

Featured Articles

More Advanced Use of Information in Retailing

—Hitachi’s Solution for Analyzing Distribution Data—

Hideki Negishi
Atsumi Mano
Naoya Sugiyama
Atsushi Shimada
Kazumasa Tashima

OVERVIEW: With retail facing increasingly difficult business conditions, consumer purchasing behavior is becoming more diverse and segmented, and the amount of information required is growing in size. While the retail industry has a need for the analysis of customer information, at present this often goes no further than report-level information due to a lack of knowledge about how to perform these analyses and utilize their results. In response, Hitachi’s solution for analyzing distribution data is supplied as part of its Intelligent Operations solutions to support the use of product, customer, and other information in the retail industry. The solution supports business improvements through more sophisticated use of information and is supplied in the form of a system that combines a high-speed database with merchandise and customer analysis, where merchandise analysis performs multifaceted analyses of product sales data, and customer analysis supports customer-targeted strategy formulation, execution, and evaluation.

INTRODUCTION

THE retail industry has been experiencing changes in consumer purchasing behavior over recent years. Along with these changes, the industry is facing emerging challenges in the form of a greater diversity in the product sales channels and promotional methods used by retailers, greater segmentation in customer needs and in the points of contact with customers, and an accelerating growth in both the types and quantities of information required for performing analyses. For retailers in the future, an important key to the development of their businesses will be the collection and utilization of the large amounts of data needed for an accurate understanding of the situation around things like sales and customer purchases. Also important for the collection, analysis, and practical application of increasingly large amounts of information will be the scope of use of high-speed processing on big data information platforms.

Hitachi’s solution for analyzing distribution data is supplied as a package that combines merchandise and customer analysis systems, which support analysis by retailers, with a big data information platform capable of high-speed processing of point of sale (POS)*1 data and customer details (such as membership type, age, and gender).

This article presents an overview of Hitachi’s solution for analyzing distribution data (which helps retailers overcome the challenges posed by data analysis), describes two case studies of retailers who have installed the solution, and looks at the outlook for the future.

HITACHI’S SOLUTION FOR ANALYZING DISTRIBUTION DATA

Overview

Data analysis by retailers can be broadly divided into “merchandise analysis” of product sales figures and “customer analysis” of the customers who purchased these products. However, the following difficulties mean that many retailers have yet to make effective use of analysis.

(1) Because information is spread across different sales channels (which themselves are becoming more diverse), and because it is common for analysis to be performed independently for each channel, there is a need for a variety of different information to be viewed together.

(2) An inability to make full use of information as the quantity that needs to be collected increases along with

*1 Data collected at the time of sale from the retail store checkout or similar.

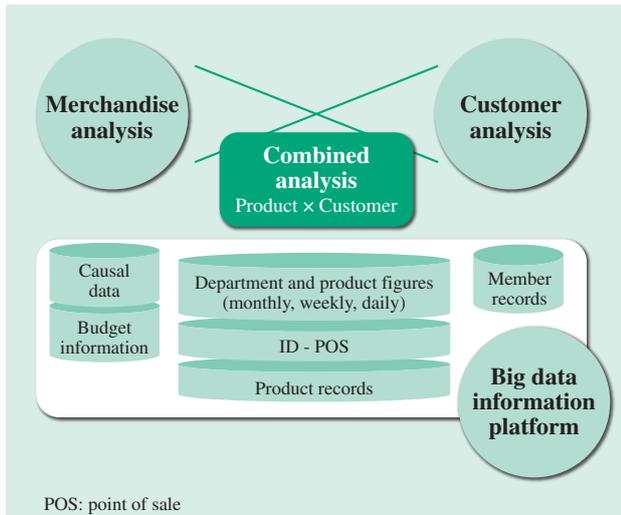


Fig. 1—Overview of Hitachi's Solution for Analyzing Distribution Data.

Hitachi's solution for analyzing distribution data is the name for an integrated system that includes merchandise analysis, customer analysis, and a big data information platform.

the proliferation in points of contact with customers (“multi-channel retailing”).

(3) A limit to the ability of existing systems to keep pace with processing this growing quantity of information.

(4) The growing importance of optimal approaches based on a specific understanding of customers achieved not through the report information used in the past, but by looking at information from a variety of perspectives in order to achieve specific objectives such as improving sales or enhancing service.

In response to these difficulties, Hitachi's solution for analyzing distribution data helps overcome the challenges facing retailers by combining merchandise and customer analysis systems with a big data information platform (see Fig. 1).

Unlike past systems, Hitachi's solution for analyzing distribution data uses the same database for both the merchandise and customer analysis systems, integrating data and system operation to allow analysis in ways that combine both merchandise and customer analysis. This can incorporate previously independent analysis functions in the form of scenarios, and implement analyses and problem solving processes in story form.

Features

Merchandise Analysis System

This system uses the results of analyzing not only sales figures but also other actual data including stock

TABLE 1. Analyses Provided by Merchandise Analysis System*
The merchandise analysis system provides a range of analyses for retailing, including shelving allocation, planned discounting, product procurement, product development, and product selection.

Merchandise analysis system	Overview
Dashboard	Check business summaries and progress on KPIs by management, department, SV, or store.
Sales and margin analysis	Switch between numerous different analyses to review figures such as sales and margins by department.
Product figures	Switch between numerous different analyses to review figures such as sales and margins by product. Includes ABC analysis and comparison of results by store.
Attribute analysis	Combine and analyze product and store attributes.
Shelving allocation analysis	Analyze sales for each shelving allocation.
Sale (planned discounting) analysis	Analyze sales for each sale.
Analysis by product characteristics	Apparel analyses such as seasonal products, inventory liquidation, and transfers, and food product analyses such as time-of-day and day-of-week.
Customer category analysis	Determine sales by age range, gender, and customer category.
Information sharing with suppliers	Supply POS data to distributors or other suppliers.

KPI: key performance indicator SV: supervisor

*As of October 2014. Includes some planned functions.

levels, procurements, margins, ordering, and transfers for such product-related tasks at retailers as shelving allocation, planned discounting, product procurement, product development, and product selection.

Table 1 lists the different analyses that can be performed using the merchandise analysis system. It supports the plan, do, check, and act (PDCA) cycle for planning and other activities aimed at improving operation, extending from providing basic information on actual margins and sales trends for specific products through to ways of reducing losses due to disposal or price changes, improving margins, and selecting the range of products to offer with consideration for loyal customers.

The merchandise analysis system in Hitachi's solution for analyzing distribution data has the following three main features.

(1) Use as a dashboard

The dashboard appears whenever a user logs into the merchandise analysis system. It allows prompt action to be taken by providing an intuitive representation of sales figures up to the previous week and day, and of progress on improving key performance indicators (KPIs).

(2) Use for analyzing customer categories

Combining merchandise analysis with customer categorization allows the simultaneous analysis of both products and the purchasing behavior of loyal customers, something that has not been possible in the past. For example, the likely benefits include more accurate product selection by identifying which products affect the purchasing behavior of loyal customers, reducing missed opportunities for sales and helping keep loyal customers.

(3) Information sharing with distributors and suppliers

The solution includes functions for sharing information with suppliers. This provides opportunities for retailers to suggest new products and otherwise collaborate with suppliers rather than working on their own.

Customer Analysis System

The customer analysis system provides analysis scenarios that implement customer-driven retail business practices by acquiring information on purchases, which is growing in quantity as customer purchasing behavior becomes more diverse and segmented. Table 2 lists the different analyses that can be performed using the customer analysis system. In addition to information such as customer attributes and membership of loyalty schemes, customer analysis also provides a starting point for supporting activities that extend from the analysis of purchasing trends, merchandise analysis, and customer identification to the formulation and evaluation of ways in which scheme members should be approached.

TABLE 2. Analyses Provided by Customer Analysis System
The system integrates purchase histories and other customer information from multiple channels to support customer-targeted strategy formulation, execution, and evaluation.

Customer analysis system	Overview
Loyalty analysis	Analyze customer categories using decile analysis, decile trend analysis, and RFM analysis.
Event analysis	Analyze response rate for coupons and other promotional campaigns.
Basic member analysis	Graphically display age, gender, and optional group.
Time-series analysis	Assess time-based trends using time-of-day analysis, day-of-week/time-of-day analysis.
Regional analysis	Identify regional characteristics using data such as post code and choice of store.
Cross-selling analysis	Use cross-selling and basket analysis to identify trends in customers purchasing products together.
Trend analysis	Use product cross ABC analysis, Z charts, and other techniques to assess trends in sales figures.

RFM: recency, frequency, monetary

The customer analysis system in Hitachi’s solution for analyzing distribution data has the following three main features.

(1) Integration with merchandise analysis

Appropriate measures can be implemented by obtaining customers’ purchase histories and using this information to determine their preferences and needs, combining both customer and merchandise analysis. For example, it could be used to increase sales and avoid losing customers by using direct mail (DM) to offer discounts on products frequently purchased by an estranged customer who has not recently visited the store.

(2) Use for analyzing results of activities

The solution includes functions for assessing the results of activities to verify how well they have worked. An improvement process can be established by using the results to perform a new cause analysis and by working through the cycle of planning, action, assessment, and improvement for future plans.

(3) Management of customer information

The functions of the customer analysis system range from customer category analysis functions that do not require personal information to customer selection functions used to generate DM. To ensure that personal information about customers is only available to those who need it, each system user is assigned operation and viewing permissions, with detailed settings that include screen-by-screen control of menu screen display and field-by-field control within screens on which customer record details (name, address, telephone number, and so on) can be viewed.

Big Data Information Platform

The Hitachi high-speed data access platform*2, which features ultra-high-speed retrieval, is used to support the merchandise and customer analysis systems.

Conventional analysis systems handle large volumes of data such as POS records by creating a separate data mart for each analysis viewpoint. Because of the diversity of retailers, which handle a wide range of products from food and clothing to general household goods, and that operate in a number of different formats such as general merchandise stores (GMSs) or supermarkets, they need to perform analyses from different viewpoints, including those of

*2 Utilizes the results of “Development of the Fastest Database Engine for the Era of Very Large Database and Experiment and Evaluation of Strategic Social Services Enabled by the Database Engine” (Principal Investigator: Prof. Masaru Kitsuregawa, The University of Tokyo/Director General, National Institute of Informatics), which was supported by the Japanese Cabinet Office’s FIRST Program (Funding Program for World-Leading Innovative R&D on Science and Technology).

management, merchandising, and stores. The problem with creating a large number of data marts is that it makes it difficult to switch quickly to a different view.

Taking maximum advantage of the high-speed retrieval provided by Hitachi ultrafast database engine, Hitachi's solution for analyzing distribution data is designed to allow flexible changes in the basis of analysis by keeping the number of data marts to a minimum and calculating line item totals in realtime.

UNY CO., LTD. CASE STUDY

Overview

Established in 1971, UNY Co., Ltd. is the third largest general retailer in Japan, operating 226 stores across 20 regional jurisdictions, primarily in the Chukyo Metropolitan Area around Aichi Prefecture, with non-consolidated sales of 771.5 billion yen (year ending February 2014). It has a vision of being a retailer of new lifestyles, with self-managed stores that have close ties to their communities. It introduced the "uniko card," a form of electronic money for the UNY Group, in October 2013 with aims that included improving customer convenience and developing loyal customers, and is seeking to expand further its membership and number of participating stores⁽¹⁾.

Installation of Hitachi's Solution for Analyzing Distribution Data and Future Initiatives

With member and purchase data already available from its existing "UCS card," UNY installed the customer analysis system of Hitachi's solution for analyzing distribution data at the same time as the uniko card, with objectives that included determining customer purchasing behavior, holding on to the loyal customers, and assessing sales campaigns. The system reduced the time taken to perform analyses, being able to complete a recency, frequency, monetary (RFM) analysis for a month's worth of data from one store (approximately 2 million records) in 10 s and from all stores (approximately 200 million records) in 70 s.

UNY is currently setting up a project to increase the number of its loyal customers. Activities include establishing a variety of analytical procedures and performing effectiveness studies using collected data through interoperation between the customer analysis and other systems.

(1) Prevent loss of loyal customers

Identify which products are repeatedly purchased by the loyal customers, and use information on sales

at different times of the day to avoid running out of stock during peak periods.

(2) Increase spending and number of store visits (days)

Identify scheme members by specifying conditions from the customer analysis system and issue coupons to them at the checkout. Check the results in terms of the number of days on which they visit a store and the amount that they spend.

(3) Optimize where to circulate advertising flyers

Optimize where to circulate advertising flyers by using map software to display scheme members, sales, and other parameters by area.

With a view to making more use of customer analysis at store-level in the future, they are seeking to set up a cycle of activities whereby not only headquarters but also individual stores are aware of their own customer base. Through the integrated analysis of information from different sales channels [including brick and mortar stores, "net-supers" (online sales with delivery handled from a store (which usually has items in stock) and delivered in a day), and conventional online stores], this enhances customer-targeted retail service and sales capabilities, and facilitates the move to omni-channel sales.

FUJI CO., LTD. CASE STUDY

Overview

FUJI Co., Ltd. was founded in Uwajima City, Ehime Prefecture in 1967. A regional chain, it operates 98 supermarkets and GMSs across six prefectures in the Chugoku and Shikoku regions, with total sales of 309.4 billion yen (year ending February 2014). It's vision is to establish itself as a dominant player with close ties to the community, customers, and way of life in the Chugoku and Shikoku regions where it operates, with commercial practices that are closely linked to its location and customers⁽²⁾.

Installation of Hitachi's Solution for Analyzing Distribution Data and Future Initiatives

To keep pace with changes in the business environment, FUJI understands the need to link product and customer information so that it can look at its business from a variety of perspectives and obtain detailed information in a more timely manner. The company chose to install Hitachi's solution for analyzing distribution data in recognition of its ability to link information quickly and to implement the PDCA cycle with a high level of accuracy.

Adopting Hitachi's solution for analyzing distribution data solved the following two problems.

(1) Get overall faster display times for search results compared to previous system. The response is up to five times faster than the previous system, making online use practical.

(2) Improve processing performance to reduce the number of data marts and allow data to be stored in more detailed form.

In the future, they intend to expand use of Hitachi's solution for analyzing distribution data across the FUJI group with the aim of making business improvements by utilizing the PDCA approach to problems at a company-wide level while also encouraging wider use of analytics. They are also seeking to increase sales through greater integration of customer information, including measures for analyzing the influence of competition within trading areas and the analysis of "online to offline" (O2O)*3.

CONCLUSIONS

It is anticipated that analysis systems will become an important part of retailing in the future in order to

*3 Measures on the Internet for encouraging people to visit brick and mortar stores.

obtain an accurate understanding of the ever-changing operating environment for retailers. In the future, Hitachi intends to use information technology (IT) to support further advances in retailing by using Hitachi's solution for analyzing distribution data (merchandise analysis system, customer analysis system, and big data information platform) to provide systems that can respond flexibly to changing circumstances, as described in this article.

ACKNOWLEDGEMENTS

The study of installation benefits and business improvements achieved by Hitachi's solution for analyzing distribution data described in this article received considerable assistance from the people involved at UNY Co., Ltd. and FUJI Co., Ltd. The authors would like to take this opportunity to express their sincere thanks.

REFERENCES

- (1) UNY Co., Ltd., <http://www.uny.co.jp/> in Japanese.
- (2) FUJI Co., Ltd., <http://www.the-fuji.com/> in Japanese.

ABOUT THE AUTHORS



Hideki Negishi

Smart System Department, Smart Business, Smart Information Systems Division, Services Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd. He is currently engaged in the design and development of Hitachi's solution for analyzing distribution data.



Atsumi Mano

Systems Department 2, Distribution Systems Management Division, Enterprise Solutions Division, Services Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd. She is currently engaged in the planning of Hitachi's solution for analyzing distribution data.



Naoya Sugiyama

Smart System Department, Smart Business, Smart Information Systems Division, Services Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd. He is currently engaged in the design and development of the merchandise analysis system for Hitachi's solution for analyzing distribution data.



Atsushi Shimada

Big Data Business Solutions Department, Software Development Operation, IT Platform R & D Management Division, IT Platform Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd. He is currently engaged in the design and development of products for big data infrastructure.



Kazumasa Tashima

Department 2, Distribution Solution Division, Industrial & Distribution Solution Business Division, Hitachi Solutions West Japan, Ltd. He is currently engaged in the design and development of the customer analysis system for Hitachi's solution for analyzing distribution data.