**From Platt Retail Institute's**

# Resource Library

See the entire PRI Resource Library at www.plattretailinstitute.org/library.

## Consumer Location-Based Analytics Deliver Actionable Insights

*By Martin P. Block, Professor, Medill School, Integrated Marketing Communications and Executive Director, Retail Analytics Council, Northwestern University, and Steven Keith Platt, Director and Research Fellow, Platt Retail Institute and Research Director, Retail Analytics Council, Northwestern University*

Advances in in-store, location-based technology are empowering retailers with cutting edge insights about consumer behavior in their stores.[1] A major benefit associated with these new technology platforms is that they can be inexpensive to deploy, particularly when compared with more traditional measurement instruments such as traffic-counting devices and video observations. Now, systemwide deployment is financially possible.

In general, this technology enables a retailer to accumulate information on the following:

- Date, time, and number of customers detected in a store.
- Store traffic patterns.
- In-store location dwell time.
- Store penetration rates.
- Repeat visits.

This information provides a retailer with various types of actionable, real-time information that enables rapid response. Additional store performance metrics are generated when this information is integrated with other data, such as that from Point of Sale (POS) and human resource management systems.

In this article we discuss how this technology enables retailers to learn more about consumer behavior in-store and use that information to improve operating performance. We also present two scenarios: one from a hypothetical department store chain that addresses various related questions; and another that demonstrates the benefits gained by using this technology on a university campus.

### Store Traffic

Data related to the date, time, and number of customers detected in a store can be useful for various purposes. Here we address the use of traffic

[1] These technologies include, among others: Bluetooth Low Energy Beacons, Wi-Fi, RFID, Magnetic Field, and Visible Light communications, for example.

information to improve store performance and gain insights into the impact of marketing and promotional activity.

Traffic data is a key store performance measure because store revenue and merchandise management information (such as inventory turnover and gross margin) might not be revealing the entire picture. Consider this example. Two comparable stores are located in the same town. Top- and bottom-line numbers are the same, so one may draw the conclusion that the stores have comparable performance characteristics. However, one of the stores has 12 percent more traffic. The inability of this store to convert traffic into sales points to various performance shortcomings. These may include, among other things, poor staff training, inconsistent merchandising and/or out-of-stock positions, a failure to properly institute promotional programs, or extended wait-times at checkout that are causing customer abandonment, etc.

Traffic information is also useful for understanding marketing and promotional campaign effectiveness. For example, an indicator of local mass media campaign success may be tied to its ability to drive traffic into the store. This traffic increase, if any, can further be evaluated to determine campaign cost efficiency. That is, what is the return realized from an investment in mass media advertising by increased store traffic, which creates a sales opportunity?

**Store Traffic Patterns**

The study of in-store traffic patterns can help a retailer understand and improve many operational aspects of its business. These include the following:

- Optimizing store and fixture layout.
- Improving merchandise placement.
- Programming in-store marketing activities based on traffic flow and speed (i.e., tracking consumer movement along a path can provide an opportunity to engage with them at coordinated locations where the customer and merchandise intersect).
- Positioning staff to improve customer service. For example, by knowing the flow of customers from certain areas of the store to the checkout area, managers can increase staffing at the checkout before wait-times build.
- Directing customers from crowded to uncrowded assets can increase asset utilization and customer satisfaction. For example, a department store has several restaurants in its building and one has a wait line while the other does not. Redirecting customers to the less-crowded restaurant can increase utilization, as well as increase customer satisfaction.

Here we explore how store traffic patterns can be studied to measure the effect of messages delivered by digital signs on consumer behavior.

Consumer behavior is generally defined as the decisions and associated activities of individuals related to buying and using goods and services. It encompasses both the mental decisions and the physical actions that result from those decisions. While primary research focused on gaining insights into both components of consumer behavior can be undertaken, an understanding of consumers' physical actions is a strong indicator of how those decisions are manifested. This is particularly true when a consumer's physical actions are measured in response to a stimulus, such as messages communicated on digital signs, static signs, and those delivered to a handheld device, such as a smartphone.

**PRI Offices**

**U.S. Office:**
P.O. Box 158
Hinsdale, IL 60522 U.S.A.
Phone: 312.265.6106
contact@plattretailinstitute.org

**German Office:**
Rather Kirchplatz 11
40472 Dusseldorf
Germany
Phone: [49] 211 59896507
frankr@plattretailinstitute.org

**Spanish Office:**
Ctra de Mig, 75
08907 L'Hospitalet de Llobregat
Barcelona, Spain
Phone: [34] 981847755
juanc@plattretailinstitute.org

When considering the investment required to create effective messages for digital signs, it is helpful to understand if those messages are producing the desired result. For instance, is a message delivered in one part of the store moving traffic to another part of the store as desired? Is a message displayed helpful in upselling, affecting dwell time, or reducing perceived wait time? By tracking traffic patterns, insights into message impact can be obtained that answer these types of questions.

**In-Store Location Dwell Time**

Understanding customer dwell time in a store and in-store, location-specific dwell time can provide a wealth of insights. The study of store visit duration is useful because increased visit length has been found, in certain instances, to lead to increased purchases, as well as serve as an indicator of customer loyalty.

Tracking the duration of customer store visits can help a retailer understand its progress in attracting and keeping customers engaged. Introducing revenue measures into the equation can provide insights into spending levels during each visit, and how various promotional and marketing activities are affecting sales based on time spent in the store. In addition, store dwell time, when combined with repeat visit information, can provide consumer loyalty insights.

Research into consumer in-store, location-specific dwell time can also be valuable. Changes in zone-specific dwell time, as well as whether customers are moving to targeted zones because of the effect of messages delivered to a customer's mobile device, for example, can be measured. The length of a zone-specific message also can be optimized based on understanding dwell times. Finally, product placement and assortment can also be improved based on zone dwell time measurement.

**Store Penetration Rates**

A store's penetration rate refers to the number of customers that walk past a store versus entering the store. While not useful in all instances, measurement of this in a mall environment, for example, can yield interesting insights. As an illustration, it is possible to study whether messaging (static or digital) or product merchandising visible at the front of the store are successful in drawing customers into the store. In addition, the significance of various promotions can be analyzed by traffic draw. Finally, this measure can also be helpful in understanding whether various other marketing and media campaigns are driving traffic into the store.

**Repeat Visits**

Tracking customer repeat visits is useful for understanding, among other things, if out-of-store marketing activities, such as a direct mail campaign, are successful in drawing customers back to the store. Moreover, it is possible to estimate product and service purchase cycles and how they are influenced by various marketing activities. Further, measuring repeat customer visits can lead to new insights into loyalty programs with a retailer's best customers, as well as tracking new visitors.

The five core consumer location-based analytics discussed above, when combined with other data, can provide additional store performance feedback. We discuss here those that result from combining traffic with POS and human resource management system information.

**Sales Conversion and Productivity**

Sales conversion refers to the percentage of shoppers that enter a store and make a purchase. Stated another way, it considers the available pool of

customers in a store and how many of them make a purchase. It is calculated as the total number of transactions divided by traffic. To illustrate, consider the following example:

A store completes 25 transactions in an hour during which 50 customers visited. This results in a 50 percent conversion rate (25÷50). Assume that the same store then changes the messages on its digital screens and/or promotions delivered to smart devices. Subsequently, the store completes 35 transaction in an hour during which 50 customers visited. This results in a 70 percent conversion rate (35÷50). One could therefore conclude, all else being equal, that those messages and/or promotions are having a positive effect on customer behavior.

Sales productivity, on the other hand, is an indicator of the average amount spent by each shopper. It is calculated as store sales divided by traffic. For example, if a store sells $100 worth of merchandise to 25 customers, the average spend is $4 per customer (100÷25). Later, the store manager decides to increase store sales staff, which results in sales of $200 to 25 customers, increasing the average spend to $8 per customer (200÷25). This demonstrates that the cost of increasing staff in this instance may be justified.

Factors such as in-store marketing, pricing, merchandising, and staff skill level, among other things, can impact sales conversion and productivity. Depending on the retailer's investigative requirements, these and other factors can be isolated for further study.

**Staff Availability**

Staff availability is a measure of available labor to serve each shopper. It is calculated as store labor hours divided by traffic, and can be measured for both a store and/or a specific zone. This aids a retailer in achieving operational efficiencies by matching staffing to desired customer service levels based on traffic. For example, if 100 customers visit a store in an hour when there are 50 available labor hours, the result would be a 50 percent customer service coverage ratio (50÷100). If the labor hours available are reduced to 40, the result is a 40 percent customer service coverage ratio, meaning that less labor is available to serve customers (40÷100). When the impact on sales and labor costs are then considered, ideal staffing levels can be achieved.

Traffic data can also aid in staff scheduling and impact in the following ways:

- Schedule more personnel to work at high traffic times.
- Schedule employee breaks at low traffic periods.
- Schedule merchandise deliveries and restocks at low traffic periods.
- Assign the "most qualified" associates to peak traffic periods.
- Evaluate employee performance based on sales conversion.
- Measure the impact of training on sales conversion.

In the following section of this article, we focus on the use of Wi-Fi technology in two situations. In the first, we answer some questions related to consumer location-based analytics in a theoretical department store scenario. In the second, we detail some of the benefits that may be realized by operating this technology at a theoretical university.

**Department Store**

Maddy's operates more than 800 department stores in the U.S. As part of its omni-channel program, it has made Wi-Fi available to customers in its stores. Having already made this investment in Wi-Fi, the firm's store technology manager is exploring whether to introduce Wi-Fi consumer location-based analytics. In this regard, he has advanced the following questions:

1. How expensive will it be to add this to my existing Wi-Fi infrastructure?

   This will depend on the level of accuracy desired. If the original wireless deployment was designed with optimized location-based analytics in mind, or if optimal location accuracy is unnecessary, the expense is fairly minimal. All that is required is licensing the software necessary to gather signal strength information, calculate location, and analyze the data. This software typically involves a centralized component and a per access point component from a pricing perspective. If Maddy's is looking for optimal location-based analytic data and did not design the original wireless deployment with this in mind, they will likely need to add and reposition access points, as most wireless networks are not designed to yield optimal triangulation. For the highest accuracy, Maddy's may need a different class of access point devices, along with specialized location modules.

2. Other than the potential need for additional or a better class of access point devices and specialized location modules as noted above, what is required to operate this, in terms of hardware and software?

   From a hardware perspective, Maddy's will need to make some computer capacity available to run the location and analytics software. The amount is determined by scale and use case requirements. In terms of software, the primary component is the software that collects data from the wireless network, calculates location, and performs the analytics.

3. How long will it take to get this technology operational?

   If the required hardware is in place, this can be accomplished fairly quickly.

4. As well as the five core location-based analytics offered, I want sales conversion, sales productivity, and labor staffing insights. How do I tie this into our existing POS and labor databases?

   This is achieved by means of open APIs. Data can generally be either pushed or pulled for integration.

5. We need other customized analytics. How do we create and manage this?

   In general, analytic models can be created in statistical processing software, which then pushes out the results to a custom UI. Data can reside behind the company's firewall for processing locally or can be pushed out for external processing.

6. Finally, with this increased knowledge, how do we make this information actionable within the organization?

   This will be retailer specific, but this generally can be performed in various ways. One retailer has determined to create a specific position within its organization that is responsible for reviewing activity and creating reports, alerts, etc. Rules-based programing, which generates messages to a specific department and/or individual based on certain activities, can also be created. As well, specific management dashboards can be created.

**University**

West New York University sits on 1,400 acres, has more than 400 campus buildings, and a student population that exceeds 29,000. The University's Manager of Information Systems Operations is considering adding student

Martin P. Block is Professor, Medill School, Integrated Marketing Communications and Executive Director, Retail Analytics Council, Northwestern University.

Steven Keith Platt is Director and Research Fellow, Platt Retail Institute and Research Director, Retail Analytics Council, Northwestern University.

location-based analytical services to the school's Wi-Fi infrastructure. The potential benefits associated with operating this technology on campus include, among other things, the following:

1. In a campus emergency, messages are delivered by means of Web, audio signal, phone calls, text messages, digital signs, and TV and radio communications. Rather than have broad distribution of these messages to areas that may not be impacted or are affected differently, specific instructions can be delivered to devices in the location of an emergency, while students on other parts of the campus receive different messages.
2. The University has five major dining facilities. Throughout the day, utilization rates at each fluctuate widely. For example, dining room one may be at more than 100 percent capacity at lunchtime, while dining room two may be at 60 percent. Advising students in the area of dining room one that there is a 20-minute wait time, while nearby dining room two has no wait time, can both increase utilization at restaurant two and student satisfaction.
3. The football stadium at WNYU holds over 60,000 people. This technology enables the delivery of specific messages to those attending events in the stadium.
4. On-campus parking is limited at WNYU. Messages about available parking can be delivered to a device based on its location.
5. Campus safety is of prime importance at WNYU. Students who download the University's app or on-board the network are provided with accurate directions that will easily guide them to their destinations at different times of the day. For example, if the shortest path to a student's destination is considered less safe at nighttime, students can be guided to take a safer path.
6. Students and guests, as they travel the campus, can receive welcome messages, general school information, and information related to their surroundings, such as a specific building's or department's history. In addition, information on exhibits in the University's museum, and promotional deals while shopping in the university store, for example, can be targeted based on location.
7. Pedestrian traffic and crowd control can be monitored and safety and related corrective action taken early.

**Conclusion**

This article discusses the wealth of real-time insights generated from consumer location-based analytics. We address both the data created and how it can be used to improve store operating performance. In addition to the insights discussed here, there are many others that can be implemented by a retailer, depending on its specific testing needs. Technology customization and setup, such as integrating rule-based notices in response to defined factors, will also be retailer-specific. Finally, we presented two hypothetical examples to provide additional insights.