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V-Commerce: Vending Machine Technology

Abstract

A Popular auxiliary service provided by hospitality businesses is automatic merchandising, more commonly known as vending. Recent advancement in vending technology (v-commerce) has changed the way vending machines are monitored, replenished, maintained, and reconciled. As the hospitality industry searches to reduce its reliance on labor intensive processes, automatic merchandising represents an effective way to provide unattended points of sale and service. Smart machines featuring quality products with high levels of auditability control may be more appealing to the hospitality industry. While a hospitality manager does not need to have knowledge of the vending distribution channel or machine maintenance, it is important to understand available technology and the opportunity it provides for operational efficiencies and revenue enhancement.

Keywords

Michael Kasavana, Asia

V-commerce: Vending machine technology

by Michael L. Kasavana

A popular auxiliary service provided by hospitality businesses is automatic merchandising, more commonly known as vending. Recent advancement in vending technology (v-commerce) has changed the way vending machines are monitored, replenished, maintained, and reconciled. As the hospitality industry searches to reduce its reliance on labor intensive processes, automatic merchandising represents an effective way to provide unattended points of sale and service. Smart machines featuring quality products with high levels of auditable control may be more appealing to the hospitality industry. While a hospitality manager does not need to have knowledge of the vending distribution channel or machine maintenance, it is important to understand available technology and the opportunity it provides for operational efficiencies and revenue enhancement.

The hospitality industry landscape features a collection of vending machines capable of dispensing snacks, drinks, toiletries, cameras, clothing, suntan lotions, and other products. Despite such popularity, there appears to be limited understanding or interest in the tech-

nology powering such applications. As hotels, restaurants, and clubs seek alternatives to the high cost and heavy dependence on manual labor, automated unattended points of sale should be considered. This article focuses on the technological advancements in the automated merchandising marketplace and the potential impact of these applications to the world of hospitality services.

Guest services enhanced

"In 2015, you won't need cash to score a Snickers. Just swipe a credit card, or a special debit card that works only in vending machines. Better yet, dial up the coffee machine from your cell phone and confirm that you'll be having your usual today: a double latte, skim milk, two packs of the blue stuff. It'll be ready moments before you arrive, the \$3.50 charged to your phone bill."¹ The potential impact of automatic merchandising on the hospitality industry may be significant as

innovative smart machines, seamlessly integrated with property management systems, possess the capability to enhance guest services while reducing labor costs and increasing profitability.

As the labor market remains challenging, hospitality management needs to consider alternative product delivery methods to maintain acceptable levels of guest service and profitability. Given the technological advancements in automatic merchandising and vending information systems (an area labeled as v-commerce), hospitality practitioners should consider applying vending equipment in innovative ways to meet or exceed guest expectations. For example, a hotel guest may insert a room key (rather than cash) into a vending machine and have the transaction automatically posted to a room folio. What about the delivery of upscale snacks or high-quality food service products via an automated machine? Consider the dispensing of extra pillows and towels or marketing health care and beauty products at strategic venues throughout the property. How about unattended breakfast monitoring and delivery mechanisms for budget hotels? What about the convenience and reliability of an un-staffed, 24-hour-per-day business center? Or a fully automated lobby gift shop? As the potential for these and other hospitality service applications becomes more apparent, automatic merchandising may be

propelled into the forefront of hospitality business applications.

Vending generates \$41 billion

Domestically, vending machines generated annual sales of nearly \$41 billion in 2001, up from \$22 billion in 1990, according to statistics compiled by the National Automatic Merchandising Association.² During the past few years, the vending industry has experienced significant advancement in hardware, software, and network. Wireless devices capable of tightly controlling cashless transactions at remote locations, application software that monitors inventory replenishment and audits sales activity, and network topologies that involve real-time and two-way communications are available. Historically considered a low-tech industry, the introduction of sophisticated automation techniques has revolutionized the automatic merchandising channel in the United States.

In Japan, a country with a long history of vending applications, machines are used to distribute everything from alcoholic beverages to batteries to underwear to train tickets to toilet paper to live beetles to instant noodles to cellular phones to fresh beefsteaks. Japan, with a population of less than half that of the United States, boasts nearly the same number of vending machines (5.6 million compared to 6.9 million).³ Recent Japanese developments include implementing smarter, more interactive machines capable of monitoring

contests, performing cashless transactions, and networking with mobile phones. Such technologies are also beginning to emerge domestically.

V-commerce grows

V-commerce is the term used to describe the nearly unlimited range of advanced automatic merchandising technology applications available to the vending industry. V-commerce is capable of improving productivity and expanding operational services, and represents a platform for competitive advantage. It may be appropriate to move unattended points-of-sale to the mainstream of hospitality information system application, rather than let them remain a background operation.

While few hospitality managers have noticed improvements in vending machine reliability and efficiency, these developments can represent a significant cost containment strategy for the historically labor-intensive hospitality industry. As the hospitality services labor market remains competitive, replacement of staff with sophisticated unmanned distribution technology may appear attractive. In the vending industry, wireless communication and cashless transaction technologies are being implemented at an unprecedented rate.

While some vending operators have migrated to a cabled, network-centric system, the advancement of wireless technology has emerged as an attractive alternative. Wireless technologies possess tremendous

potential for hospitality applications requiring mobility, flexibility, and reliability in enterprise-wide operations. Vending practitioners dissatisfied with the constraints and complexities of hard wiring are migrating to the convenience of design portability and user mobility that wireless technology solutions provide. Operators are starting to benefit from such devices as handheld terminals, personal digital assistants, smart paging units, global positioning systems, telecommunication links (telemetry), proximity transponders, and related techniques. The critical ingredient enabling these technologies is a unique v-commerce communication standard referred to as DEX.

DEX provides advantage

DEX, which is short for Data EXchange, is a popular abbreviation for DEX/UCS (Data EXchange Uniform Code Standard). DEX communication technology provides the basis for significant technological advancement across the vending channel. Since DEX/UCS has received support domestically from the vending industry trade group, the National Automatic Merchandising Association (NAMA), and internationally from the European Vending Association (EVA), experts believe it will further facilitate a movement toward consistent data formatting.

The fact that vending equipment tends to be strategically placed in disparate locations presents a challenge to efficient replenishment, sales analyses,

malfunction notification, and comprehensive audit reporting. Fortunately, machine-level transactional data can be captured through a computer control board installed within each vending machine. Aggregating machine-level data enables remote review of transactions and inventory without having to have a physical presence at the machine. The fact data can be exported to a distant warehouse, headquarters or central operation, or product fulfillment center extends the opportunity for more thorough, immediate, and frequent analysis. Such applications are the result of DEX implementation.

In the past, machine manufacturers varied in how data exchanges and transmissions occurred. Edition 6 DEX software, (expected the first quarter of 2003), tightens the language of the protocol to prevent possible misinterpretations in accountability and brand identification and preference analysis.⁴ In other words, since there has been a proliferation of different vendable products, and several variations in the packaging of the same product, the DEX standard has been refined to acknowledge and differentiate between product offerings.

DEX designers and equipment engineers now agree on a common linkage. While not all vending operators demand identical informational output, machines are equipped with data capabilities for delivering consistent reports. For example, common data set elements in the DEX standard

include number of bills held in the bill stacker, quantity and denomination of coins stored in the coin box, machine product inventory status, and product sales tracking. Given recent DEX developments, coupled with the fact that vending machines have an average life of 10 years, it may take a generation of new machine installations to fully realize the DEX potential. Many industry practitioners claim DEX provides an indisputable, auditable accounting method for actual cash collections, units sold, and product price.

Data extraction developed

During the past decade, NAMA and EVA adopted a communication protocol for the electronic retrieval of machine-level information via data polling. As a consequence, vending machines are now manufactured as DEX-enabled (or DEX-compliant). Basic DEX extraction includes sales, cash collections, product movement (sales mix), and related information. DEX data retrieval can be accomplished via three distinct polling modes: local polling, dial-up polling, or wireless polling.

Local polling incorporates a hand-held device (or pocket probe) designed to plug connect to a machine based DEX-port. Once plugged into the dedicated vending machine port, the hand-held device automatically initiates the downloading of stored data. A local polling DEX download (machine to hand-held device) usually lasts about five seconds.

Field collected data is later transferred from the hand-held device to a central office computer for processing and analysis.

Dial-up polling (telephone line) and wireless polling enable remote access to DEX data without requiring a physical presence at the point of connectivity. Once a valid connection is established, DEX data can be collected for evaluation and analysis. While most DEX information centers on sales information, there are several important accounting elements. For example, how much cash should be in a machine at the close of a sales period? A route driver, unable to access the DEX electronic record, will have cash collections reconciled to the machine-level report.

Exporting insures accuracy

A DEX-compliant machine relies upon DEX architecture to enable vending machine polling. The vending machine exports its unique identification number and stored data to an external system for analysis and processing. An important element of this data stream is the machine's service history, including the last date the machine was serviced. Once DEX data is exchanged with a vending management system, various transaction audits can be performed. Since captured data is not accessible or editable prior to interfacing to an auxiliary system, cash accountability will be accurate and complete. Also, the ability to track product information at the machine level enhances produc-

tivity, as machine fulfillment is improved and manual data entry eliminated.

The DEX protocol enables different makes and models of vending machines to communicate in a consistent manner. DEX data sets include sales mix, cash collection, product movement, and malfunction alerts. Additionally, DEX specifications contain a standard for reporting error codes for payment validation, dispensing jams, and other operational problems, all of which tend to rely on ASCII (American Standard Code for Information Interchange) text blocks for report generation.

From a sales perspective, DEX provides the vending operator with the ability to track brand and/or product preferences at the point of purchase. DEX has been found to improve sales performance, reduce operating expenses, and minimize machine malfunctions. In addition, DEX is capable of performing a space to sales analysis for machine-level column allocation optimization. This is an important outcome of a DEX-compliant device.

The main benefit of line item tracking is accountability and machine plan-o-gram (i.e., rotating menu of product offering) development. A DEX BuzzBox system employs a wireless transmitter installed at the vending machine that transmits machine-level DEX data to a receiver in the route driver's truck called a BuzzBox, which may be equipped with a portable printer or hand-held computer and can be used to deter-

mine which machines at a sales location require service and which do not. In turn, the BuzzBox analyzes the imported data and generates a detailed pick list to assist the driver in determining machine restocking. All of this takes place prior to the driver ever entering the facility. Reducing trips from a route truck to the vending machine contributes to enhanced driver productivity and efficiency.

Wireless operations effective

Vending machine data can be collected using wireless protocols through radio frequency (RF) or telecommunication (WAN) transmission. A wireless transceiver and an accessible access point can be configured for remote data acquisition. Most vendors estimate that a single access point can serve a configuration of up to eight micro-controller-based vending machines.⁵ Wireless configurations typically are effective for a range of up to 150 feet indoors with captured data subsequently directed to a telephone landline for wide area communication. Basically, wireless transmission of DEX data may represent a cost-effective way for operators to dramatically increase sales while reducing operating expenses.⁶

An alternate wireless application configuration involves telemetry modeling. Telemetry basically invokes a long-range remote control unit to monitor and regulate environmental conditions of a distant mechanical device (e.g., vending machine). Telemetry

enables automatic measurement by wire, RF, or WAN. Telemetry systems act independently and automatically by adhering to a set of prescribed procedures. For example, when a vending machine inventory is nearing a par stock level of depletion, a message can be sent to the product supplier advising him of the condition. By eliminating the need to have a person check the machine inventory and ready fulfillment supplies, expenses are reduced, efficiency is enhanced, and product cycling is efficiently maintained.

From a financial perspective, a wireless system is relatively inexpensive to implement compared to the cost of field personnel and service vehicles and thereby has been shown to be highly reliable and productive in the vending channel. USA Technologies, a leading vending technology provider, offers remote, online auditing and monitoring capabilities that allow management to proactively maximize space-to-sales, minimize service stops per asset, and limit machine down time. By establishing connectivity between a bank of vending machines and the home office, it is possible to establish a two-way information flow enabling the downloading of sales data, inventory monitoring, and machine functionality and the uploading of price changes.⁷ There is no longer a need to perform administrative functions at the machine; such functionality can be accomplished virtually.

Consumers appreciate convenience, and if nothing else, cashless vending offers convenience. In vending, like many other industries, cashless payments have been shown to increase customer spending and attract new customers without the complexity or costly security associated with cash transactions. Current cashless vending settlement options include credit and debit cards, smart cards, phone-activated cellular transactions, radio transponders, and interactive online solutions. Cashless sales boosts can be attributed to the convenience of non-cash settlement that enables patrons to spend more. In addition, cashless purchases create an electronic trail of purchase detail unavailable through cash settlement. Cashless systems may also feature loyalty point rewards, prepaid gift cards, and purchase incentives.

Micro-cashless transactions as inexpensive as one dollar may require an authorization code to complete the sale. A cashless system may rely on telecommunication equipment to solicit transaction approval. In the case of cashless vending, management has the option of trying to secure an authorization for each sales transaction as it occurs (i.e., real-time) or at a predetermined point in time (i.e., batch processing). An additional benefit of cashless vending is the ability to offer higher priced products since the customer is not restricted to cash on hand. Currently, Pepsi and Dr. Pepper are testing credit card enabled soft

drink machines in which transactions are processed quickly via a wireless network.⁸ One firm, USA Technologies, for example, provides wireless Internet applications that enable vending machines to accept payment via credit card, smart card, hotel room key card, and assorted RFID tags. Such variety enhances the potential of unattended points of sale to the hospitality landscape.

Future is significant

Wearable computers, not just authorization chips, form the basis for an innovative set of communication and reporting applications some vending operators are developing. Body-worn technology suggests powerful applications capable of significantly impacting both on and off-premise services, including route management, data mining, product replenishment, menu engineering, and labor productivity. In addition, the recent proliferation of vending company websites supporting a variety of online opportunities provides a solid base for expansion into sophisticated online purchasing, virtual private networks, online training, and other web-based applications, including e-wallets. In addition, unattended business centers, in-room mini-bars, and kiosk operations are beginning to appear in public spaces of hotels, restaurants, and clubs.

The hospitality industry faces a challenging labor market. A popular but seldom considered

mainstream opportunity exists in the application of unattended points of sale, better known as automatic merchandising. Advanced electronic capabilities that enable remote machine monitoring, mobile phone activated purchases, and card-based transactions are being rapidly adopted. As telemetry applications and cashless transactions alter the vending industry, hospitality management would be wise to investigate the potential benefits of vended operations.

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⁸Ibid.

⁹Note: a logical source of information for hospitality industry practitioners interested in pursuing v-commerce opportunities is to contact the National Automatic Merchandising Association in Chicago, Illinois, or visit their website (www.vending.org).

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Appendix A

Vending technology trade journal websites	amonline.com vending.org vendingtimes.com
Software	aes-intellinet.com ruthsx.com aes-intellinet.com ruthsx.com auditsystems.com streamware.com compuvend.com televend.com emssi.com validata.com isochron.com vendonline.com marconi-online.com vendscape.com meiglobal.com vendmaster.com msa.com
Hardware	automaticproducts.com cranems.com nationalvendors.com
DEX Software Vendors	AuditSystems.com Rutherford.com CompuVend.com Streamware.com Emssi.com Validata.com Meieasytrax.com Vendmaster.com