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Retail | Business analytics with HyperCube

Beyond the horizon of retail analytics

This white paper describes how business analytics can be successfully used by a retail organization. It also discusses two approaches to gain business-critical insights: hypothesis-driven and data-driven. The latter, using a modern tool like HyperCube, covers all data available and is based on facts rather than hypotheses.

In this white paper

A majority of retailers are missing out on business-critical insights to drive growth and profitability simply because they have chosen the wrong approach to business analytics and therefore will not receive answers to the right questions[1].

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Introduction

Do you have doubts about your business model? Wonder whether you will make your budget or not, if your analyses were the right ones and if they gave you the insights you needed? Have you considered that analyses based on hypotheses can never reach deeper insights than those of the person making the hypotheses?

BearingPoint experiences that a majority of retailers are missing out on business-critical insights to drive growth and profitability simply because they have chosen the wrong approach to business analytics and therefore will not receive answers to the right questions. This white paper will address just that, in an environment that has never been so complex and as massively overloaded with information as it is today. We will describe the context of business analytics in retail, the overload of information and business subjects where questions are commonly asked to improve business performance. We will then address two diametric approaches to business analytics, recommend when to use what approach and conclude that understanding and practicing one of them, data-driven analysis, is vital to attain business advantage in retail today. New tools are available to manage this approach and we will present and discuss around a leading one: HyperCube. You will learn about how this tool and how the approach of data-driven analysis are put into practice on two areas where many retailers struggle for answers: store performance and marketing effectiveness.

With these new insights, it is only natural to wonder how you and your company can reap the benefits of this opportunity. At the end of the white paper, we present our five-step approach and methodology for how to get started.

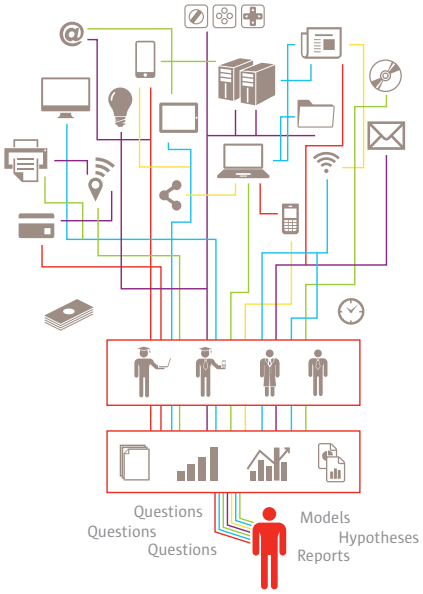
Retail business analytics in context

Retailers around the world offer their customers a vast variety of products, but how do they know what their customers want to buy? The answer to this question and many other related ones is what retailers would like to know. And by using business intelligence and business analytic methods they can!

The main purpose for companies to use business analytics is to gain a competitive advantage. By using different tools, models and skills this can be done in a number of ways. Below, we briefly present some commonly known business issues within retail today[2] and what potential benefits and insights could be gained from business analytics to help address those issues.

Business issues	Potential benefits from business analytics
Enhance assortment and shelf space management	Know what products to sell in the store.
Out of stock	Improve stock levels to never run out or tie up unnecessary capital.
Planning new stores and their locations	Match the store design with surrounding preferences from its given location to improve profit.
Know your customers when marketing	Understand customer behaviors and needs by developing a closer relationship with them.
Improve the marketing mix	Understand what motivates customers to make a purchase and use advertisement, promotions and offerings to trigger their willingness to buy.
Price optimization	Increase profit by charging the exact price a customer is willing to pay for a product at a certain moment.
Forecasting	Anticipate customers' demands for the future and plan ahead to increase profit.

Figure 1: Hypotheses-driven approaches are dependent on the hypotheses that specialists, statisticians, and other experts prepare for providing insights into business issues.



One of the major challenges that retailers face when it comes to business analytics is knowing how to get started. They often do not know exactly what data to collect, how to collect it, how to analyze and use it to gain insights that will help drive growth and profitability. On the other hand, it is no secret that retailers collect enormous amounts of data every day. This is basic sales data and is often output from sales systems (cash register), purchasing systems or a loyalty program. And for basic analyses this is often more than enough. But when the objectives of the business analyses are to gain more spectacular insights that really make a difference, other areas of data input often need to be taken into consideration.

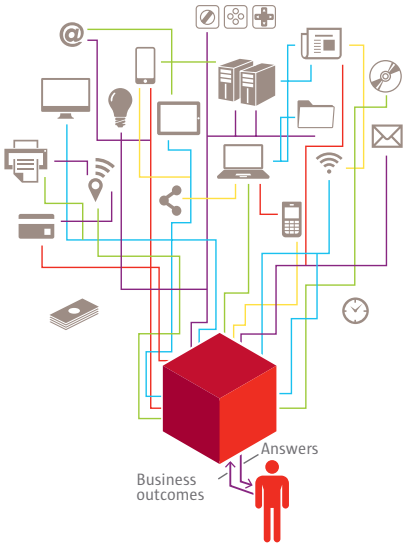
Depending on what business areas a company would like to focus the business analyses on, the input data may need to be collected from a number of different sources. Such input, which to the naked eye may appear as irrelevant data, could be for example:

- Average cleaning time of a store
- Time and place of shopliftings
- Average number of faulty products in a delivery
- Number of lights per square meter in a store
- Open floor area as a percentage of the total floor area of a store
- Each week's number of products advertised in the weekly flyer

...and much more.

To make the most out of business analytics, some changes in how to identify what data to collect may need to be considered. BearingPoint experiences that only a few retailers have invested enough resources to collect the right data to serve as base for business analytics approaches. If they do, however, their possibilities to gain extreme insights from business analytics are significantly increased. In the following chapter, we provide deeper insight into alternative approaches to make use of the collected data and our recommendations on when to use a certain type of approach.

Figure 2: Data-driven approaches make use of the data from many different sources and provide insights by letting the data tell the story behind the business outcomes.



A journey to extreme insights

What would be the right business analytics approach to use to gain these extreme insights? Formulating the questions is often the easy part but finding the answer is more difficult. Also remember that analyses based on hypotheses can never reach deeper insights than those of the person making the hypotheses. We present two diametric business analytics approaches below: hypotheses-driven and data-driven.

Hypotheses-driven approaches

Hypotheses-driven analyses (see figure 1) are conducted by first looking at a problem, considering how to describe that problem, and then creating a model to describe it. This method is based on a hypothesis developed about a situation and how different factors will influence the results. An example would be that one believes there is a clear connection between average spending and the holiday season, e.g. that spending increases in connection with major holidays. This is tested by first creating an hypotheses-driven model, and then checking to see if the model's predictions fit the outcome. If that is the case, then this is a model that describes the situation.

Data-driven approaches

Data-driven analyses (see figure 2) are a different and a modern approach on how to gain insights based on data. Data-driven analysis do not start with a model or hypotheses about a situation to be understood. The focus is rather on understanding the root-cause behind a phenomenon – letting the data tell the story behind the situation and then letting the patterns in that data provide insights into what is going on. An example of this would be to have weekly sales data from a retailer's different sales channels.

A data-driven analysis would find the peaks surrounding holiday seasons, and based on the peaks around the holiday season suggest the insight that there may be a connection relating sales levels to the timing before the holiday season.

What is the difference between the two approaches?

The crucial difference between the two approaches is whether to let data or hypotheses tell the story. In essence it can be summarized as *hypotheses-driven analyses can never reach deeper insights than those of the person making the hypotheses*. Data-driven analyses can provide insights into the underlying root causes of a problem, without the hypotheses specifying beforehand what these root causes may be.

The hypotheses-driven approach is often the right approach to use for solving issues that are of a more simple nature (see figure 3). Typically these issues are easy to describe in a model, repeat themselves over and over again, and with only a few factors needed to influence the results. The holiday season sales example above is a great example of where to use hypotheses-driven approach tools for forecasting.

BearingPoint analytics subject matter experts estimate that approximately 20 percent of all applicable business problems and the data describing them can be covered by an hypotheses-driven approach. But what about the problems that are more complex, where more than a few factors act together to create unexpected, and usually unwanted results? Examples of such problems are marketing campaign in-efficiency, low store profitability and decreasing customer loyalty. To outperform the competition in the market the root-causes behind these problems need to be understood.

HyperCube — a data-driven analytics tool

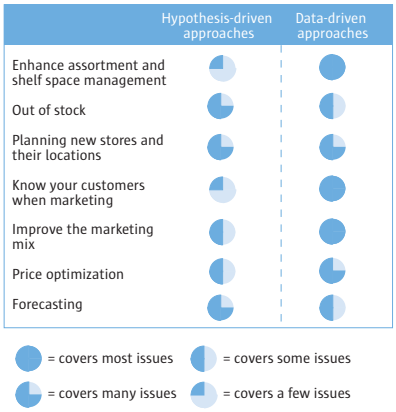
BearingPoint has developed a methodology that has been used in more than 300 projects to understand clients' business issues and analytical problems by using data-driven tools as the approach. The methodology is strongly connected to BearingPoint's software-as-a-service (SaaS) solution called HyperCube, a data-driven based analytics tool. The HyperCube algorithm is useful in identifying underlying business issues and in generating clear and implementable business insights. HyperCube is created to exhaustively analyze large amounts of data to understand the root causes behind a business issue. It is the result of 15 years of research in applied mathematics and was originally developed at the École Polytechnique near Paris. The tool is based on a mathematical algorithm and analyzes large amounts of data to generate easy to understand, formal rules for implementation in the organization. HyperCube handles missing and incomplete data sets, it does not rely on averages or best-fit lines and identifies trends before they become statistically relevant.

High impact areas for data-driven analyses

Throughout the history of retail, there has been one mantra believed to be the root of success: growth. Being big is good and the force of economies of scale can never be tampered with. Over time profitability may vary, but as long as there is growth or at least a feasible plan for it, companies tend to accept and get away with short-term profitability deviations. Finding that golden key to growth is on everyone's mind no matter if the company is a market leader or in severe financial distress.

Business analytics in retail correspondingly tend to be focused on finding the growth-driving levers. Also, to begin a journey to more advanced business analytics you will find more enthusiasm to approach a growth or profit-driving area. To illustrate how the data-driven approach can be applied, we have chosen two business issues that most retailers can easily relate to: levers for improved store performance and increased promotion and campaign accuracy.

Figure 3: BearingPoint experience of how suitable hypotheses-driven and data-driven methods are handling different analytics problems[1]



"Conventional hypotheses-driven tools only cover 20 percent of all business problems and the data describing them and produces trends or generalities[1]".

Augustin Huret
founder HyperCube

Hypercube explores information unbiased, completely and provides results with three times more precision than usual hypotheses-driven methods[3].

HyperCube analyzes large amounts of data to generate easy to understand, formal rules for implementation in the organization.

There is no such thing as "being unlucky" on profitability when opening a new store.

Customer disloyalty is not a new phenomenon but does increase and is predicted to increase further.

Levers for improved store performance

Retailers, and specifically retail chains, are well aware of the key drivers for store performance. Measuring performance in growth, profitability, sales per square meter and so forth. There is no such thing as "being unlucky" on profitability when opening a new store – it is about whether a good job was done in designing and executing on the plan or not, and advanced analytics are rarely needed to come up with the underlying reasons. Just asking the customers will take the retailers at least half-way.

Comparing the performance of stores is typically done by explaining differences by their location, maturity on the market and local competition. But what about staff behavior? The number of rainy days per year? The shelf length and height for different sub-categories? Cleaning routines? The energy consumed by display lights? The size of the parking lot? The number of campaigns in each category per year? Differences in assortment? Adherence to central planograms? The income level of the average shopper? And even better, what about combining these less commonly used factors with the typical explanatory factors and thereby finding suitable combinations that could unveil unheard of potential? Adding several factors with less obvious relevance to store performance includes great difficulty to ask the right questions. In this case, the data-driven approach would be the right choice. The result may turn out to be as expected, but is also likely to provide totally unexpected insights and findings.

Increased marketing effectiveness

An increased set of sales channels, loyalty programs and the use of add-on services such as insurance and banking have exploded the amount of customer data available to retailers. The stream of information often goes across functions, organizations and sometimes even legal entities. Retail companies, aiming at executing day-to-day operations, are seldom organized to take benefit of all relevant opportunities that the data offers. But the customers start to realize that they let go of their integrity and demand to be treated better, more precisely – especially when it comes to promotions. When being treated as just anybody, however, they may quickly re-evaluate their choice of store and shift to another. Customer disloyalty is not a new phenomenon but does increase and is predicted to increase further.

Combining data from many sources and drawing conclusions is difficult, especially when the behavior behind the data comes from the purchase of very different products and services. A customer may behave as a family provider when buying groceries, a music traditionalist when downloading music and a risk-averse policyholder when signing up for insurance. Asking the right question, that is making a sound hypothesis, to design promotions becomes almost impossible. In this case, a data-driven approach would be suitable because it is not based on models and hypotheses. Using HyperCube, vast amounts of data in different shapes and forms is no restriction.

Case stories and sample results

BearingPoint has used its methodology together with HyperCube when analyzing business issues facing retailers in many countries. One of these projects was related to understanding the business drivers behind high-performing retail stores within an optician's retail network. Another project helped solve the business issue of improving marketing effectiveness for a major international hypermarket retailer. These two projects are described in more detail below.

Understanding the business drivers behind high-performing optician retail stores

Situation

The client is a market-leading retail optician's chain in Europe with about 1,200 retail stores and 15 percent of the market share. When the client was facing issues with decreasing store performance among the network of opticians' retail stores within the group, they needed to find a way to make sense of the data available and understand the driving factors behind the stores that performed well.

Issue

The key issue to be analyzed and understood was: "What are the drivers affecting store performance and how could low performing stores be developed to perform better?"

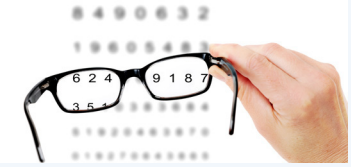
Methodology

By using HyperCube, BearingPoint analyzed data from each of the stores using approximately 100 variables, both static and dynamic, describing each store. These covered such things as demographics of customers, quality and experience of management and employees, number of years the store had been within the chain, product category information as well as product pricing, set-up and design of stores, number of designer spectacle frames and private label spectacle frames facing customers, and more. With this data as input, and through BearingPoint's methodology, it was possible to discover insights into the driving factors behind high-performing stores and low-performing stores. The methodology also generated a number of implementable business rules. One example of such a rule for profitable stores was: if the share of designer frames in store is between 15-25 percent of the products facing customers then that store is 1.3 times more often a top-performing store. This rule alone explains 30 percent of the top-performing stores.

These best and worst performance rules could be used across the full network of retail stores in the entire chain to improve store performance.

Results

By learning from the top performers' effective practices, a business improvement potential of 24 percent increase in store performance was identified for the medium and low performers.



Examples of insights generated using HyperCube (Retail network performance):

To understand the driving factors behind high performing optician stores, HyperCube was used to analyze data describing each store, using approximately 100 variables. Based on the analysis some of the findings related to the type of spectacle frames facing the customers were as follows:

- If the share of designer frames in store is between 15-25 percent of the products facing customers, then that store is 1.3 times more often a top performing store. This rule alone explains 30 percent of the top performing stores.
- If the share of entry-level frames with a price of €100-170, is between 25-50 percent of the products facing customers, then those stores are 1.45 times more often low-performing stores. In this segment of stores, an average negative growth of 3.75 percent is witnessed.
- If the share of private label frames in the store is between 16-23 percent of the products facing customers, then these are 1.3 times more often low performing stores.

These insights and many more provided the client with tangible ways forward for creating higher performing stores.

A 24% increase in store performance was identified

Examples of general insights found using HyperCube (Retail marketing effectiveness)

To understand the driving factors behind marketing effectiveness HyperCube was used to analyze marketing campaign data for an international hypermarket chain.

The input used was data on marketing campaigns on a weekly basis. Some examples of data were type of media, specifics on the set-up of the media (length of radio spots), economic statistics, size of marketing investments, types of advertisement, competitor data, market share information and more.

Based on this input the analysis generated some **general insights** into marketing effectiveness as follows:

- Equal investments every week are generally less efficient. Differing advertisements generate better results.
- Better targeting is significantly more efficient than increasing volume.

The analysis also generated **specific insights** into types of media used in marketing campaigns, for example:

- Catalog rule: advertising during weeks when a catalog with less than 36 pages are distributed in the middle of the month in parallel with TV commercial spots are 2.2 times more likely to over-perform.
- Media rule: stand-alone internet campaigns do not generate a good ROI. However, advertising weeks when radio commercials are combined with distribution of a non-food professional catalog are 2 times more likely to over-perform.

These insights gave the client a number of general and specific rules to describe how to achieve a higher ROI on future marketing campaign initiatives.

A potential of €35 million of additional sales was identified

Increasing marketing campaign effectiveness

Situation

The client is one of the largest international hypermarket chains iwth1,400 hypermarkets and operations in Europe, Africa, Asia and South America. With an annual marketing spend of $675 million, the client was facing issues with limited efficiency of the marketing campaigns within a number of its primary market areas. The client had information about its marketing campaigns but did not know how to analyze the data to understand what generated successful marketing initiatives.

Issue

The key issue to be analyzed and understood was: “What are the factors and the logic behind successful advertising campaigns?” as well as generating practical rules to help increase return-on-investment (ROI) in advertising campaigns.

Methodology

By using BearingPoint’s methodology, we analyzed data including campaign data of hundreds of campaigns from all relevant media, economic statistics data for the relevant market areas, competitor data, market share data, marketing spend in each marketing channel, and more with weekly data over a period of 2.5 years.

Using HyperCube, it was possible to understand the driving factors behind highly efficient marketing campaigns. By using the information mentioned above, HyperCube could generate a number of rules through which the client could make better and more conscious decisions on future campaigns. These rules provided a deeper understanding behind the general marketing spend (general rules), as well as a deeper specific understanding of what campaign set-up is appropriate in specific marketing channels, for instance that a specific combination of TV-promotions along with a specific type of catalog with a specific timing generated higher ROI.

Results

By using the results from the analysis and learning from the top performing marketing initiatives, a potential of €35 million of additional sales was identified. This was mainly based on the rules that provided the basis for more focused investments on media and catalog, leading to higher impact marketing campaigns.

If you are ready to take the next step, here is a way forward

The tools are available and the benefits of using a data-driven approach have been well-established in many cases. More importantly, the method of this approach results in many types of insights that can be revealed from the data.

Below we present BearingPoint's five step methodology used for tackling business issues using HyperCube:

1) Identify business issue.

Identify your business issue and describe your core question to be answered.

2) Identify and gather data.

Identify and gather all people that understand the business issue and collect their input about it.

3) HyperCube analysis.

Use the data-driven tool HyperCube to get a deeper understanding of the story the data is telling

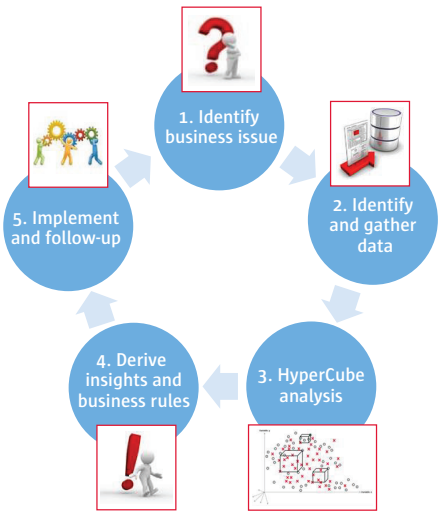
4) Derive insights and business rules.

Convert findings into implementable business rules aligned with your business situation.

5) Implement and follow-up.

Implement rules and follow-up on results.

Figure 4: BearingPoint's five step methodology



The methodology is delivered to clients as a project, where the HyperCube analysis is an initial strategic analysis of a clearly defined business issue. A typical HyperCube analysis takes approximately 8-12 weeks and follows the process described above.

If you are interested in taking your business performance to the next level, using a data-driven business analytics approach is the way forward. Leading retailers around the world are already doing so, and with great results. Examples include reaching deeper insights into store efficiency and marketing campaign set-ups. With our methodology and the HyperCube analytics tool, we have the capabilities and experience to support your organization in tackling the challenges you are facing.

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Sources

1) BearingPoint analysis and experiences

2) Retail Analytics Trend Research Study, Babson, T.H.Davenport (2009)

3) Loucoubar C, Paul R, Bar-Hen A, Huret A, Tall A, et al. (2011) An Exhaustive, Non-Euclidean, Non-Parametric Data Mining Tool for Unraveling the Complexity of Biological Systems – Novel Insights into Malaria. PLoS ONE 6(9): e24085. doi:10.1371/journal.pone.0024085. Länk: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0024085

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