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INDUSTRY DEVELOPMENTS AND MODELS

Predictive Analytics and ROI: Lessons from IDC's Financial Impact Study

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IDC OPINION

A variety of technologies form the basis for business intelligence tools and analytic applications. Predictive analytics utilize mathematically oriented techniques (such as neural networks, rule induction, and clustering) to discover relationships in data and make predictions. The category of business intelligence tools includes predictive analytics (in the form of data mining tools) as well as tools for query, reporting, and multidimensional analysis. Analytic applications can incorporate either or both sets of technologies — predictive and nonpredictive. In *The Financial Impact of Business Analytics: Key Findings* (IDC #28689, January 2003), IDC examined analytics projects at more than 40 sites across North America and Europe. There were significant differences in the pattern of costs and benefits for projects that incorporated predictive analytics versus those that did not. IDC's findings include:

- Both predictive and nonpredictive projects yielded high median ROI, 145% and 89%, respectively.
- The major benefits of business analytics projects that employed predictive analytics centered on business process enhancement, especially improving the quality of operational decisions.
- Predictive analytics projects required higher investment levels and yielded significantly higher overall returns over five years, implying that these projects tackled problems of greater scope and complexity.

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IN THIS STUDY

This study extends the analysis of IDC's major study *The Financial Impact of Business Analytics: Key Findings* (IDC #28689, January 2003). It seeks to establish whether there is a comparative business advantage to using predictive analytics tools and technologies within a business analytics project.

METHODOLOGY

For the overall study *The Financial Impact of Business Analytics: Key Findings* (IDC #28689, January 2003), 43 North American and European companies were chosen to represent a fair selection of business analytics customer sites. Senior IDC consultants conducted interviews with IS managers, business managers, department managers, and system users. IDC made efforts to select companies based on a balanced sample of geographic location, industry, and company size. IDC also made efforts to represent various types of applications within the sample.

In addition, the companies surveyed were required to meet the following criteria:

- Be in production for at least six months with an analytic application that meets the defining criteria
- Have pre- and postimplementation information to aid a cost/benefit analysis
- Be willing to participate in the study and reveal confidential cost and benefit information to IDC

For this study, 40 projects from *The Financial Impact of Business Analytics: Key Findings* (IDC #28689, January 2003) were classified as either predictive or nonpredictive. Of this group, 15 projects were classified as predictive and 25 projects were classified as nonpredictive. (The study included three other cases for which there was insufficient information to classify the project or analyze it along the dimensions examined in this study.) Predictive and nonpredictive business analytics projects are defined as follows:

- **Predictive business analytics projects.** These projects utilized business intelligence tools that IDC classifies as "data mining" (i.e., tools that incorporate technologies that apply mathematically oriented techniques such as neural networks, rule induction, and clustering to discover relationships in the data and make predictions). Alternatively, predictive projects implemented packaged analytic applications that incorporated predictive technologies, such as a fraud detection application.
- **Nonpredictive business analytics projects.** These projects utilized business intelligence tools that IDC classifies as "end-user query, reporting, and analysis." Alternatively, nonpredictive projects implemented packaged data warehouses or analytic applications that incorporated these technologies.

Projects that incorporated both predictive and nonpredictive technologies were classified as "predictive." In fact, business intelligence tools for query, reporting, and analysis were frequently used in conjunction with predictive analytics technologies.

SITUATION OVERVIEW

Companies are scrutinizing IT investments with greater rigor, ensuring that the cost is justified over competing alternatives for scarce funds. Analytics projects must be justified by measuring the contribution they make to the business in the form of reduced costs or added revenue generation.

The Financial Impact of Business Analytics: Key Findings (IDC #28689, January 2003) demonstrated that analytics projects can make such a difference. The median ROI for all projects was 112% across organizations of a wide of range of sizes, industries, geographies, and applications.

The choice of technology is only one element in ensuring a project's success. Best practices were identified from an organizational perspective including senior executive sponsorship, end users, and IT working together to define requirements and a commitment to train knowledge workers on new skills needed in order to change decision-making processes to make use of the information and analytical models. Without these practices impacting people and processes, a project's chance of success are slim. Assuming these practices are in place, this study explores the differences in the nature of goals and achievements of projects that employed predictive analytics versus those that did not.

DOES PREDICTIVE ANALYTICS MAKE A DIFFERENCE ON A PROJECT?

The median ROI for the projects that incorporated predictive technologies was 145%, compared with a median ROI of 89% for those projects that did not. Both figures are impressive, so this difference should not determine a decision on the choice of technology.

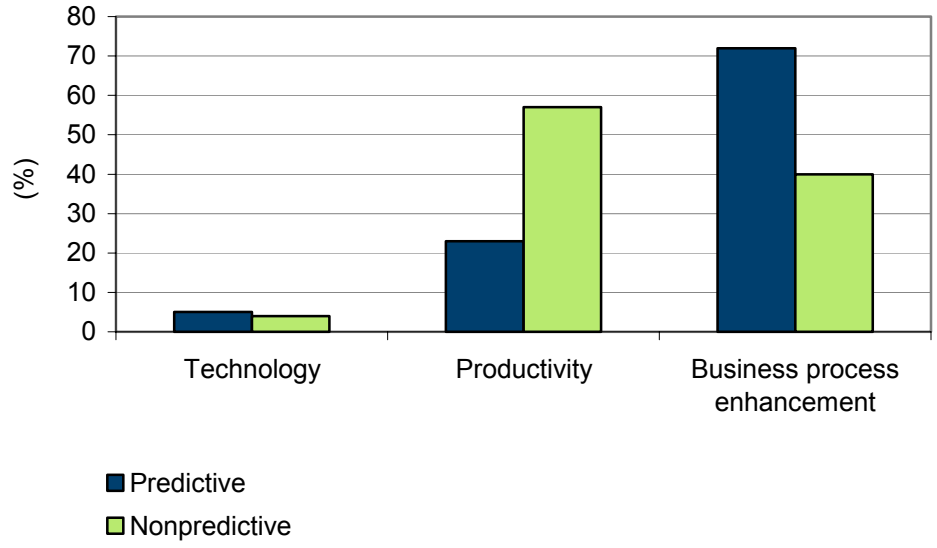
What is more meaningful are the types of benefits that the projects yielded. Overall, IDC measured three different types of benefits: technology, productivity, and business process enhancement, which are defined as follows:

- **Technology.** The amount of money saved on technology or technology costs avoided by introducing the analytic solution, such as diverting data processing to a more cost-effective system
- **Productivity.** Efficiency savings due to the reduced amount of time and effort required for particular tasks
- **Business process enhancement.** All identifiable annual savings that were realized due to changes in business process supported by the analytic application

Across all of the projects, the benefits attributable to technology accounted for only an average of 4% of the total return. In other words, 96% of the benefits overall were in the productivity and business process enhancement categories. Figure 1 shows the comparative benefits for the predictive and nonpredictive cases according to these categories.

FIGURE 1

COMPARATIVE BENEFITS: PREDICTIVE PROJECTS VERSUS NONPREDICTIVE PROJECTS



Source: IDC, 2003

The main benefits in predictive projects were attributable to business process enhancement. For example, better analytical models for fraud detection resulted in improved operational decisions that resulted in bottom-line savings. Or precise segmentation by customer profitability led to sales strategies on pricing and product mix.

On the other hand, the main benefits in the nonpredictive cases were due to productivity improvements. For example, more organized means of gathering financial data resulted in less time needed by financial professionals for producing required reports for budgeting, revenue recognition, or financial consolidation.

Both types of benefits are important. Yet there is a limit to the efficiency gains due to *productivity* in bringing information together. The data-gathering process can be streamlined only so far before diminishing returns set in.

But this is not the case with *business process enhancement*. The virtuous cycle of feedback and correction can be continually improved. Models can be made more accurate in predicting the impact of policy changes. Knowledge workers can improve their judgment as they learn to incorporate relevant feedback in making better decisions.

The following characteristics were especially prominent in the group of cases in which predictive analytics was employed:

- **Repeatable, operational decisions.** A key to business process enhancement is to focus on a specific process in which the same type of decision is made over and over again. Paying attention to improving these repeatable decisions pays dividends. Examples from the study include:
  - Deciding whether or not to extend credit to a customer

- Finding leading indicators or predictors of fraud and taking action at several banks in the study
- Identifying early warning of quality issues and correcting for them on an ongoing basis in a semiconductor manufacturing process

- **Precise customer segmentation.** This was a factor in many of the cases, including the fraud and credit cases noted. But it is also a key in shifts from mass marketing of products to determining a product or group of products to recommend to individual customers, based on an affinity model. Companies went from a limited number of large-scale campaigns to more frequent campaigns at particular customers or segments. This practice was specialized to companies representing diverse vertical industries, from an online retailer that used the information to make real-time purchase recommendations to a major entertainment and gaming company that related specific customer and slot machine usage to drive targeted activities.

- **Responding to events.** Several cases featured alerting or notification when there were changes to key trends that were being monitored. This triggered corrective actions. One of the best examples was a computer manufacturer seeking advance warning of product quality and customer satisfaction issues. The manufacturer was able to communicate with customers much more quickly and take action to improve the production issues that were the basis for the dissatisfaction.

The payback in these cases was due to a combination of the above factors. The companies identified a type of repeatable decision that could be optimized, developed very precise analysis and segmentation to predict likely outcomes, and took action on an ongoing and event-based fashion. Adaptive organizations were able to continually translate new learning into operational improvements.

PREDICTIVE ANALYTICS ACROSS THE MAJOR TYPES OF ANALYTIC APPLICATIONS

Each of the 40 projects involved the implementation of one or more analytic applications. Some were *built* from the underlying business intelligence tools, while some were *bought* (i.e., packaged analytic applications) and then customized to fit specific needs. Whether built or bought, the applications were classified in one of the following categories according to the business process supported:

- **Financial/business performance management (BPM).** These projects sought to increase efficiency in financial processes, such as budgeting.

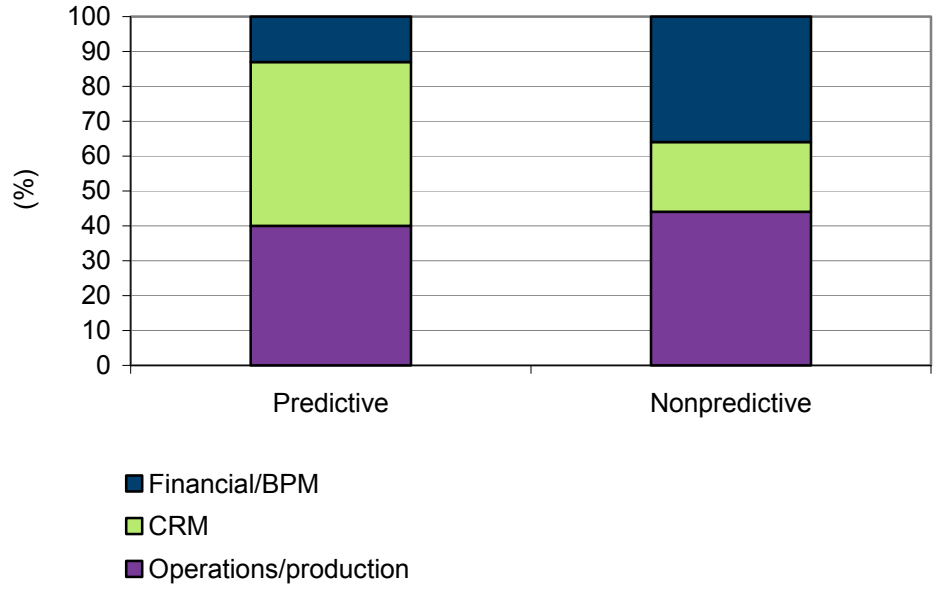
- **Customer relationship management (CRM).** These projects sought to enhance customer support and marketing initiatives, decreasing costs and increasing revenue.

- **Operations/production.** These projects sought to optimize the production and delivery of a business' products and services.

Each project was classified in one of the three application groups. Figure 2 shows the distribution of applications for the predictive and nonpredictive projects.

FIGURE 2

ANALYTIC APPLICATIONS: PREDICTIVE PROJECTS VERSUS NONPREDICTIVE PROJECTS



Source: IDC, 2003

Following is an examination of the distribution of cases in greater detail:

- **Operations/production.** Both the predictive and nonpredictive projects had significant representation for operations/production. The most important type of project in this category that employed predictive analytics was fraud detection at a bank or credit card company. For nonpredictive projects, examples featured demand planning and manufacturing quality analysis.

- **Customer relationship management.** Most of the CRM projects in the study featured predictive analytics. Examples included marketing analysis and real-time recommendations in the Web-based or store-based retail environments. Data mining is well suited to customer analytical applications. It's not just that there are many customer records (whether point of sale for retail or call detail for telco) — but the records are very "wide." In other words, there are many attributes available on each customer, and mathematical techniques help to identify which attributes are the best predictors of customer behavior.

- **Financial/BPM.** Most of the financial/BPM projects in the study emphasized reporting and multidimensional analysis. This is traditional for financial planning applications, a major category in this group. Other projects centered around greater efficiency in producing and distributing reports. There is room for greater deployment of predictive analytics in this category, especially for BPM. The search for the leading indicators of financial performance could lead to an intensive examination of large and diverse data sets. With the requirement for early warning of material changes to a company's financial position (à la Sarbanes-Oxley), the use of predictive analytics in this domain is likely to increase.

OVERALL INVESTMENT AND OVERALL RETURN/NET PRESENT VALUE

The most striking difference between projects that did or did not employ predictive analytics was the difference in scope. Figure 3 compares the two groups of projects on the following three dimensions:

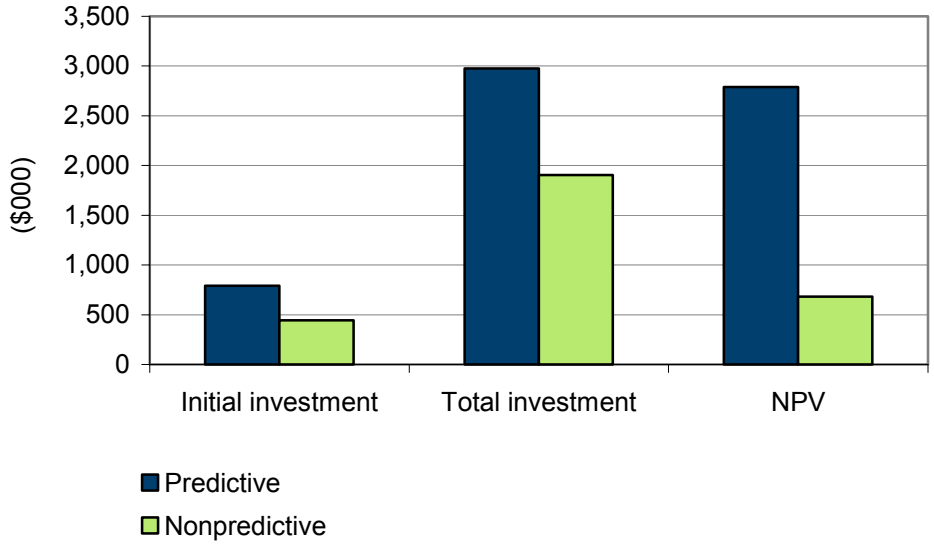
- **Initial investment.** The incremental costs to the organization incurred due to the decision to implement a business analytics solution, up to the point of implementation
- **Total investment.** The total five-year costs, including internal and external services, software license, and maintenance
- **Total return (net present value [NPV]).** Similar to the income statement for the project, calculated by subtracting the costs (including taxes and depreciation) from the revenue to generate a net financial return or loss for the project (The calculation assumes a 15% annual discount rate to account for the time value of money.)

Figure 3 shows the difference when the *median* results were compared for overall investment and overall return between the predictive and nonpredictive projects.

There was a significantly higher cost to projects that employed predictive analytics due to greater scope and complexity, but there was also a greater overall return. The scope of major CRM projects is the most prominent example. From an IT perspective, these projects require the integration of data from diverse customer-facing systems. From a business perspective, these projects can require the linkage of processes across business functions — a significant organizational challenge.

FIGURE 3

INVESTMENT AND OVERALL RETURN: PREDICTIVE PROJECTS VERSUS NONPREDICTIVE PROJECTS



Source: IDC, 2003

FUTURE OUTLOOK

Predictive analytics projects represented three-eighths of the cases in the study, while projects that did not employ predictive technologies represented five-eighths of the cases. But in the overall marketplace, the ratio is far more skewed in favor of query, reporting, and analysis tools versus data mining tools. The share of data mining tools within the BI market is increasing, but in 2002 this share stood at only 13.2%. IDC forecasts the share of such predictive analytics tools in 2007 to grow to 15.5% of the BI tools market. There are several reasons for this low penetration, including the following:

- The use of predictive analytics in projects requires specialists who understand both the specific mathematical techniques and the business problem to be able to apply the appropriate technique. As packaged analytic applications incorporate the experience of custom projects in specialized domains, this type of project will become accessible to more organizations.

  The number of users of predictive analytics tools within a project is small — especially the number of users who build the analytical models. A greater number of users apply the models and may use reports to direct attention to particular results. But the results of the modeling can be incorporated as rules within a transactional application. This is the way in which predictive analytics can reach a large number of users. The call center operator or a telemarketer would make a new offer, unaware that the recommendation came as a result of the "embedded analytics." They would only observe that their system is responding differently. Such applications ultimately would not even be sold as "analytic applications" but as "enhanced operational systems with analytics inside." The potential is to reach workers across all types of business operations in all industries.

ESSENTIAL GUIDANCE

The results of this examination of business analytics projects suggest the following:

- The difference in median ROI across the two groups of cases should not imply that predictive analytics is appropriate for all projects. The choice of technology depends on the scope and complexity of the problem to be addressed and the availability of skilled personnel to apply the technology. The scarcity of such personnel implies an opportunity for packaging this expertise in analytic applications.

- The benefits of predictive analytics projects centered on business process enhancement, using information to drive more optimal decisions. It's best to tackle processes where there are repeatable, operational decisions that over time have a major impact on bottom-line results.

- Predictive analytics projects required higher investment levels but yielded significantly higher five-year returns. In other words, organizations were tackling problems of broader scope and complexity. Such projects are more challenging but have been demonstrated to be highly rewarding.

LEARN MORE

RELATED RESEARCH

- *Worldwide Total Analytic Applications Software Competitive Analysis, 2003: 2002 Shares and Current Outlook* (IDC #29886, August 2003)
- *Worldwide Business Intelligence Forecast and Analysis, 2003–2007* (IDC #29519, June 2003)
- *The Financial Impact of Business Analytics: Key Findings* (IDC #28689, January 2003)

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