

# Present Status and Future Prospects of Vending Machines

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## 1. Introduction

According to the Japan Vending Machine Manufacturers Association (JVMA), the number of installed vending machines and automatic service equipment in Japan has exceeded 5.6 million units, and annual sales of a variety of sold merchandise and offered service has exceeded 7.1 trillion yen. On average, there is one vending machine per 23 Japanese people and the per capita sales is 56,000 yen. Vending machines have become very popular among Japanese and have become an indispensable part of our daily life.

On the other hand, the volume of shipments, which after peaking in 1989, had decreased until hitting bottom in 1994 and then increased until 1998, driven by replacement demand. Since 1998, however, demand has been decreasing again, and in the first half of fiscal 2001 year, the actual volume of shipments across the vending machine industry was 89 % of the previous year's figure.

This paper describes the transition of Japan's vending machine industry, Fuji Electric's product development and future prospects.

## 2. Present Status and Transition of Vending Machine Industry

Figure 1 shows the number of installed vending machines by type, and Fig. 2 shows the percentage breakdown of merchandise sales. Figure 3 shows the transition of the number of installed vending machines and annual merchandise sales. Figure 4 shows the transition of annual shipment volume and shipment value of vending machines.

As shown in Fig. 3, the number of installed vending machines and total annual sales are increasing, although very gradually.

Figure 2 shows that 40 % of sales are from beverages, but as shown in Fig. 5, beverage sales by vending machines are on the decrease and beverage sales by convenience stores and mass merchandisers are on the increase. The sales of beverage by vending machines in fiscal 2000 year was 97.5 % compared to the previous year. With regard to beverages, the

Fig.1 The number of installed vending machines by type (as of the end of Dec. 2000)  
(Japan Vending Machine Manufacturers Association)

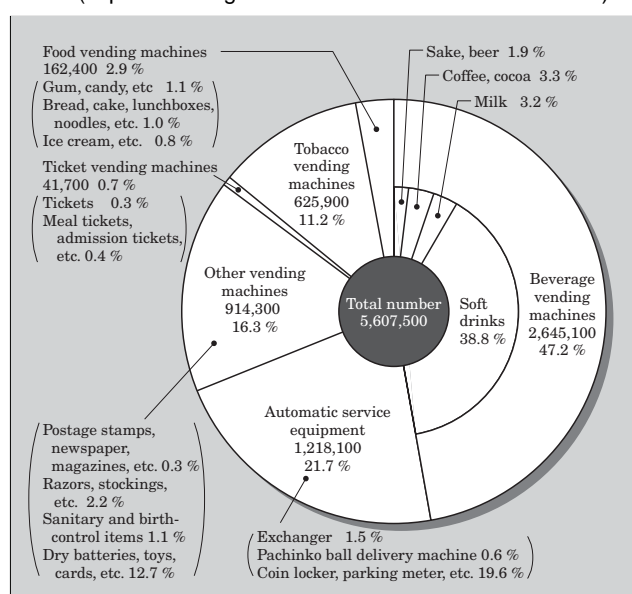
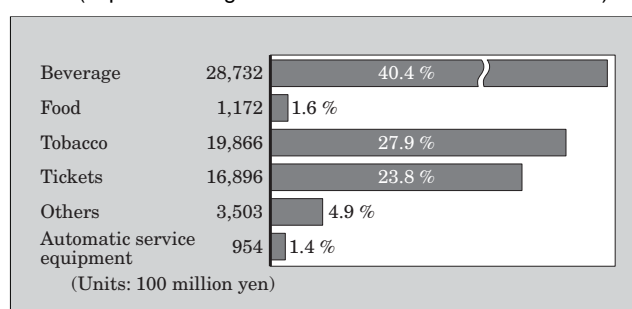


Fig.2 Annual sales and percentage breakdown of merchandise by type (Jan. to Dec. 2000)  
(Japan Vending Machine Manufacturers Association)



number of installed machines is increasing but the sales amount is decreasing; that is, per machine sales are decreasing.

Because of reduced sales and profitability, beverage manufacturers are increasingly cutting investment in vending machines.

Thus, as shown in Fig. 4, since 1998, the shipment

Fig.3 Transition of the number of installed vending machines and annual sales of merchandise (Japan Vending Machine Manufacturers Association)

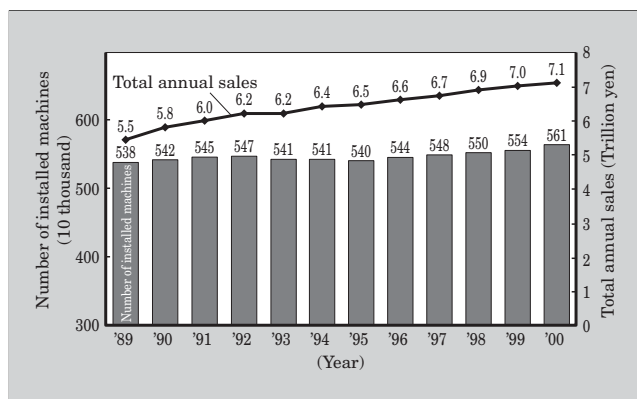
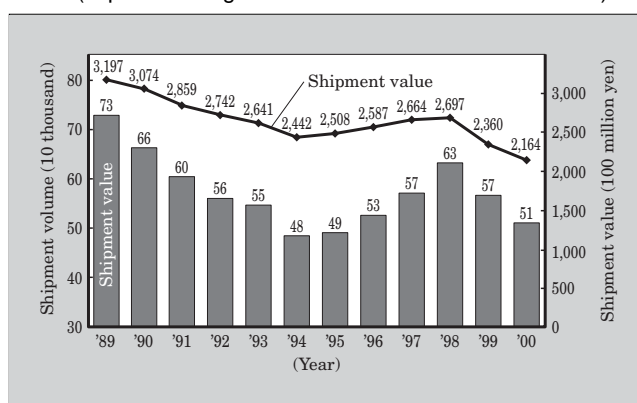


Fig.4 Transition of the shipment volume and value of vending machines (Japan Vending Machine Manufacturers Association)



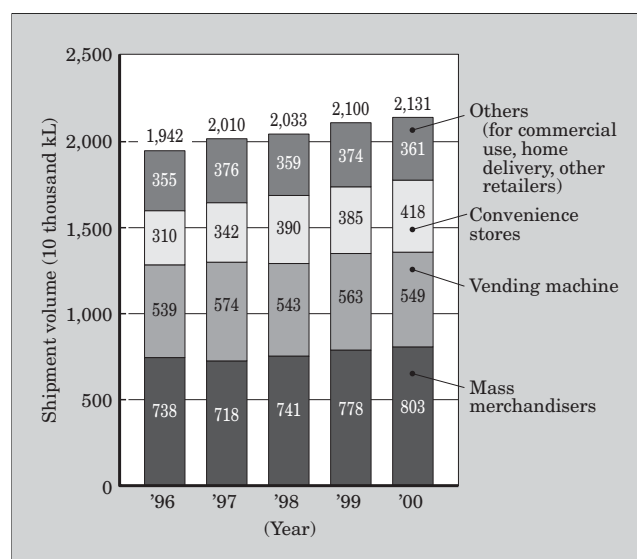
volume of vending machines has been on the decrease, but as shown in Fig. 3, the number of installed vending machines is increasing slightly. The reason for this discrepancy is that vending machines already in operation are being overhauled and their exterior parts such as doors are renewed to elongate their service life, leading to a reduction in investment outlays while maintaining the number of installed vending machines.

Customers are strengthening the drive to purchase as low-priced products as possible through introducing a group purchasing system with participation by several companies and by continuing to use the same-model for several years without upgrading to a new model every year.

Under the market conditions of sluggish per-machine sales, operating companies compete amongst each other to secure good locations for sales. However, because of fierce competition, the fee for reserving a good location and rebates on sales are sharply rising every year, reducing operating companies' profits.

The present harsh market conditions are expected to continue for the next several years. Thus, it will be necessary to increase per-machine revenue and to

Fig.5 Transition of shipment volume of beverage by distribution channel



reduce the operating cost of vending machines. Accordingly, improvement in efficiency of vending machines will be accelerated by using information technology.

On the other hand, there is a promising opportunity arising from compliance with an intensified drive for prohibiting the sale of tobacco to minors, the Tobacco Institution of Japan (TIOJ) is planning to replace present vending machines with machines having a function to identify customers' ages using IC cards not later than 2008.

### 3. Fuji Electric's Present Status of Vending Machine

Fuji Electric manufactures goods-vending machines such as for food and beverage, food service equipment, peripheral equipment such as coin-and currency-related equipment and POS (point of sales) systems, and vending machines that can accept various cards. This paper describes market needs in these fields including social responsibilities and Fuji Electric's product development to address these needs.

#### 3.1 Social responsibilities and market needs for vending machines

Vending machines in Japan have made unparalleled progress and are providing a great number of people with convenience in the streets. The magnitude of their number, however, requires various social responsibilities and environmental awareness of vending machines.

##### (1) Environmentally friendly vending machines

Vending machines are specified as designated equipment under the Law Concerning Rational Use of Energy (the Energy-saving Law). It is necessary to develop more energy-efficient vending machines by

benchmarking the machines against the best performer in a top runner approach.

It is also necessary to accelerate the development of vending machines using natural refrigerant having a low global warming coefficient. Greater attention is increasingly given to environmentally friendly vending machines.

#### (2) Recycling production system

Enhancement of the three Rs (recycling, reduction in size and reuse) of vending machines is required from the viewpoint of prevention of environmental disruption. It is necessary for the vending machine industry to promote and upgrade the recycling system.

#### (3) Anticrime measures

There seems to be no end to crimes such as theft by forcibly breaking open the door or using counterfeit coin slugs, necessitating a more intelligent coin mechanism and a bill validator to reject slugs and forged bills, and reinforced housings to withstand vandalism. The development of a vending-machine crime reporting network system is now in its testing stage and is expected to be commercialized soon.

#### (4) Promotion of the application of IT

As part of the application of IT to vending machines, Fuji Electric has developed a Java\* platform. In the future, further application of IT to vending machines is strongly desired to address customer needs, to reduce operating costs and to develop new systems for promoting sales of merchandise.

#### (5) Development for increasing per-machine sales

Fuji Electric was the first in the world to develop cup vending machines that automatically capped the cups in which beverages were served. This type of enhancement to the commercial value of merchandise that leads to increased per-machine sales is strongly desired, such as through giving priority to taste to compete with specialized niche coffee shops.

#### (6) New fields for vending machines

Fuji Electric has developed vending machines for such locations as booths in workplaces and hospitals, allowing changeover between manned operation during periods of time when there are many customers and unmanned operation during periods of time with few customers, in order to develop a new market for vending machines with a revolutionary idea.

### **3.2 Present status of Fuji Electric's new product development**

#### **3.2.1 Introduction of an information network into vending machines**

With the rapid progress of the Internet technology, the introduction of information technology into vending machines is accelerated. The introduction of IT is expected to transform vending machines from machines only selling merchandise to machines capable of providing new services.

As a leading manufacturer in the industry, Fuji Electric was one of the first to start developing vending machines designed for the Internet, and has already developed a machine provided with a message board on its front panel using an LED (light emitting diode) system.

In addition, Fuji Electric has developed a Java mounting system utilizing state of the art technology, and established a platform to support various applications. Java can provide a processor- and OS-independent operating environment that is separate from the basic control unit of the vending machines. Java is a high quality, object-oriented programming language that enables the efficient development of software.

In the past, functions were added or modified by rewriting ROMs, which took a long time and had many restrictions. The development of a Java system allows functions to be dynamically changed and software to be updated from a network or a handy terminal. That is, information acquisition from the Internet using a portable digital assistant (PDA) facilitates real-time communication and route management, such as quality control and preventive maintenance, the reporting of malfunctions, and anticipated sellout. As a result, sales efficiency has substantially been improved, and it has also become possible to broadcast advertising images and emergency information. Furthermore, Fuji Electric is promoting the development and commercialization of new Java applications to various fields, such as cashless shopping and point of sale services, which are accessible from a mobile phone, to increase per-machine sales and marketing support through analysis of demand for merchandise and customers' trends.

#### **3.2.2 Can and bottle vending machines**

The primary challenges for can and bottle vending machines is to comply with environmental regulations pursuant to the Energy-Saving Law, to support an increasingly diversifying range of containers, and to reduce life cycle cost.

Since 1995, to help curb global warming, Fuji Electric has been developing energy-saving vending machines. Because vending machines are specified as designated equipment and thus their targeted values are clearly defined, Fuji Electric is now vigorously promoting the development of energy-saving vending machines.

In order to satisfy two conflicting requests from beverage manufacturers, for as much storage capacity as possible and as little power consumption as possible, Fuji Electric is promoting the reduction of environmental impact from the production stage using life-cycle assessment (LCA) in a joint research project with a university, and is promoting optimization of the heat insulation structure and efficiency improvement of the refrigerator system based on thermal conduction analysis.

As for non-Freon vending machines, Fuji Electric has already completed the change to alternative Freon

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\*: Java is a registered trademark of Sun Microsystems, Inc.

(HFC-407C: zero-ozone-depletion potential), and is promoting the use of natural refrigerant having a smaller global warming coefficient. In addition, Fuji Electric has completed the technological development of an alternative for the blowing agent in hard polyurethane foam, which is now in the preliminary stage for application to products.

PET (polyethylene terephthalate) bottles introduced around 1997 have become more and more widely used, and new products using distinctively shaped PET bottles, such as cylindrical and prism types, are available, mostly in 500 mL bottle sizes. Fuji Electric is developing an adjustment-free merchandise-selling mechanism to provide vending machines that are easy-to-operate and capable of selling a variety of merchandise.

Fuji Electric has developed a super-smart rack that incorporates Fuji's unique "posture control of goods" concept, based on the falling motion analysis of merchandise using CAE (computer-aided engineering), to obviate the necessity for changing thin and thick racks both at the product insert and outlet, and to eliminate blocking and congestion of cans in the storage racks. The super-smart rack is provided with a newly developed solenoid-drive mechanism, enabling fast sales and providing strong resistance to vandalism such as attempts to remove the goods without paying.

In 2002-model machines, anti-vandalism measures are intensified through strengthening the guarding boards and structure of 2001 model machines.

### **3.2.3 Cup vending machines**

Cup vending machines have been introduced chiefly into workplaces, but per-machine sales continue to see sluggish growth. Meanwhile, to meet customers' strong demand for good-tasting coffee, such as espresso coffee, Fuji Electric is helping to revitalize the vending-machine market through providing vending machines which can serve beverages of the customers' desired taste, on the spot and quickly.

To serve good-tasting regular coffee and authentic, strong espresso coffee, Fuji Electric developed and commercialized vending machines featuring a hybrid brewing mechanism that changes the extraction pressure according to each kind of coffee and is provided with an automatic capping mechanism to facilitate carrying after preparation. Since, Fuji Electric developed such a new mechanism to securely mount flammable polyethylene caps one at a time in a cup-dropping system to prevent contents from spilling and to preserve flavor, vending machines equipped with this mechanism are valued by the market as hygienic and easy-to-operate, and can be installed in hospitals and computerized offices. In the future, Fuji Electric intends to develop and serialize this mechanism so as to be able to handle cups with drinking tabs and cups for which a straw can be used, including application to a direct cup mixing system.

Fuji Electric is determined to strive to improve the

operability of vending machines and the flavor of merchandise, from the viewpoint of consumers, for the purpose of revitalizing the cup vending machine market.

### **3.2.4 Food service equipment**

In the field of food service equipment, Fuji Electric is developing vending machines, giving the highest priority to the flavor of food.

Fuji Electric installed a newly-developed automatic valve in a soft drink dispenser, enabling dilution at a fixed rate even if the temperature of the raw materials varies, and developed an optimum mixing method based on the results of analysis of the CO<sub>2</sub> distribution between a carbonator and a mixing nozzle. As a result, Fuji Electric developed and commercialized a carbonator system, which enabled sales of carbonated beverage with high carbon dioxide solubility, superior to that of competitors, and is promoting the application of this system to new-model vending machines for Chu-hi (Shochu mixed with soda water) and a variety of liquors.

As a venture into a new field, Fuji Electric is also developing a coffee machine for commercial use. This machine can serve palatable, full-bodied regular coffee using a newly-developed reduced-pressure extraction system and a paper-filter dripping system using a roll-type paper filter.

Fuji Electric will continue to develop food service equipment as an offshoot of its vending machine business.

### **3.2.5 New field products**

Fuji Electric has developed new field products, for which component technologies can be utilized, such as a "vendor showcase for dual performance store," which allows changeover between attended and unattended services depending on the number of customers and busyness of operation, and a "multi-purpose food vending machine" for bread, rice balls and lunch boxes, which provides a catch mechanism to retrieve merchandise on spiral racks and conveyer racks.

Fuji Electric will continue to develop these new field products, utilizing the acquired mature technology of vending machines. The market for new field products is expected to grow.

## **4. Future Prospects**

Driven by the concept of "convenience anytime and anywhere," nearly the same number of vending machines has been installed in the small area of Japan as throughout the US. With increased public concern about the environment, it is imperative to pursue harmony between environment-friendly and human-friendly products.

Vending machines having growth potential include entertainment-oriented vending machines that provide the pleasure of looking at and of choosing merchandise, in addition to the pleasure of buying, are easy to

operate and feature universal- and barrier-free-design, anti-disaster vending machines which serve free various drinks in case of an emergency, and Java-compatible vending machines which recognize sold out or failure conditions from a remote location and react to realize optimum operation.

Concerning environment prevention, in addition to energy conservation and countermeasures against Freon, the campaign for recycling and reuse of used vending machines will become intensified through the elongation of products' service life, and through the adoption and expansion of policies promoting the reuse of parts.

## 5. Conclusion

This paper described the present status of Fuji Electric's product development, and presented a general view of the present status and transition of the vending machine industry.

In the past, Fuji Electric has constantly made efforts to become a leading "most valuable service provider." In the future, to response to the so-called three keywords of this era, "humans, spirit and environment," Fuji Electric is determined to do its very best to develop human-friendly and environment-friendly vending machines and systems, with creative ingenuity, to further develop vending machines and to survive the age of structural market change.

In addressing environmental concerns, because the issues of parts reuse and recycling of used vending machines cannot be resolved only by vending machine manufacturers themselves, Fuji Electric is determined to resolve these issues in a joint effort with all the parties concerned, such as industry groups, beverage manufacturers, operators, installation companies, and location owners.

Fuji Electric requests continued assistance and guidance from all concerned parties.





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