INDUSTRY REPORT
Frost & Sullivan* Research Services
Intelligent Vending Machines Market

Intelligent Vending Machine Shipments Are Forecasted to Grow at a 49% CAGR[1]

Driven by the need for LCD/touch-screen displays, cashless payment, telemetry, voice recognition, digital signage and ERP integration

"The vending machine has become a symbol of the world's quest for convenience, operating 24 hours around the clock, 7 days a week."

*Frost & Sullivan**

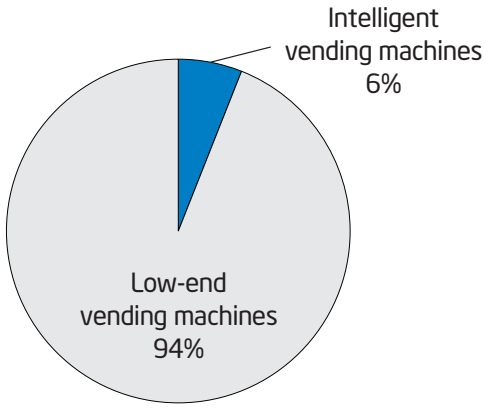
Introduction

Over the past 18 months, there has been a surge in interest by the vending machine industry to adopt new technologies. With over 18 million vending machines installed worldwide, what changes are in store for the market over the next five years? To understand this better, Intel asked Frost & Sullivan* to research the future requirements and trends, and they found the vending market is undergoing significant change that will transform the industry. To address changing market dynamics, up-sell opportunities and increasing government regulation, vending machine manufacturers are turning to computing technology, which is revolutionizing the industry. They are integrating a range of technologies, foremost LCD/touch-screen displays, cashless payment and telemetry.

This paper provides insights into the many conclusions from the Frost & Sullivan report, including an intelligent vending machine market forecast, key drivers, restraints and challenges, geography-focused insights, and an overview of the Intel technologies that are expected to play a major role in this industry transformation.

KEY MARKET TRENDS

- Global shipments of intelligent vending machines are forecasted to grow at a 49% CAGR from 2010 to 2016, reaching around 2 million units with both the new and retrofit markets combined.
- Top food and beverage companies are taking the lead, currently testing advanced technologies, such as mobile payments, card readers, digital signage and user interactivity.
- Increased regulation is a key driver, including government mandated nutrition labeling (North America) and improved energy efficiency (APAC), which is being addressed by the adoption of LCD displays and telemetry, respectively.
- Cashless payment via mobile phones with near-field communication is expected to increase sales per transaction, especially for high-end products, like smartphones and portable media players.
- To be viable in the marketplace, vending operators need to increase efficiencies by implementing better route management and operational procedures, using human resources more cost-effectively, and improving machine maintenance procedures.



Source: Frost and Sullivan*

Figure 1. Total Vending Machine Market: Product Market Share by Units, 2010

Note: This analysis defines an intelligent vending machine as one with an LCD/touch screen.

What is an Intelligent Vending Machine?

The vending machine market comprises many players consisting of thousands of small operators and relatively few large or major ones. As of 2010, the total vending machine installed base was estimated to be 18.7 million units, represented by machines that have sufficient space to accommodate LCD screens. This includes large table top office vending service machines that have enough surface area to potentially support 6 to 14 inch LCD screens.

The installed base is segmented in Figure 1, where an intelligent vending machine is one that has an LCD screen for interaction. While an LCD screen may seem like a low bar to qualify as an intelligent vending machine, it's typically the first priority of operators who expect to incorporate other technologies, listed in Figure 2, over the next 3-5 years.

Priorities for Intelligent Vending Machine Enhancements:

- **LCD:** Touchscreen and interactive displays, typically ranging between 6 and 42 inches.
- **Cashless Systems:** Payment by means of mobile phones and credit/debit cards.
- **Telemetry Systems:** Fixed or wireless connection for communicating machine health (i.e., sensor), inventory levels, etc.
- **Voice Recognition:** Another way for customers to interact with the machine.
- **Digital Signage:** High definition content medium: product info, graphical and video ads. Rich interactive content: when used in conjunction with a touchscreen.
- **ERP:** Vending machines communicating with corporate systems: finance, planning, dispatch, maintenance.

	LCD	Cashless Systems	Telemetry Systems	Voice Recognition	Digital Signage	ERP
North America	●	●	●	◑	◑	◑
Europe, Middle East, Africa	●	●	●	◑	◑	◔
Asia Pacific	●	◑	●	◔	◑	◔
Latin America	◑	◑	●	◔	◑	◑

Impact: ● High ◑ Medium ◔ Low

Source: Frost and Sullivan*

Figure 2. The Top Priorities of Operators World-Wide for Intelligent Vending Machines

FULL-FEATURED INTELLIGENT VENDING MACHINES

VE Global Vending* (VEGV*) is revolutionizing vending everyday from its development offices in the United States and Europe. The company provides software, hardware and consumer interface solutions that can be applied together or individually to suit specific vending challenges. By offering scalable solutions, VEGV is able to tailor solutions for vending operators' specific needs and budgetary restraints. VEGV vending machines are based on Intel® processors, allowing them to deliver a wide range of advanced features, including:

- Anti-theft/Anti-vandal cameras
- Anonymous facial recognition using Intel® Audience Impression Metrics Suite (Intel® AIM Suite)
- Product recognition allowing operators to control and monitor vending transactions and interactions
- Cashless payment using near-field communications
- Full vending machine controller functionality where an Intel processor replaces previously-used microcontrollers

Machine operators are supported by a comprehensive suite of software tools for the above functions, as well as for digital signage content management, telemetry, remote management and communications, and the overall operation of the system. VEGV also implements the interactive vending machine interface called MIND (Make Informed Nutritional Decisions), which allows consumers to make informed decisions, and operators to comply with new legislation in the United States and Europe mandating the display of nutritional information.

The VE Discover* integrates MIND technology with a content-managed screen that allows the user to explore product information and promotions, as well as execute payment and product selection on an interactive touchpad rather than a button keypad. The optional upper screen features promotional content and advertising, while the lower touch screen displays product information and facilitates the transaction, as shown in the picture.

The VE Discover* gives the consumer an interactive experience and provides the vending operator and product companies with opportunities for promotions.

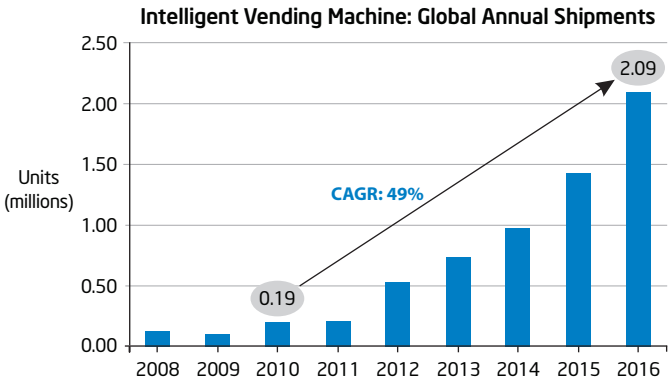


Figure 3. Intelligent Vending Machine Market: Annual Global Shipment 2008-2016

Market Forecast

Annual intelligent vending machine shipments are forecasted to exceed 2 million by 2016, after growing at a CAGR of 49% beginning in 2010 (Figure 3). Worldwide, over half of the intelligent vending machine shipments will be retrofits, primarily adding a small LCD display and/or a card reader. Typically, system integrators retrofit the machine by installing pre-qualified kits from vendors specializing in this field.

Key Market Drivers, Restraints and Challenges

Based on their vending machine market analysis, Frost & Sullivan identified key market drivers, restraints and challenges that are expected to have significant impact on the industry over the coming years.

Market Drivers:

- Opportunities enabled by mobile phones
  - > Accept payments and transfer coupons with the swipe of a phone using near-field communication technology.
- Government mandates
  - > Display product nutrition information and product warnings (i.e., tobacco).
- Increased user interactivity
  - > Interact with both the customer and the customer's smart phone, add intelligence to detect and respond to individual viewers, and provide a dynamically visual experience with high-definition displays running rich graphics and interactive promotions.

- Remote management
  - > Enable machines to contact vending operators by sending and receiving real-time notifications via the cloud, thus decreasing maintenance cost, increasing machine availability and automating restocking. The connected machines can communicate when they're running low on product and facilitate dynamic route optimization and other logistic efficiencies.
- Software flexibility
  - > Adopt general-purpose processors capable of easily supporting new technologies and features in software, as opposed to hardware-focused, fixed-function platforms.
- Pricing power
  - > Command a higher price for products (e.g., coffee) by using a vending machine's high-end technology display and interactivity to position them as higher quality than others sold in machines.

Market Restraints:

- Measures banning vending machines in public locations
  - > Growing regulation prohibits junk food sales in schools and tobacco use in public.
- Return on investment (ROI) concerns
  - > Economic slowdown and high technology costs deter operators from upgrading machines.
- Vandalism
  - > Security issues in some locations limit high-end vending machine adoption.
- Rental space costs increase significantly in some parts of Europe
  - > As rents rose 15% over the past few years, operators moved or took back machines.
- Low operating margins
  - > Vending operators run their businesses on very narrow margins and need to be able to justify the purchase of new technology with a large increase in revenue.

Industry Challenges:

- Energy management regulation
  - > Emerging mandates require lower energy consumption and improved monitoring.
- Technology integration
  - > Operators incorporating new technologies must integrate new protocols and standards.

"ROBOT STORES"

Responding to the special needs of various product manufacturers and operators, Investrónica*, headquartered in Spain, offers a range of vending machines to meet any requirement. The company is an innovator, incorporating their experience in sales management applications, payment terminals, automation, electronic sensing and control systems, secure payment media, communications and advertising.

Pools of vending machines operate like a robot-store, marketing various products, including music, books, movies, video games, perfumes and telephones. They also provide services, such as mobile recharge, travel agency, insurance and ticket sales for events. The machines are attractively designed and adaptable to specific needs, particularly space requirements, low maintenance, remote messaging about product and cash levels, and alarm monitoring.

The machines combine the most advanced vending functionality with the promotional potential of dynamic digital signage displayed on an integrated 32 inch high definition touchscreen. These Intel® processor-based systems support cash or cashless payment via an RFID card or mobile device using near-field communication. Receipts and coupons can also be printed, and machines can be equipped with a camera for anonymous audience measurement or product identification via barcode.

Investrónica* vending machines enable a self-service store.

Geographic Trends

The following presents a snapshot of geographic trends in the vending machine industry.

North America will lead the adoption of intelligent vending machines – driven in large part by the need to implement LCD screens for disclosing food and beverage calories per 2010 U.S. legislation.

In Japan, the twin natural disasters, tsunami and earthquake, had a catastrophic effect on the vending machine industry and reduced the installed base; however, Japan is expected to maintain its top position as an adopter of advanced vending machine technologies, such as telemetry and cashless systems.

Additionally, Japan's large install base of vending machines has the attention of government authorities who are concerned about their overall power consumption, particularly for machines that keep soft drinks cold. In response, operators are dispatching personnel to power on/off machine refrigeration throughout the day.

In EMEA, Western European countries will continue to remain the hotbed for new vending technology adoption (see sidebars for examples).

Security threats and vandalism are expected to remain a major threat to the growth of the intelligent vending machine market in countries such as Poland and South Africa.

VENDING MACHINES WITH LARGE, CUSTOMER-AWARE TRANSPARENT DISPLAYS

Providing a peek into the future of vending, Sanden Corporation*, Okaya Electronics* and Intel designed a concept model that incorporates a massive transparent touchscreen display and anonymous facial recognition capable of identifying basic characteristics of customers. This high-tech vending machine replaces the typical glass front-panel with a 65 inch translucent touchscreen, which allows customers to see the products behind the screen even as it plays high definition video and animation. When patrons stand in front of the machine, it senses their age and gender and makes targeted product suggestions based on anticipated tastes and preferences. This capability uses a sensor device mounted on the front of the machine and Intel's anonymous viewer analytics solution, called Intel® Audience Impression Metric Suite (Intel® AIM Suite).

With full high-definition (1920 x 1080 pixels) resolution, the see-through screen can display text, photographs and rich animations, powered by Flash* or other software, with a high degree of clarity. It consists of a conventional LCD panel with the backlight unit (light source) removed and behaves like a sheet of glass. This allows people to watch various types of content while seeing the products positioned behind at the same time. In this concept model, the products inside the vending machine are illuminated by high-intensity LED lights, which also serve to make the images on the transparent touchscreen visible.

The display is also a touch panel so that menu selection and other functions can be performed interactively. When the vending machine is not in use, it attracts the attention of potential customers by playing content such as a large digital clock or animated animal characters. When someone stands in front of the vending machine, the signage content changes to show targeted advertisements or provide details about the products the purchaser is considering. After the purchaser makes a selection, a brief, cheerful animation plays to express appreciation. The animation moves in sync with the robotic mechanism that transfers the product to the outlet.

Concept Model Developed by Sanden Corp*., Okaya Electronics* and Intel.

Why Intel Technology in Intelligent Vending Machines?

As vending machines integrate advanced capabilities and become more connected, there's a need to replace the microcontroller used today with a higher performance CPU. This is where Intel® architecture processors excel, especially since they boost performance when needed and conserve energy during periods of low demand. Intel® processors have on-chip graphics that can drive HD displays and digital signage while using much less power than alternative standalone graphics cards. Product manufacturers and operators can take advantage of the powerful graphics capabilities of Intel processors to raise brand awareness and attract customers in increasingly dynamic ways.

Vending operators can manage machines remotely using the inherent connectivity of Intel architecture-based vending platforms. If they want to update images or advertising content on the display, or adjust the planogram or prices, they can do so quickly and securely — without leaving their office – whether they're managing ten machines or ten thousand. Furthermore, Intel platforms with Intel® Active Management Technology (Intel® AMT) can be remotely diagnosed and repaired over the wire, which reduces machine downtime and service costs associated with sending a technician onsite. When it's necessary to dispatch a technician, Intel AMT can help identify which replacement parts are required ahead of time, which avoids an extra trip.

Telemetry is a priority for operators because it makes it easier to manage machines in the field. In support of telemetry, Intel platforms can communicate and be managed over common networks, including LAN, WiFi and 3G. Similarly well-connected, Intel platforms are ubiquitous in enterprises, so the technology to interface to ERP systems is well established.

With an increased focus on interactivity, Intel® Audience Impression Metrics Suite (Intel® AIM Suite) uses Anonymous Viewer Analytical facial detection technology to collect tracking and impression data for people viewing smart digital signs or vending machines – all anonymously and while respecting viewer privacy. The technology allows operators to capture customer demographic information, such as gender and age. For operators looking to implement voice recognition, Intel platforms have a proven track record among leading car navigation vendors.

Intel sponsors a broad ecosystem of hardware and software vendors ready to make standard modules to address the requirements of embedded applications, like intelligent vending machines.

For more information about Intel solutions for the vending industry, please visit **www.intel.com/retail**

[1]Source: "Assessment of the Intelligent Vending Machines Market", Frost & Sullivan*, November 2011.

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