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**Article**

## Smart Inspiration at the Point of Sale - Connecting In-Store Ad-Impressions with Purchase Data

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# Marketing Review

## St. Gallen



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Digitalisierung  
am PoS



Universität St.Gallen

*"From insight  
to impact"* 

# Smart Inspiration at the Point of Sale

## Connecting In-Store Ad-Impressions with Purchase Data

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Retailers increasingly use digital signage to inspire customers. The present article introduces C.A.P., a new customer inspiration approach that combines the ad-impressions from digital signage with purchase data from individual shoppers. These insights enable the analysis of individual customer reactions towards digital displays in physical stores, in order to calculate offline conversion rates and to optimize these in-store marketing activities.

**Prof. Dr. Dennis Herhausen, Prof. Dr. Sven Henkel**

**D**espite the rise of search engines and mobile technologies, more than half of all final purchase decisions still take place at the last moment of truth: the physical store (Briggs 2016). In addition, a customer browsing physically in a store is always in a particular situation: close to the product and in shopping mood, hence very receptive to marketing stimuli (Grewal, Roggeveen, & Nordfält 2017; Newman et al. 2010). Thus, even online pure-players such as Amazon open brick-and-mortar stores to address customers at a physical point of sale (PoS). Due to growing assortments, shortening product lifecycles, increasing substitutability, regionalization, limited shelf-space, and decreasing customer attention, traditional marketing at the physical store is challenged (Rudolph, Böttger, & Pfrang 2012). Consequently, innovative and digital marketing activities that allow to influence the final purchase decisions are gaining in importance. Not surprisingly, in recent years several studies tried to determine the effectiveness of different marketing activities at the physical PoS (Shankar et al. 2011).

However, many of these studies face the common offline marketing problem of missing data and insights to effectively link marketing activities (e.g., running an in-store video campaign) to actual behavioral changes of individual customers (e.g., increasing conversion and purchases) – who has seen an ad and bought the product because of it? Current PoS-media, such as in-store TV, in-store radio, billboards, trolley banners, second placements, and floor stickers do not generate reliable data for individual customers that allow to calculate conversion rates as is common practice for online marketing activities. This means that both leading retailers and leading manufacturers invest massive amounts in PoS advertising while not gaining clear insights on how marketing spending adds value to their stores

or helps to attract shoppers to their brands. This shortcoming has led to a high economic interest in understanding the conversion rates of offline marketing activities at the PoS, or, in other words, reliable information on how customer inspiration at the physical PoS works.

To address this shortcoming, the present article introduces C.A.P. (Connecting Ad-Impressions with Purchases), a new customer inspiration approach developed by the German start-up Cyreen ([www.cyreen.de](http://www.cyreen.de)) that combines the ad-impressions from digital signage with purchase data from individual shoppers.

### **Inspiring Customers with Digital Signage**

Introducing customers to new ideas and new products lies at the heart of marketing (Rudolph, Böttger, & Pfrang 2012). Given the increasing competition with online retailers as well as new possibilities arising from digital technologies, PoS-media is moving from static media to dynamic media such as digital signage (Mossner & Herhausen 2017). Digital signage includes in-store TVs, shelf screens, and trolley screens, and can be found in retail stores of various formats and sizes (Roggeveen et al. 2016). These digital displays play content controlled by a central computer server and have an attention-drawing impact on customers due to their audio-visual appearance and interactivity (Roggeveen et al. 2015). While often aiming to enhance the in-store environment (Dennis et al. 2010), these screens can also display other information to customers. For instance, digital signage can be used to show current price offers or provide additional information about products and events, thus enriching the shopping experience (Burke 2009). In addition, with the invasion of online giants such as Amazon, digital signage has become a key focus for retailers to in-

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Both authors are members of the academic board of Cyreen and use C.A.P. in not-for-profit academic studies to examine shopper behavior.

crease sales (Roster 2012). Due to the closeness to the purchasing decision, in-store digital signage represents the opportunity for retailers to provide the final “impulse” within a customer’s journey. Indeed, audio-visual content on digital displays is especially well suited to foster inspiration among customers (Böttger et al. 2017).

Over the past years, digital signage has increased in popularity and experienced a considerable growth. According to Roggeveen et al. (2016), “digital signage is growing at a tremendous pace, with the global market expected to be worth over \$17 billion”. Correspondingly, digital signage is increasingly prevalent in large retail chains such as Walmart, Tesco, and Carrefour. However, current studies on the effectiveness of digital displays show mixed results (see Roggeveen et al. 2016 for an overview). Some studies suggest that digital displays have the potential to enhance shopping behavior. Based on interviews with 315 mall customers, one study found that digital signs enhance frequency of visits and spending (Dennis et al. 2010). Similarly, consumers in a quasi-experiment, which compared respondents’ ratings in a test mall (digital signage) and a control mall (no signage) revealed more visits, higher spending and more items bought with digital signage (Dennis et al. 2012). However, both studies depended on self-reports to assess approach behavior. The only field study capturing consumers’ actual behaviors suggests that the effectiveness of digital displays depends on the retail format and the message used (Roggeveen et al. 2016). However, this study has major limitations, as only static displays without audio were considered (i.e., pictures), and neither targeted product purchases nor individual customer behavior was analyzed. Given that videos are much more effective than pictures (Mossner

& Herhausen 2017), that only certain products were displayed, and that not all shoppers in a given store were confronted with the pictures, the impact of digital displays on sales was likely underestimated. Finally, all existing studies have solely a retailer focus while neglecting manufacturers who may be the ones paying for the displays.

Taken together, insights on the effectiveness of digital signage at the physical PoS are still scarce, and the new customer inspiration approach described here aims to shed light on this relevant topic.

### Online and Offline Marketing at the Point of Sale

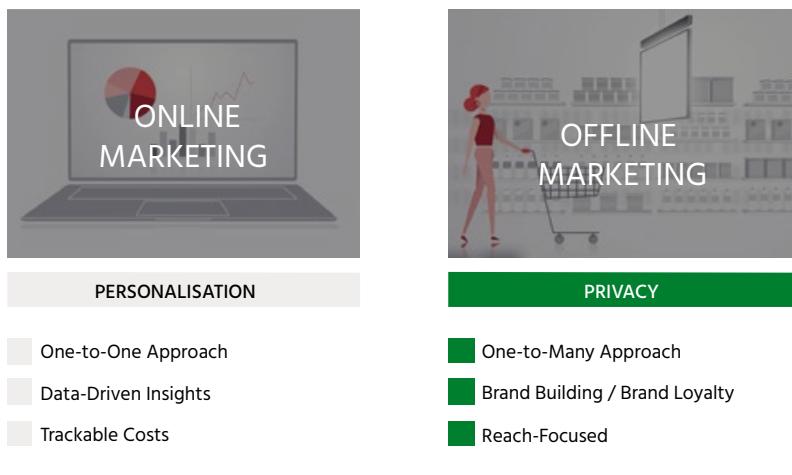
Customer inspiration, or introducing customers to new ideas or products, can take place at both the physical and virtual PoS. However, there are large differences regarding the marketing possibilities between these two types of PoS as summarized in Figure 1. Online marketing at the virtual PoS allows companies to identify and target potential customers through a one-to-one approach. Companies thus are able to get sophisticated key performance indices for their online marketing activities such as opening-rates, click-through-

rates, or conversion rates. These insights allow companies to assess their return on investment and adjust their spending accordingly. Moreover, given the possibility to track and compare the effectiveness of different marketing activities in real time, companies can constantly optimize their online marketing with A/B testing. While online marketing has experienced an astounding growth over the last decade, individually tracking the digital footprint of each customer and trying to achieve the perfect customer-fit has its downsides. With the recent Cambridge Analytica scandal, followed by the introduction of the overly complex General Data Protection Regulation, limitations are placed on many online tools that reduce their accountability.

In contrast offline marketing at the physical PoS follows a one-to-many approach, as potential customers cannot be targeted individually. While offline marketing activities enable companies to foster brand building and brand loyalty, they do not allow to capture the same key performance indices as online marketing activities. To address this shortcoming, in recent years innovative companies have tried to transfer the online logic to the physical PoS via the introduction of beacons, GPS-trackers,

### Management Summary

While online marketing allows companies to target potential customers through a one-to-one approach, to calculate conversion rates, and to constantly optimize their marketing activities based on these insights, offline marketing largely lacks these possibilities. The present article introduces C.A.P. (Connecting Ad impressions with Purchase), a new customer inspiration approach that combines the ad-impressions from digital signage with purchase data from individual shoppers. These insights enable the analysis of individual customer reactions regarding digital displays in physical stores, to calculate offline conversion rates, and to optimize these in-store marketing activities.

**Fig. 1: Advantages of Online and Offline Marketing**

Source: Own illustration.

and facial recognition cameras. Despite their potential to cause disruptive changes at the physical PoS in the long term, to date all these solutions suffer from major disadvantages and challenges. In addition to an explicit opt-in of customers, beacons rely on an app-interaction previous to the shop visit, GPS-trackers are challenged by the high frequency of shoppers as well as by the metallic shelf environment, shopping trolleys and general store design, and facial recognition faces an increased

privacy-awareness of shoppers. For example, the supermarket chain real,- terminated their facial recognition approach to measure the effectiveness of in-store advertisements after six months (real,- 2017).

C.A.P. overcomes the limitations of other solutions and allows to use the online logic at the physical PoS. By combining ad-impressions from digital signage with purchase data from individual customers, the technology allows for distinct analyses of shoppers' purchase behavior when being inspired by audio-visual ads directly at the physical PoS. Instead of using beacons, GPS-trackers, or facial recognition cameras, C.A.P. makes use of RFID technology to enhance the rudimentary digital signage. Differing in many aspects from existing solutions, the C.A.P. system is not dependent on personal data and, hence, protects the privacy of all customers. Thus, C.A.P. is able to introduce an attractive, sustainable business model to the physical PoS with common offline and online marketing performance indicators such as cost per thousand and conversion rates.

## Main Propositions

1. PoS-media is moving from static media to dynamic media such as digital signage.
2. However, insights on the effectiveness of digital signage at the physical PoS are still scarce.
3. Combining ad-impressions with purchase data allows to calculate offline conversion rates.

## Smart Inspiration at the Point of Sale

C.A.P. analyzes individual customer behavior in order to calculate conversion rates of digital signage (see Figure 2). To do so, digital displays placed in the middle of the main aisles are activated by an invisible RFID-tag in the shopping trolley and play ads of products sold in the retail store. Besides showing the ads on screen, a directional loudspeaker is used to target distinct shoppers. An RFID-reader tracks individual shopping trolleys and memorizes which shoppers were in contact with which advertisements. At the end of their shopping journey, the products purchased are compared to the ads seen (but not to any personal information). Constantly observing the behavior of shoppers allows for exact ad-impact analyses, transferring the online "seen & bought"-principle to the offline world. Moreover, determining the conversion rate of audio-visual ads helps to adapt and optimize the marketing stimuli. Among other things, this allows retailers and manufacturers to conduct offline A/B testing.

This unique combination of digital signage with a well-established tracking device in the usual shopping trolley is what Gourville (2006) referred to as a significant product change with limited behavior changes. This approach is key at the physical PoS, as shoppers, retailers, and manufacturers alike are usually reluctant to introduce change at this crucial moment of truth. Furthermore, (perceived) behavioral changes constitute the reasons why beacons, GPS-trackers or facial recognition cameras never reached the mass-market. Consequently, by gathering reliable data without requiring extra efforts from customers and without evoking privacy concerns, retailers, manufacturers, and academics alike are able to

**Fig. 2: Smart Inspiration at the Point of Sale**



Source: Own illustration.

link offline marketing activities to actual behavioral changes of the customers and gain new shopper insights.

### Gaining Shopper Insights with Data Driven Smart Inspiration

Current effectiveness measurements for digital signage at the physical PoS are based on either customer surveys or applying a store-to-store referencing methodology (e.g., Dennis 2014, Roggeveen et al. 2016). However, insights from customer surveys are subject to the attitude-behavior gap (Glasman & Albarracín 2006), thus limiting their validity. The store-to-store referencing methodology usually compares two similar retail stores: one with and one without digital signage. Then, the overall sales of both stores are compared and checked for any sales uplift. Nonetheless, even when controlling for similar sales cycles, geographic proximity, socio-demographic profiles, and store-size, the results may potentially be biased. Product discounts, in-store (shelf) positioning, or the assortment-breadth may vary, and out-of-stock situations

or external effects (e.g., temperature, events) may compound the situation. Moreover, changes in individual customers' behavior can-not be tracked with this measurement approach.

With C.A.P., retailers, manufacturers, and academics are given an alternative to the existing methodology

of comparing different stores. As C.A.P. measures every shopper-/digital signage interaction individually, the system recognizes which shoppers were triggered by which ad. This approach allows to differentiate between two groups within the same retail store: shoppers who have seen the respective ad ("study group") and shoppers who have not seen the ad ("control group", see Figure 3). In addition, given the link with purchase data, it also allows to differentiate between shoppers who have bought and who have not bought the respective product. Given that shoppers are chosen randomly, this analysis reveals differences in the purchase behavior of the two groups that stem from the ad while controlling for all the aforementioned potential biases.

### Lessons Learned

1. C.A.P. enables retailers to introduce an innovative digital signage system to profit from the increasing relevance of PoS marketing spending.
2. C.A.P. allows manufacturers to calculate the ROI of digital signage and to conduct A/B testing to optimize in-store ads.
3. C.A.P. provides the necessary infrastructure for academics to conduct large-scale empirical studies in real time.

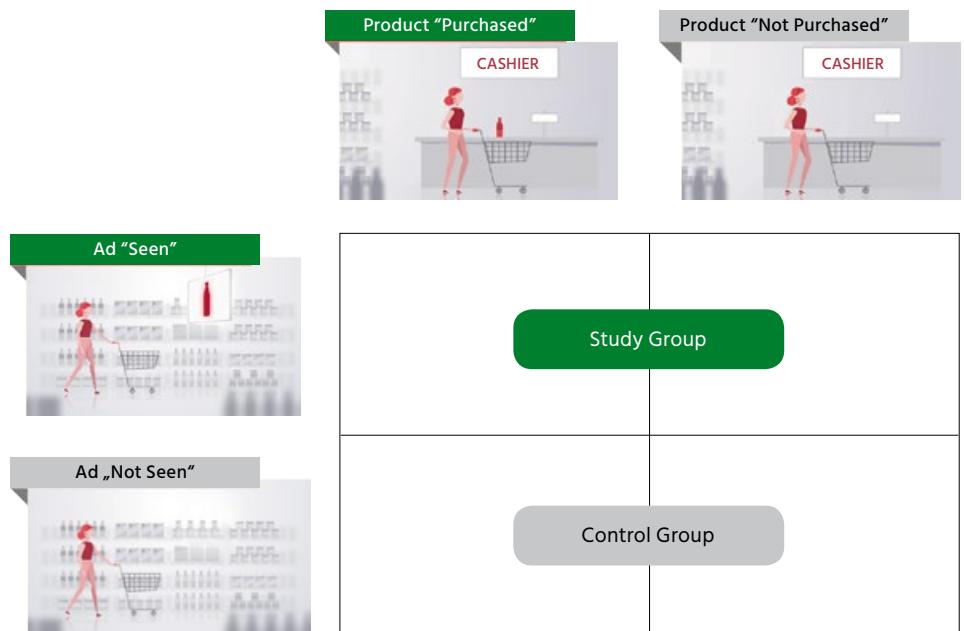
### Case Study: Inspiring Customers at the Point of Sale

A recent case study in conducted cooperation with EDEKA Minden-Hannover and the major pasta and pasta sauce brand Barilla underlines the effective-

ness of using the C.A.P. methodology and showcases its opportunities and flexibility. Barilla created a short 10-second video ad featuring the famous German football player Thomas Müller enjoying Barilla Pesto alla Genovese in a very appealing situation at home. Thus, rather than using price promotion, Barilla decided to use an inspirational setting for its in-store ad (see Figure 4). This ad was played on digital displays in several EDEKA E-Center and Marktkauf hypermarkets of over a period of nine weeks.

The ad of Barilla was played 680 000 times in 10 EDEKA E-Center and Marktkauf hypermarkets with a total of 70 000 square meters sales area. The pre-campaign week (CW 0) was used to calculate an index for the sales of the focal product (Barilla Pesto alla Genovese), and the following campaign weeks (CW 1–9) were used to calculate the effectiveness of the in-store inspiration through the ad. In the pre-campaign week, on average 6 out of 10 000 shoppers bought Barilla Pesto alla Genovese. For the traditional store-to-store referencing methodology, 10 EDEKA E-Center and Marktkauf hypermarkets with the C.A.P. methodology were compared to 12 reference hypermarkets from EDEKA E-Center and Marktkauf without digital signage from a similar region, with similar sizes, and with similar shoppers in terms of income and demography. The results reveal a 30% sales uplift in the C.A.P. hypermarkets and a 9% sales uplift in the reference hypermarkets for Barilla Pesto alla Genovese (Figure 5). However, some influenceing factors might have potentially biased these results. The holiday period, changing shopper frequencies, differing temperatures, or promotional activities may have had an impact, since in a large field experiment in a real-life setting such as this one, not

**Fig. 3: New In-store Referencing Methodology**



Source: Own illustration.

all factors can be controlled or captured (Levitt & List 2009).

The more detailed analyses of the individual purchasing behavior of the two groups of shoppers in the same EDEKA E-Center or Marktkauf hyper-

markets control for potential biases of the store-to-store referencing methodology because shoppers were randomly assigned to the groups (i.e., shoppers have randomly seen or not seen the respective ad). Among the 1 527 000



**Fig. 4: Inspiring Customers for Barilla Pesto at Marktkauf**

shoppers in the control group that did not see the ad, the conversion rate was 0.064%, meaning that 6 out of 10 000 shoppers bought Barilla Pesto alla Genovese. In the study group of 176 000 random shoppers that did see the ad, the conversion rate was 0.168%, an increase of 163% in the number of shoppers that buy Barilla Pesto alla Genovese (Figure 6). Moreover, the slightly lower number of focal products that were sold to the inspired shoppers as compared to the other shoppers indicates that the ad indeed led to inspiration as many shoppers who saw the ad only bought one glass of Barilla Pesto alla Genovese. This is typical for first time buyers and separates them from planned purchases or price seekers who would likely buy more than one glass (Wright & Rip 1980).

## Discussion

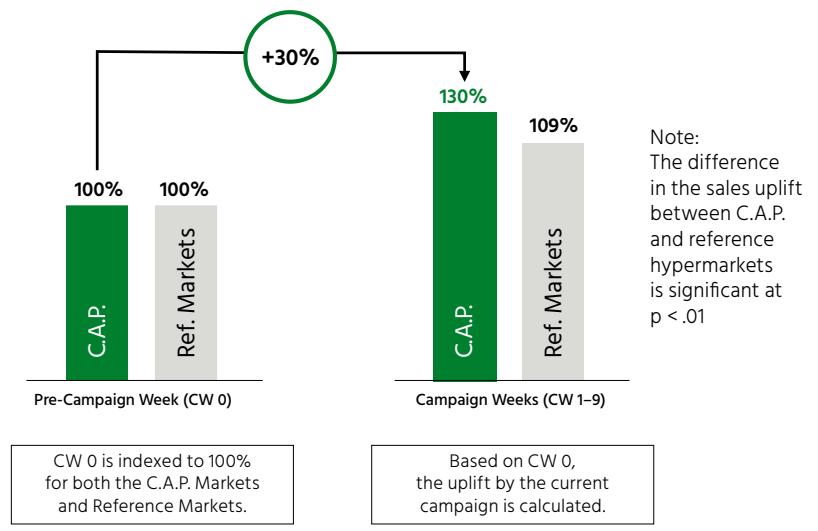
Besides enabling Barilla to calculate conversion rates, C.A.P. also allows to test for the effectiveness of variations with regard to the advertised product and the design of the ad, and PoS shopping behavior. One potential weakness of in-store displays lies in the fact that customers do not stop to watch the complete ad. Accordingly, ad stimuli need to be designed in a way that allows customers to recognize and clearly assign the promoted product independent of the video sequence they have been exposed to. For example, C.A.P. can be used to vary the presence of the brand logo. This might cover the variations no brand logo, showing the logo with low versus high frequency, and permanent logo presence. These variations can be randomly aired in the same supermarket, and their impact can be measured with C.A.P.. Moreover, the effect of audio stimuli can be investigated. Accordingly, music categories as well as sound and volume can

be varied to test for audio effects. Finally, studies can test the effect of content and context variations. Therefore, ad variations could, for example, show the preparation vs. consumption of the product to refer to different phases within the customer journey.

While retailers are increasingly using digital signage at the physical PoS

to inspire customers, to date the effectiveness of digital signage is still under-researched. The present article introduced C.A.P., a new customer inspiration approach that combines the ad impressions from digital signage with purchase data from individual customers. This approach enables retailers to analyze individual customer reactions

**Fig. 5: Impact of In-store Inspiration with Cross-Store Reference**



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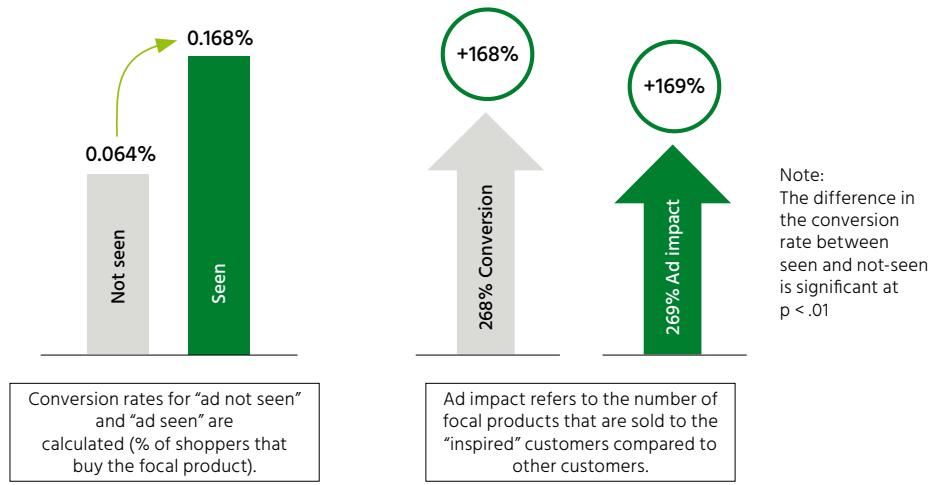
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towards digital displays in their physical stores, to calculate offline conversion rates, and to optimize their in-store marketing activities. Thus, it offers the possibility to overcome the attitude-behavior gap and to more realistically assess the effectiveness of digital signage. A first case study in cooperation with EDEKA Minden-Hannover and Barilla indicates that digital signage may double sales for a hedonic product.

Using C.A.P. offers several advantages for retailers, manufacturers, and academics. For retailers, C.A.P. opens up new revenue sources by enabling a calculation model analogous to that of online marketing companies such as Google. Based on conversion rates, performance-related pay could be obtained by manufacturers. For manufacturers, C.A.P. allows to calculate the ROI of digital signage and to use A/B testing to optimize in-store ads. Finally, for academics, C.A.P. provides the necessary infrastructure to conduct large-scale empirical studies in real time.

Despite its many advantages, C.A.P. is not without limitations, which, however offer promising avenues for future developments. So far, potential exposure to an ad is measured, not whether

**Fig. 6: Impact of In-store Inspiration with In-store Reference**



Source: Own illustration.

customers actually see the ad. Using a camera that tracks customers' attention might overcome this limitation (if in line with privacy rules of the retailer). In situations with high in-store traffic not only the tracked customers but also additional customers might be influenced by the ad. Given the in-store referencing methodology, these spillover effects lead to an underestimation of the effectiveness of C.A.P. Finally, to

date it is not possible to identify the recipient of the ad, and thus to personalize or target messages. Combining C.A.P. with face recognition, beacons, or loyalty cards could overcome this limitation. While this is technologically possible, privacy concerns from customers and retailers currently prevent this improvement of digital signage. 

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