



A High Productivity Web-Based Vending Machine Platform **Built with Sencha Ext JS and RAD Studio**

CUSTOMER SUCCESS STORY

Sencha Ext JS and Embarcadero's RAD Studio enables HISCOM to design and deploy a highly productive AI-enabled vending machine operation and logistics platform to reduce work hours, lower fuel costs, and standardize field operations.

HISCOM, a Japan-based services and solutions company spun off from the Information System Department of Hokuriku Bottling Company, offers vending machine operation and logistics solutions for beverage manufacturers and sake brewing companies. The company supports logistics optimization of transportation, delivery, and warehousing across all functions of designing, developing, building, and deploying IT systems for Hokuriku and other groups.

As a part of its core business solutions for vending machine field operations, the company offers a system for inventory management, delivery truck loading, routing, and scheduling, as well as optimizing the timing of visits to locations. Additionally, the system supports the "full-service operation" services required by field staff for restocking products, refilling vending machines, repairing and maintaining machines on behalf of vending machine owners, proposing product lineups, and other related vending machine activities.

Some of the biggest challenges that the vending machine operations faced were the shortage of vending machine field staff, suboptimal usability of the web system UI, and adhering to the Japanese government regulations related to workstyle reforms requiring employees to manage field operator working hours more vigilantly.

HISCOM employed Sencha Ext JS and RAD Server to successfully transition the vending machine system to a web-based platform, improving productivity by almost 120%. Combined with AI technology, the new system brought in benefits such as minimized lost sales opportunities, reduced working hours, lower fuel costs, and standardized field operations.



"With Sencha's rich set of components and RAD Server's flexible data sharing and collaborating features, we have successfully built a system to standardize vending machine field operations and expect to enhance field operator productivity by 120%."

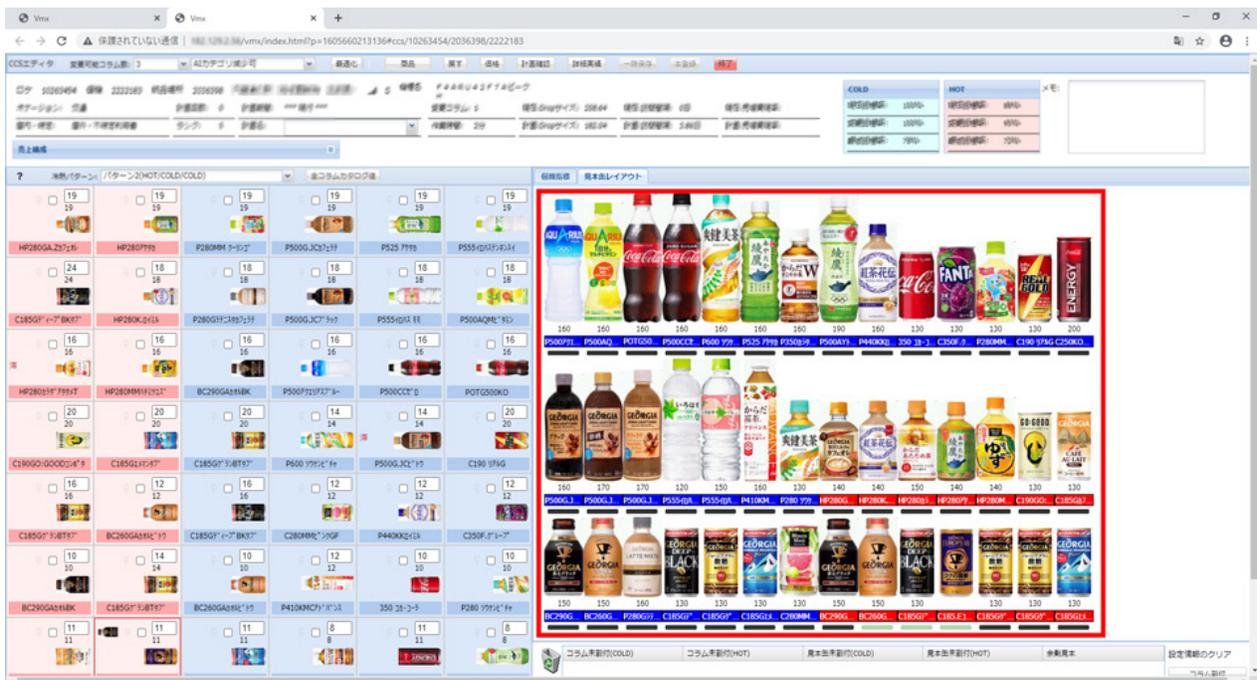
Takeyuki Watanabe, **Operations Planning and Promotion Manager at HISCOM**

A Lightweight, High-Productivity Web System Built with Ext JS

Since 2017, there have been several discussions about revamping and renewing the almost -ten-year-old system that no longer supported Visual Basic (VB) 6.0. “We launched a project to move from the existing client/server configuration to a web-based architecture. While accomplishing that we also wanted to build a web system without compromising the VB system’s ease of using UX features such as drag-and-drop. After extensively searching for options and solutions, we decided to use Sencha Ext JS,” says Takeyuki Watanabe, Operations Planning and Promotion Manager at HISCOM, who led this project.

The older client-server system required hours of work for installing and registering settings each time additional PCs were deployed in the field. With a web system, this time-consuming extra work could be replaced by easily issuing an account. In spite of that ease, there were still concerns about the user interface design for the web system—such as graphs and charts, drag-and-drop operations, etc.

HISCOM transitioned to using Sencha Ext JS as the development framework for the renewed web interface system. They utilized Sencha’s rich set of components for developing the enterprise web application. The best part about Ext JS was the unique advantage of building web interfaces with powerful components such as charts and grids that provide rich UI interactions.



Bottling Layout Panel incorporating Ext JS drag-and-drop capabilities

At the prototype stage, Ext JS successfully demonstrated that the UI of the existing VB applications could be easily adapted for the web, which supported the pivot to using Sencha's solution for the project. To enable real-time collaboration features for sharing assets across data, the project employed Embarcadero Technologies RAD Server for support and efficiency.

The screenshot displays a web-based application window titled '182.129.2.56/vms/index.html?pv=16056602131364vistingplan'. The interface features a grid of data with columns for various scheduling parameters. The data is organized into multiple columns, each representing a different machine or unit. Each row contains numerical values and status indicators (such as '0', '1', 'X', 'H', 'D') for each unit. The interface includes standard web browser navigation elements and a menu bar at the top.

Field operator scheduling interface built with Ext JS

Reduced Labor Shortages and Workstyle Reform Support with AI Technology

The vending machine field operation optimization introduced three AI technologies—one for accurate statistical sales forecasting, another for route optimization, and the third for product lineup optimization. The route optimization (RO) technology is used to find the most cost-effective route for servicing the vending machines—in line with the Japanese government's initiative for workstyle reforms, which require employees to manage field operator working hours cautiously. The product line optimization uses historical sales or demand data to suggest which items should be placed in which vending machine column for each unit.

"Compared to the text-based and color-decorated user interface of the old system, the new system using Ext JS allows intuitive visualizations through graphs and charts. For example, a sales trend and forecasting graph allows us to get a comprehensive glance of the data for a particular machine of interest, while the old system provided this information as individually charted and displayed on separate screens," says Shigenobu Terabayashi, in charge of AI deployment at HISCOM. Having the ability to see the data in one view was extremely important for a coherent platform.

“With the new system, field status information, such as which machines need to be serviced on a particular day, which products are out of stock, does the operator need to visit a particular location, is displayed. All the information that used to be displayed on multiple screens is now available in one single chart,” said Terabayashi. “Experienced operators were able to schedule their work for the day from numbers alone, but now even entry-level operators can process status information more easily via an intuitive interface,” Terabayashi added.



One of the purposes of the new system was to reduce working hours in support of the workstyle reforms and labor shortages. “Even if the sales-forecasting AI judges it is proper to restock twenty machines today, the RO AI limits the number of machines serviced to fifteen within the working hours. That’s how we can achieve sales targets and workstyle reform at the same time,” said Daisuke Tsuru, Section Head, Operations Services Division at HISCOM.

“As the working population was expected to decrease, it was challenging to standardize field operations. So we collected information on what functionality field staff considered necessary. Traditionally, field operators did the route planning purely based on experience coupled with some intuition. As a result, route planning would take more time for our less experienced staff. Our goal was to solve this problem with the use of AI,” says Naomi Hayase, Operations Services Division, HISCOM.

From Development to Deployment within a Short Year

HISCOM started working on the development of the new system in 2019 and implemented a full-scale solution in May 2020, with pilot deployment in February 2020. "In this project we designed a database to avoid dependency on Oracle to meet various customer needs. For this purpose, the standard SQL was used to fetch data instead of Oracle functions. Since RAD Server gives us flexibility to process data, we thought that the combination with Sencha Ext JS was an ideal match!" said Hayase.

RAD Server is responsible for the web API between web interface and database. The database layer is abstracted from Sencha, and data-access components are completely prebuilt in RAD Server. This enables programming at a high level of abstraction and helps achieve flexibility in design as well as database changes.

When the HISCOM team started working on building the system, they received full support from the Sencha and RAD Studio support staff. "Every month the support staff visited us and checked the work in progress, helping us solve any problems we encountered on site," says Terabayashi. As a result, within a short year's time, HISCOM was able to complete the full scale implementation of the new system.

"Because of the impacts of COVID-19 this year, the effect of the new system on sales cannot be simply measured in comparison with the last year. But the on-board inventory has been drastically reduced. Before the implementation, we had 50% of stock items left on board after a truck completed its daily route. Now the on-board stock is lowered to 10 to 20%. This level of on-board inventory is still not sufficient to refill necessary items, and we are fine-tuning for the right level. The new system is expected to contribute to the group wide eco-initiative of lowering fuel costs," says Watanabe.

From the system developer's perspective, the new system has multiple benefits. The novel web system has made it easier to deploy among users. With the old system, it took two to three hours to install the database and applications and to test operability. "We are a small-sized system team and cannot respond immediately to a request for deployment in some cases," said Tsuru. "The other prominent benefit is that the interface design created with Ext JS allows users to customize the operations. For example, users can sort a grid, filter data, and customize these actions according to their unique needs," Tsuru added.



"Sencha's drag and drop, graphs, grids, and other components enabled us to build a native-like web system offering a rich user experience."

Daisuke Tsuru, **Section Head, Operations Services Division at HISCOM**



120% Boost in Field Operator Productivity

HISCOM expects the new system to successfully improve productivity by over 120%. Due to the implementation timing amid the COVID-19 pandemic, a YoY comparison is unfortunately not realistic. However, HISCOM is confident of the productivity boost the new system provides. "If a vending machine operator can cover 100 units of machines, we are confident that the number can be increased to 150 units according to AI calculations (a 50% boost). Personally, I have expectations for improving productivity by 120% considering other factors as well. We are confident to say this system is able to hold up and boost productivity even if we were to face a 10% reduction in our workforce in the foreseeable future. We plan to continue to perfect it as life gradually gets back to normal," says Watanabe.

Regarding the next move, Watanabe has a vision: "We want to enhance AI simulation performance to add a booking feature. Because we have to satisfy a combination of product and vending machine requirements, it inevitably takes time to get results. In addition to providing support for vending machine field operations, I have an idea for a framework for the field staff and field operation manager to share targets."

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