost tables for each production site. Non-manufacturing expenses are the costs associated with getting from the production site to the market, and include things like sales, distribution, and administrative expenses. They are different for different combinations of production site and market. Because they do not relate to specific products, finding a rational mechanism for the cost allocation of products is a challenge. To solve this, non-manufacturing expense calculations are grouped into production site, market, product, and cost expense item combinations, and the calculation formulas are templated, with a cost allocation calculation performed for each cost expense item (see Fig. 2).

(2) Simulation of benefits of cost reduction strategies

Two ways of improving product profitability are to plan and execute strategies decided on by management, or for design and production staff to perform target costing. Strategies include measures for increasing sales (such as establishing new sales offices, introducing new products, or changing pricing), and measures for reducing costs (such as changing the sales route, reorganizing production sites, or changing the mix of in-house and external production), with a way of evaluating the return on investment in advance being essential to management decision-making. The cost management solution enables such evaluations to be made in advance by selecting the applicable products and cost expense items for each strategy and estimating the profit contribution, and then utilizing this information in product profit planning (see Fig. 3).

Target costing is the activity of formulating specific plans for manufacturing within the target cost specified by product profit planning prior to the product entering full production. To achieve the target cost, it is necessary to add up the production costs from the plan conceptualization stage in the early part of product design, and to calculate a highly accurate cost at the parts and materials level during the detailed design stage, and provide the result of this evaluation as feedback to the design department. In the cost management solution, the ability has been provided to add up production costs for a product by adding production process information to the design parts list, and by adding the labor cost, machine cost, tooling cost, energy cost, and other information on costs in the production process along with the unit prices for parts and materials. By collating these data sources for adding up production costs in a database, it is possible to automatically select the products and cost expense items that are relevant to cost improvements such as changes to parts and materials procurement

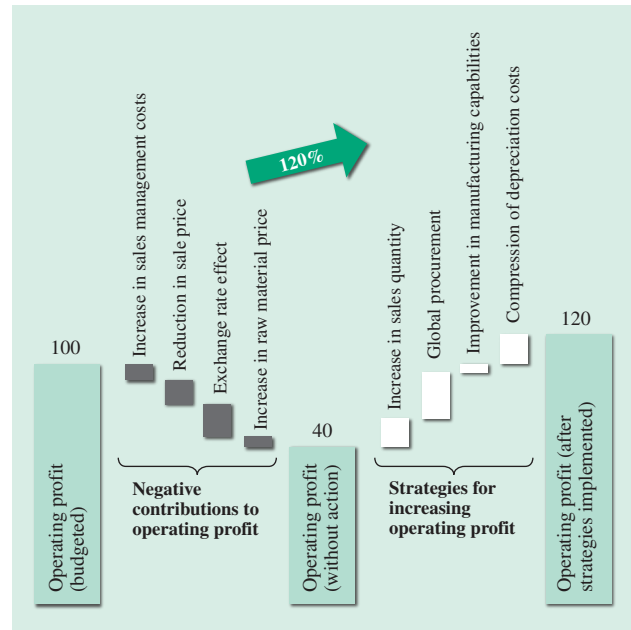


Fig. 3—Graph Showing Benefits of Strategies for Profit Planning.

The graph reflects the factors that have a negative effect on initially budgeted operating profit and the benefits of strategies for increasing operating profit.

or changes to processes and equipment, and to take account of the benefits of these improvements when adding up product costs. It has also achieved effective cost management by linking data on strategy implementation and target costing at the product and cost expense item level.

(3) Business operation support

The cost management system deals with highly confidential information that is routinely updated by numerous people and organizations. The provision of operation support functions is important for using the system. At meetings held in a variety of circumstances, such as management strategy meetings and design reviews, it is necessary to call up information that was used in previous meetings and elsewhere. In response, Hitachi created a means for one-touch recall, which it achieved through the dynamic linking together of meeting bodies and the data they use, and also recording storage folder link information made up of other reports, etc. that are used at meetings. The management information used in cost management includes a mix of highly confidential commercial information (such as new product developments and revenue plans) and workplace-level information (such as parts and material consumption or process changes). Access control is enabled by using master records that specify the screens and data access

permissions for each user identity (ID). In the case of entering cost information for overseas sites, production costs can be entered in the local currency, parts and materials procured globally can be entered in multiple currencies, and then they can be converted to the master currency in realtime using exchange rate master records.

ACTUAL EXAMPLES AND BENEFITS

Product profit planning based around the cost management solution can be used in medium- and long-term business planning. This section gives an overview of its use for medium-term planning at a particular manufacturer, and describes the challenges to be overcome, as well as the benefits.

The management planning department at a manufacturing company had been in the practice of using the skills and experience of expert staff to conduct medium-term planning for its globally optimized production model with the help of spreadsheet software. A medium-term plan is produced based on product profit planning after product cost and profitability evaluation. The planning procedure involves study at headquarters followed by a review at overseas sites, with reporting to and

approvals from the operational department managers and the management board being required. The challenge was to determine how to solve the problems of the time taken to provide requested information, the narrow range of discussion due to limited options for presenting information or undertaking analyses, and the difficulty of cause analysis due to the time taken to determine the effects of changing circumstances.

They set out to overcome these problems by building a cost integration database, a basic function of the cost management solution that consolidates the information required for medium-term planning and allows it to be referenced by product, site, and time, and by providing application framework functions. This enables the adding up of costs obtained in product profit planning; the analysis of product cost structures; profit simulations that treat price, quantity, and exchange rate as variables; and updating of the plan values for the predicted benefits of management strategies. It also enables automatic deployment in business site plans during product profit planning.

Implementation as a system achieved shorter planning times; raised the level of strategy debate by expanding the scope of information sharing, presentation, and use; and enabled timely contribution of ideas by managers (see Fig. 4).

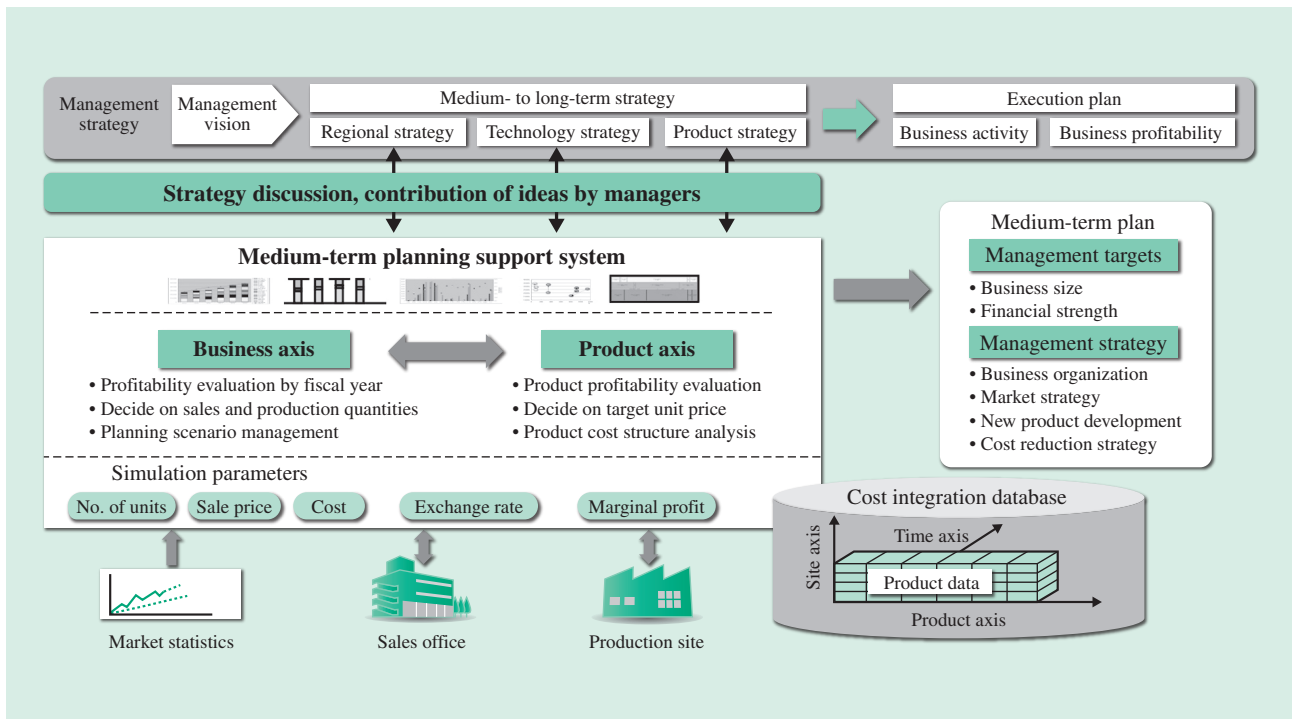


Fig. 4—Example Implementation of Medium-term Planning Support System. By consolidating the information required for medium-term planning and storing it in a database, planning times were shortened and the level of strategy discussion was raised by providing more diverse forms of information presentation.

CONCLUSIONS

This article has provided an overview, described the features, and presented case studies of a cost management solution that represents one way of contributing to managing a business so that it can thrive amid global competition. While the system is currently designed for use by discrete manufacturers, it will achieve use by process manufacturers in the future.

As globalization progresses, Hitachi is aiming for cost management solutions that can further enhance the competitiveness of Japanese manufacturers, increase their revenue, and assist with long-term growth.

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