

Behavioural Business Intelligence: the next generation of predictive analysis

Business Intelligence (BI) generally refers to support systems that analyse data in order to improve business decision making and facilitate better market research. Important business decisions include the introduction of new products, services, franchises or infrastructure, worth many millions of dollars. Strong growth in BI is driven primarily by two factors. Firstly, the increase in enterprise systems in organisations, and publicly accessible information, provides a plethora of data which can be transformed into meaningful insight using BI. Secondly, advances in technology enables powerful tools to perform complex analysis on data, presenting valuable information to strategic planners that was previously not possible.

Although traditional BI approaches provide powerful and useful information for businesses and other BI support systems, they lack the ability to gain useful insight and understanding into the fundamental component behind business success: *the people*. Whether one is operating in a business-to-business or business-to-consumer scenario, ultimately it is the people (customers) that drive the decisions, and it is the people that need to be won over in order for a business to succeed. Understanding the people and their complex behaviours provides great business benefit when making strategic decisions. In this paper, we introduce the concept of Behavioural Business Intelligence (BBI) which focuses on decision support tools to assist in understanding what people do and why they do it. These powerful insights into consumer behaviour and their dynamics can mean the difference between success and failure of a business strategic plan.

Shortfalls with traditional business intelligence

Various BI approaches are currently used by decision makers. Some decision makers use simple software tools such as spreadsheets and databases to assist with strategic planning. The use of these tools alone is generally limited as they do not have the capability to perform complex analyses on the data. Similarly static information such as maps and demographics may also be used. Useful deductions can be made from this type of information, such as determining a suitable location for a franchise. However, it may be the dynamic complexities and consumer behaviours which are the primary factors that influence the success of the franchise. For example: working hours and movement of consumers and their relationship to the positioning and operating hours of the franchise; expected change in demographics in the future; and the influence of current and potential future competition.

Other BI approaches focus on observing, analysing and reporting on consumer behaviour in order to understand what consumers are doing. Similarly these techniques can be applied within organisations to understand people within the organisation and improve business performance (business performance management). Powerful techniques such as data mining can be applied, processing large quantities of data on peoples' behaviour to find relevant information about the consumer or the organisation itself. Although such

information can be invaluable to decision makers, it only provides part of the picture. These BI approaches do not provide insight into why consumers are doing what they are doing, and why a business and its staff are performing the way they are. Greater understanding of the ‘*why*’ is vital in predicting the future and gaining insights in a systems functioning, in order to reduce inefficiencies, costs and risks, and improve future decisions.

Finally, many forecasters use extrapolation of historical data in order to forecast future trends. This analytical approach is not always appropriate, particularly in a dynamic and changing world. For example, consider forecasting electricity demand based on historical usage data. Today people are purchasing a greater number of large screen (LCD or plasma) televisions as they become more affordable. These televisions consume more electricity than older CRT models. More people are also acquiring computers and other gadgets reliant on electricity. Climate change may also result in a greater use of air conditioners in the future. Therefore, one cannot rely solely on historical data to predict expected future demand for electricity. Rigorous and detailed analysis of changing household behaviours and influences is required.

Benefits of Behavioural Business Intelligence

Behavioural Business Intelligence (BBI) overcomes shortfalls with traditional BI as it focuses on the people, their behaviours, as well as their detailed environment and constraints that influence their behaviours. BBI does not only aim to understand what people do, but why they do it. This gives the decision makers greater power in assessing the success of their strategic decisions – as it could be the “why” that ultimately determines the success or failure of their product, service, franchise or infrastructure.

BBI does not eliminate the need for traditional BI. BBI is driven by data about people, their characteristics, what they do, their environment and constraints. Traditional BI provides powerful tools to analyse and filter data in order to provide useful information for BBI use and analysis. BBI therefore provides the next step of data analysis – simulating the real world and providing a picture of what will happen based on the rich data, knowledge and models available.

Behavioural simulation approach to BBI

BBI is facilitated using behavioural simulation. Behavioural simulation allows decision makers to create a virtual replica of the real world, including complex social and physical behaviours, in order to test their ideas before implementation. Behavioural simulations can model systems of all scales; from organisations to complete cities. Behavioural simulations crystallise a vast quantity of complex data, expert knowledge and human behaviours that are available publicly and within organisations, in order replicate components of the real world. The comprehensive models that can be generated with behavioural simulation, enable greater insight into a systems functioning, and convincing predictions. Decision makers are thus able to test many options and perform what-if scenarios in order to assess and optimise their strategic plans.

The underlying technology used in behavioural simulations is artificial intelligence, or namely agent-based modelling. Agents are individual software programs that are based on the human cognitive model and are thus able to model human behaviours. Each agent can model (mimic) a component of the real world, such as people, cars, households, organisations or infrastructure. The dynamic nature of the real world components, including environmental, political, economic and social behaviours, can be captured within the software agent. As many as millions of components can be modelled, enabling a virtual replica of a complete city to be created.

An example where BBI has been successfully used is in the modelling and analysis of water pricing in an entire city [1]. Over half a million households and over 400 demographic types were modelled, including household purchasing behaviour for water. The analysis enabled the identification of a more effective and fairer price¹ than that which the Government was proposing to implement, while simultaneously increasing total Government revenue. Detailed models of individual households² provided convincing predictions on consumer behaviours. The ability to study the many types of demographic households allowed a water price that targeted the correct demographic.

Conclusion

BI support systems are becoming a vital analytical tool for strategic planners and forecasters to reduce risk, cost, time, and improve decisions. Traditional BI tools are limited to static information, historical data and observations of what people demonstrate. BBI is the next generation of predictive analysis, supplementing these traditional BI approaches by providing decision makers information not just on what individuals are doing, but why they are doing it. Greater insight is instrumental in understanding whether a new product, service, franchise or infrastructure will succeed or fail.

References

[1] Perugini, D., Perugini, M., 2008, “*A Fairer Water Pricing Policy for Adelaide Residents*”. Public Report, Intelligent Software Development, Available online: www.intelligentsoftware.com.au.

¹ The pricing policy reduced the financial and water saving burden on low income households and low water users.

² E.g. number and type of people in the household, and average household income.