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## **LEVERAGING INTERACTIVITY: TRANSFORMING RETAILING USING PREDICTIVE ANALYTICS**

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### **INTRODUCTION**

The retail sector has undergone dramatic transformations in the recent years with the explosion of venues and channels available for disseminating information as well as for consummating transactions. With the growth of interactive channels including the web and mobile devices, the amount of information available to retailers about consumers has also grown exponentially. Information about consumers' browsing and buying behaviors are now available to firms at unprecedented levels of granularity. Despite the plethora of "business intelligence" offerings that seek to provide "deep insights" into consumer behaviors, most of the BI offerings in the marketplace today do not go beyond the descriptive. We develop a prescriptive framework that focuses on the transformative potential of interactive channels. The goal is to provide guidance on how to leverage data about consumers' online behaviors – search, navigation, and information seeking - to develop optimal customer-focused strategies and design real-time interventions and offerings to influence consumer behavior online as well as across multiple channels.

**Most current "state-of-the-art" BI offerings in the marketplace today do not go beyond the descriptive, despite the availability of tools and techniques to derive deep insights about consumers, and the value in leveraging these insights to drive strategic growth. The Interactive framework highlights the potential and the substantial value-added in moving from the descriptive to the transformative realm.**

Traditionally marketers have sought to segment and target consumers and influence their purchase behaviors with varied success. Traditional segmentation strategies have been based on geography, demographics, psychographics, and product usage. The purpose of these segmentation strategies have been to improve product differentiation, provide customized offerings, design price discrimination strategies, promotions, etc.

**Geography:** Marketers have for long used consumers' locations, address, **and** community to provide targeted advertising messages and for mailings and catalogs.

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**Demographics:** Commonly-used demographics include gender, race, age, religion, nationality, occupation, income, disabilities, mobility (in terms of travel time to work or number of vehicles available), educational attainment, home ownership, employment status, family size. These demographic variables have been the mainstay of retailers marketing messages and targeting strategies. Over the past few decades while some marketers have resorted to a mix of demographic and psychographic variables, others have resorted to behavior segmentation techniques.

**Psychographic** variables include attributes relating to personality, opinions, values, attitudes, interests, or lifestyles. Marketing and advertising messages often seek to appeal to individuals' lifestyles, and their attitudes or values (for instance, highlighting eco-friendly attributes of products to environmentally conscious customers)

**Behavioral Segmentation** strategies are based on the benefits sought by consumers, their usage rates, brand loyalty, user status (for e.g., first-time vs. repeat), usage occasions (for e.g., weddings, birthdays, etc), among others.

While these traditional targeting and segmentation variables have been used successfully by marketers in a variety of instances, they still fall far short of what marketers would ideally like to achieve – implementing real-time interventions and dynamic targeting of consumers. Traditional targeting and segmentation strategies have been largely constrained by the lack of real-time data, as well as data of adequate granularity to provide insights into the dynamics of consumer behaviors. In addition, to the lost opportunities of targeting and influencing consumers, there is also significant “wastage” that results from the inadequacy of traditional targeting practices. Even the “best marketing decisions” today, are typically based on historical “transactional data”. However, strategies and marketing actions based on historical transactional data can be misleading if they are not based on a systematic understanding of consumer behavior. Most importantly, they can reinforce wasteful behaviors. For e.g., providing coupons or discounts to consumers will increase sales. However, not all consumers might need coupons or discounts to be motivated to purchase a product at a given price-point. Eliminating such wasted marketing efforts that are often directed at the wrong consumer profiles, or at consumers who are at different states in their purchase decision, can be critical to a firm's bottom line.

Interactive channels including the web provide an unprecedented opportunity to move away from mass-marketing and traditional segmentation approaches. What is needed is an understanding of consumer decision making behaviors as they progress through the various stages of their decision process. While interactive channels provide retailers and marketers an unprecedented opportunity to influence potential

customers as they shop, successful interventions require a fundamental understanding of not only customer segments, but also the discrete attitudinal stages in their purchase process. Online channels and emerging technologies have opened up new avenues for understanding the consumer behavior value chain in great detail. Understanding and constructing this consumer behavior value chain will form the foundation upon which marketing interventions can be designed.

Clearly, not all consumers are created equal (for the firm). Adding value to a consumer is worth it only if the consumer will add value to the firm. So understanding differences among consumers is the critical first-step in designing the right strategies for each consumer/group-of-consumers.

Identifying the right interventions for the right consumer segments requires a deeper understanding of consumer behaviors stemming from collecting and analyzing data about them. The future of consumer targeting and segmentation will build on the science of data analyses and measurement, and the art of deriving insights based on a systematic understanding of consumer behavior patterns.

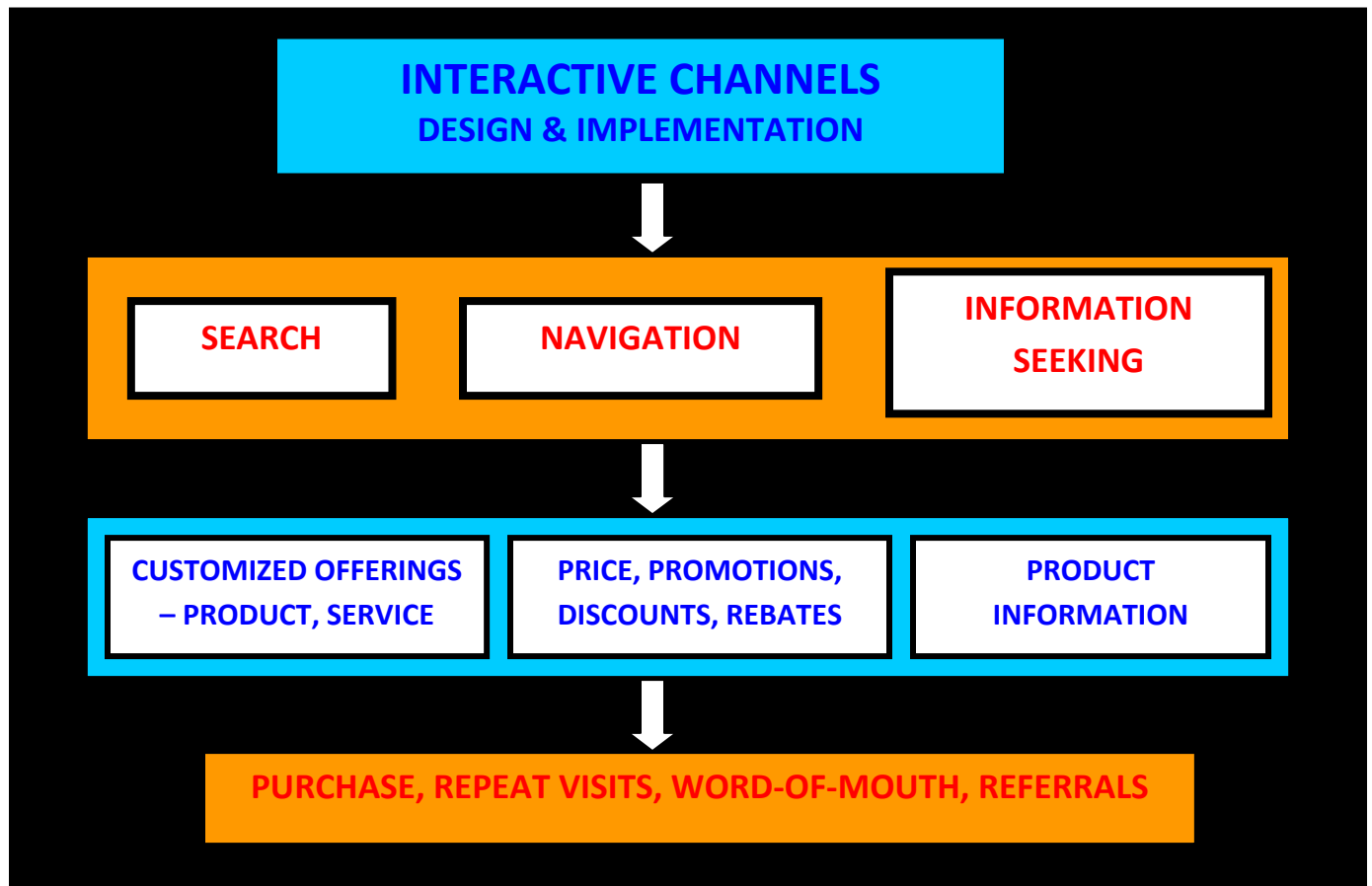
**How can firms understand consumers when there is little information about them – about their demographics, their past purchase histories, their sensitivity to price and product features, etc..? How can firms meaningfully segment consumers and identify differences among consumers segments and states that are actionable?**

### **LEVERAGING INTERACTIVITY: Understanding Consumers' Online Search and Interaction Behaviors**

One of the key features that distinguish emerging channels and venues from traditional channels is “interactivity”. The ability for consumers to interact with firms and their offerings, as well as for firms to interact with consumers in real time to customize and personalize offerings promises to open new vistas for consumers and retailers alike. The key to understanding consumer behavior in interactive or online environments is to understand their search and interaction behaviors. Consumers’ online behaviors are a window to their underlying preferences and profiles. Firms now have the ability to capture granular information on consumers’ interactions and search behaviors in unprecedented ways – granular information that promises a wealth of understanding of consumers’ needs and preferences.

Understanding consumers’ online behaviors will provide insights into understanding the differences across segments of consumers as well as the stages in their purchase process. Understanding these differences in turn, can help firms devise the right “information provisioning” strategies – information relating to products, prices, promotions, etc. In summary, to effectively exploit the novel and interactive features of

emerging channels firms need to understand the search and interaction behaviors of users and consumers and leverage this understanding to design and implement product, pricing, and promotional strategies.



**FIGURE: LEVERAGING INTERACTIVITY USING PREDICTIVE ANALYTICS**

**(i) Design and Implement Interactive Channels (ii) Gather Data and Decompose Metrics; (iii) Analyze Online Search, Navigation, and Information Seeking Patterns; (iv) Understand the Customer-Behavior Value Chain; (v) Design Targeted Information Provisioning Strategies; (vi) Measure Performance; (vii) Fine-tune Channel Design and Intervention Strategies**

#### **UNDERSTANDING CONSUMER SEARCH AND NAVIGATION**

The ability to provide real-time information about products, prices, and promotions is a valuable feature of interactive channels. However, the ability to provide such targeted information depends crucially on the ability to understand customers' needs and preferences. Customers' needs and preferences in turn depend not only on which segment they belong to but also which "state" (of shopping) they are in at a given instant. While it is possible to infer customer segments from traditional variables such as demographic data and psychographic variables, it is more difficult for retailers to infer customers'

states of shopping” in traditional settings even in the presence of historical information about customers. In reality, several online retailers typically face visits from relatively anonymous or “unidentifiable” visitors, who form a significantly higher proportion of traffic than “loyal” or “registered” customers. Retailers usually know very little about these customers due to the lack of identifiable historical interactions. At the same time, customers are more likely to conduct extensive pre-purchase research and place greater value on appropriately targeted information that improves the utility of their purchase – more so for big ticket items and high-involvement products. Faced with limited interactions and a slim dossier on each customer, retailers must seek alternate ways to learn about their customers’ needs and preferences.

Interestingly, consumers’ interaction, search, and information seeking behaviors are revealing of their underlying needs and preferences even when there is very little additional information about them. This is particularly valuable for less frequently purchased categories (or one-time purchases). The ability to observe customers’ interaction, browsing, and search patterns in online channels at a very granular level opens up new avenues for not only segmenting customers but also, gaining insights into their “shopping states”. The availability of micro-level consumer behavior data promises to bring online retailers closer to achieving truly customized interactions with their customers.

One source of rich micro-level and real-time information is the store-level clickstream data. Analyzing the clickstream can help firms meaningfully characterize consumers' search and navigation behaviors within a session - in ways that reflect consumers’ shopping-relevant underlying differences. Tracking consumers’ clicks can not only enable firms to segment consumers into meaningful groups but also help identify their shopping states.

**Clickstream or path data offers the ability to analyze not just the purchase occasion alone, but also the sequence of events that lead to desirable outcomes within a website. The clicks generated by consumers provide retailers fine-grained insight ranging from their relative level of interest across categories and their consideration sets, to the types of information accessed and their purchase-related outcomes. The use of such data is promising; not only can retailers learn what consumers do at their store, but they can also extract key purchase-relevant unobservable parameters that can be invaluable in helping serve customers with information and offerings that will be most useful given their needs and preferences.**

### Insights from Clickstream Analytics\*

Real-time targeting – the holy grail of marketing – has been beyond the reach of most retailers until recently. With the explosion of interactive channels and online commerce, retailers now have the opportunity and the tools to target users with customized product-related, pricing, and promotional information. Real-time targeting, though, requires the provisioning of customized information that matches not only the right segment to which a customer belongs to, but also their *state of shopping*.

In their recent study of consumer interaction and search in an online durable goods retailer's store, Ramachandran et al (2010) examine how clickstream analytics can help identify consumers' shopping states. Their study seeks to meaningfully characterize customers' search and navigation behaviors from clickstream data in ways that reflect shopping-relevant underlying differences across sessions. Their study uses observed session-level behaviors to infer latent states of customers that differ in their shopping needs. They then examine whether product and price-related (promotions and discounts) information provided by the retailer had different impacts on conversion rates for customers who were in various latent *states of shopping*, as well as whether (product versus price) information varied in its impacts on purchase related behaviors *within a session* and *across sessions* (return visits and future purchases). In doing so, Ramachandran et al (2010) extend the notion of targeting to *price* and *product* related information that a retailer can provide to online customers in real time to influence their purchase outcomes and conversion rates.

The study uses a data-driven approach to empirically determine the optimal number of states of shopping. However, given that a consumer's "state" is actually latent (unobserved), a consumer's shopping state is inferred from observed search behaviors and navigation patterns of consumers across the website.

The *breadth*, the *depth*, and *intensity of search* are found to best describe consumers' latent heterogeneity in shopping needs and goals, and are used to differentiate between *directed* and *browsing* behaviors. The breadth of search is measured by the number of unique product departments viewed, and the number of unique product categories viewed. The depth of search measures the extent of hierarchical search within the product category of the focal product. The total time spent in minutes and the number of pages visited in the session provides a measure of the intensity of search. A three-state model comprised of *directed shoppers*, *deliberating researchers*, and *browsers*, is found to best describe the latent shopping-relevant differences across customer sessions in the data. Interestingly, this corresponds to the traditional "purchase funnel" where consumers progress from relatively undirected to more focused states of buying.

Prior research suggests that consumers in the early stages of shopping (the browsers) are less likely to complete a purchase, while those in later stages (directed shoppers) are more likely to complete a purchase in a given session. While these “shopping states” are known to influence purchase propensities, what is not clear is how consumers in these different states would react to different types of information (for e.g., product versus price/promotional information). In other words, is a promotion (a discount, coupon, or rebate) likely to be more effective for shoppers in early stages of shopping than for those in later stages?

Ramachandran et al (2010) find that information about promotions and discounts had a significant impact on both “directed shoppers” and “browsers”. Information about free-shipping impacted the conversion rates of consumers in all three states. However, product-related information had the strongest impact on purchase conversion for “deliberating researchers”. Most interestingly, information about category-wide promotions and discounts had a negative effect on “deliberating researchers” leading them to delay their purchase or abandon their shopping session. Further, product information (highlighting various product features and product alternatives in a category) had a negative impact on the conversion rates for “directed shoppers”. Information about promotions and discounts was also found to have a negative influence on purchase conversion for returning visitors.

Ramachandran et al (2010) also identify distinct consumer segments – price-sensitive versus brand-sensitive consumers – based on their navigation patterns and use of refining tools. Consumers who chose to refine their search using product categories were found to be more responsive to product-related interventions, while consumers who chose to refine their search using price tools were found to be more responsive to price and promotions-related interventions – highlighting the importance of targeting interventions to the right segments.

\* Source: Ramachandran, V., Viswanathan, S., and Lucas, H. “The Impact of Price and Product Information on Conversion Rates: Insights From Clickstream Analytics”, Working Paper, Robert H Smith School of Business, University of Maryland, College Park, MD., May 2010.

While firms have traditionally had limited and often static opportunities to interact with consumers, the fast-changing environment of interactive marketing is radically transforming this landscape. The availability of micro-level consumer behavior data promises to bring online retailers closer to achieving

truly customized interactions with their customers. Clickstream analytics can help retailers gain deep insights into consumers' latent needs and preferences based on easily available information about consumer search and navigation patterns - even in the absence of any additional identifying information or details about prior purchases and transactions.

Current practices such as offering broad-based promotions (including free shipping and product category discounts) to all customers who visit a store are typically expensive and wasteful as a number these customers would have purchased even in the absence of such discounts and promotions. Understanding customers' latent states of shopping enables retailers to optimally target product and price/promotional information to customers who are less likely to complete a purchase in the absence of such information, thereby increasing the lift created by online information. Further, depending on the retailer's goal – immediate conversion in the short term, i.e. before the customer ends a session, versus ensuring that the customer develops a longer-term relationship with the retailer and returns to the site over time – a different information provision strategy is likely to be optimal. Real-time customization strategies enable retailers to better match consumers' concurrent preferences. More importantly, they allow for the same consumer to be targeted in different ways on different occasions, based on changing needs and preferences leading to positive sales outcomes.

## **UNDERSTANDING CONSUMER'S INFORMATION SEEKING BEHAVIORS**

Consumers today have access to a plethora of channels to acquire different types of information – information that is typically required to help them consummate a transaction. Consumers differ in the types of information they seek to complete a purchase. Interestingly, different types of information differ in their impacts on purchase outcomes. Understanding consumers' information seeking behaviors, their information needs and preferences, and more importantly, understanding how information impacts purchase outcomes is crucial for retailers seeking to design optimal information provisioning strategies as well as optimal segmentation and pricing strategies that can help significantly boost their bottom-line.

Price-sensitive customers typically seek price-related information – information about promotions, discounts, rebates etc. On the other hand consumers who seek a better product-fit with their needs and preferences are likely to seek product-related information – information about product features, add-ons, options, performance etc. As shown by Viswanathan et al (2007) Price information and product-related information lead to very different economic outcomes. Increased availability of comparative price information (information about the prices of different alternatives available to a consumer) leads to increased price-competition among the different brands and to lower overall prices. Thus when

consumers are exposed to more comparative price information (through price comparison tools and mechanisms), consumers find it easier to find the lower priced offerings leading to increased pricing pressures among competing brands. On the other hand, increased availability of product-related information leads consumers to seek products/offerings that better fit their preferences. This fosters greater differentiation among brands to better meet customers' preferences lessening pricing pressures and leading to higher prices on an average.

Viswanathan et al (2007) study pre-purchase information seeking behaviors among consumers and compare the purchase outcomes of different consumers. They find that consumers who sought and found price-related information paid a lower price (on average), while consumers who sought and found product-related information paid a higher price (on average) for exactly the same product. Thus, understanding consumers' information-seeking behaviors can shed light on their price-sensitivities – enabling retailers to customize pricing and promotional offers to different customers. While their study examined consumers' information seeking behaviors across different websites, retailers can design interactive offerings, search and navigation tools to let consumers choose different categories of information. Analysis of these information seeking behaviors can reveal interesting facets of consumer needs and preferences.

\*\*Source: Viswanathan S, Gosain S, Kuruzovich J, Agarwal R. "Online Infomediaries and Price Discrimination: Evidence from the Auto-Retailing Sector", *Journal of Marketing*, Vol. 71, July 2007, pp. 89-107.

## **CROSSCHANNEL ANALYTICS**

While consumers can typically use the same channel to find information as well as to consummate their purchase, in most cases consumers typically use multiple channels to complete their purchases. For instance, consumers typically use the web and mobile devices to gather information relating to their purchase, while consummating their purchase offline.

Kuruzovich et al (2008) examine the choice of different types of price and product-related information by consumers in online channels and analyze the impact of these choices on their propensity to complete their purchase online or extend their search to the physical marketplace. They find that consumers who seek and find price-related information are less likely to consummate their purchase online and are more

likely to extend their search to the offline channel. On the other hand, consumers who sought and found product-related information were less likely to search extensively across multiple channels.

These findings suggest that traditional retailers would benefit by understanding consumers information seeking behaviors in online channels. Targeting consumers who seek product information online is likely to payoff in the short run as these consumers are less likely to further search extensively offline. On the other hand, customizing information provision (including product demonstrations and workshops) to consumers seeking price-information online could benefit a retailer in the long-run. These findings also point to the need for a careful choice of linkages and partnerships with information intermediaries across multiple channels. In particular, retailers would benefit from customizing their information provision strategies, and designing cross-channel services that integrate and exploit cross-channel complementarities.

Source: Kuruzovich J, Viswanathan S, Agarwal R, Gosain S. "Marketspace or Marketplace? Online Information Search and Channel Outcomes in Auto Retailing", *Information Systems Research*, Vol. 19, No.2, June 2008.

#### **EXPERTISE @ DIGITS**

The role of predictive analytics in retailing is one of the key focus areas for DIGITS. Clickstream analysis of consumer purchasing behaviors in sectors such as consumer durables, automobiles, financial products, among others, can provide valuable and unique insights beyond those available through traditional business analytic tools. Researchers in DIGITS are also involved in the study of online social networks and how firms and retailers can leverage these digital platforms for strategic objectives.