The availability and use of competitive and business intelligence in South African business organisations

P. Venter & D. Tustin

ABSTRACT

Business intelligence (BI) plays a critical role in providing actionable intelligence to enable good business decision-making. International research shows clear evidence of the benefits of implementing sound BI practices. However, within a South African business context, an understanding of the practice, impact and benefits of BI is only partly addressed by existing research. Consequently, this article presents the most salient findings of a recent BI study, which was one of the few such studies that have been conducted in South Africa in the 21st century. Although the discussion reflects fairly high general satisfaction levels with BI among South African businesses, some problems related especially to external BI dimensions are highlighted. An equally important and major concern raised by the article is the apparent lack of companies capitalising on BI opportunities and coordinating BI functions effectively. Of concern at the general management level, in particular, are the low satisfaction levels with BI quality, as well as various aspects of BI collection, analysis and dissemination. Despite the fact that businesses use BI functions and planning support software, the survey findings reveal insufficient investment in sophisticated BI analysis tools.

Key words: business intelligence, competitive intelligence, marketing intelligence, business intelligence systems

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Background

It would seem that there is no commonly accepted term for referring to internal and external intelligence required for business decision-making. Market (or marketing) intelligence, competitive intelligence, business intelligence and other terms are all used at various times to describe more or less the same concept. Hannula and Pirttimäki (2003: 593) define business intelligence (BI) broadly as "organized and systematic processes which are used to acquire, analyse and disseminate information significant to their business activities". This definition is similar to definitions commonly used for competitive intelligence (CI) (for example, Viviers, Saayman, Muller & Calof 2002: 28; Wright, Pickton & Callow 2002: 350–351), with a focus on the intelligence processes. Definitions used by Herschel and Jones (2005: 45), who adopted the Gartner definition of BI as a "set of technologies that gather and analyse data to improve decision-making", and Harrington (in Nemati 2005: 66), who describes BI as "a suite of tools and technologies to enhance the decision-making process by transforming data into valuable and actionable knowledge to gain a competitive advantage" have a stronger focus on the technology. Negash (2004: 178) suggests that BI systems combine data-gathering, data storage and knowledge management with analytical tools to present complex internal and competitive information to planners and decision-makers. Several characteristics of BI, in the context of this article, emerge from these definitions:

- BI refers to both internal and external information.
- It relates to a process of adding value to information: gathering, analysis and dissemination are all value-adding activities in the information cycle.
- The technologies used in the process of gathering, analysing and disseminating information are an integral part of the underlying processes.
- The goal of BI is to support management decision-making.

Understanding why BI is important to organisations becomes clear when the concept of market orientation is examined. The marketing concept is a commonly accepted notion, namely that if you satisfy your customers' needs, you will attain organisational objectives. The marketing concept manifests in organisations as market orientation (Shoham, Rose & Kropp 2005: 436, citing Deng & Dart 1994; Walker, Mullins, Boyd & Larréché 2006: 12–13). Shoham et al. (2005: 436) describe market orientation as the firm's ability to anticipate, react to and capitalise on environmental changes, leading to superior performance. BI therefore plays a critical role in providing actionable intelligence to enhance market orientation.

Various studies have been conducted over time to establish the impact of market orientation on performance. For example Kara, Spillan and DeShields (2005) found a positive correlation between market orientation and the performance of small service businesses in the USA, while Aldas-Manzano, Küster and Vila (2005) found a positive relationship between market orientation and certain aspects of innovation in Spanish firms. A meta-analysis conducted by Shoham et al. (2005) concludes that market orientation (and by implication, BI) positively affects organisational performance and behaviour.

Searches of online databases and journals suggest that most of the South African research published since 2000 focused on the South African CI environment and practices in various contexts (for example Begg & Du Toit 2007; Brummer, Badenhorst & Neuland 2006; De Pelsmacker et al. 2005; Viviers, Saayman & Muller 2005; Viviers & Muller 2004, 2005; Du Toit 2003; Viviers, Muller & Du Toit 2005; Viviers, Saayman & Muller 2002; Viviers, Saayman, Muller & Calof 2002). Sewlal (2004) investigated the effectiveness of the web as a CI tool. These studies generally focused on the competitive dimension.

With regard to the application of BI technology, O'Brien and Kok (2006) reported on the potential of BI to produce higher profits in the South African telecommunications industry, while other research focused mainly on specific subsets or applications of BI, for example online analytical processing (OLAP) (Hart & Porter 2004), data marts (Ponelis & Britz 2003) and data mining (Hart 2006; Hart, Davies, Barker-Goldie & Theron 2002). Venter (2005) explored the reasons for success and failure of BI systems, and Conradie and Kruger (2006) investigated the issue of information quality in BI.

Against this background, a broad research investigation of how BI is practised in South Africa is timely. More specifically, this paper examines the BI needs, practices and usage in South African business organisations.

Purpose of the research

The purpose of the research was to conduct a broad overview of the BI practices and preferences of decision-makers in South African organisations. More specifically, the study focused on the following research objectives:

- To determine BI requirements and availability
- To assess BI practices in business organisations over a range of industry sectors and managerial functions
- To determine the usage of BI and CI technologies and methods

- To determine the overall satisfaction with BI and the contribution BI makes to decision-making in the organisation.

Literature review

Many organisations are faced with unprecedented growth in the sheer amount of internal and external data available to them. In many instances, organisations create information systems to deal with business requirements as these develop, often leading to many disparate systems. As a result, many organisations end up with voluminous data about their business but relatively little business knowledge (Harrington, in Nemati 2005: 66). This situation is a direct result of the lack of BI. In essence, BI provides a means for extracting information from the clutter that would be useful for reporting and decision-making purposes. Not surprisingly, the information technology (IT) industry coined the phrase 'business intelligence', popularised by Howard Dresner, a Gartner Research Fellow (*circa* 1989) to describe the concepts and methodologies designed to improve decision-making in business through the use of facts and fact-based systems (Chou, Tripuramallu & Chou 2005: 344).

While the notion of BI has always been inclusive of external sources of information (for example, competitive information) and unstructured information, much of the focus during the early years has been on integrating and extracting structured internal data, for example, data from customer relationship management (CRM), point-of-sale or billing systems. It could therefore be argued that BI has not been entirely successful in integrating internal and external data (see, for example, Cody, Kreulen, Krishna & Spangler 2002).

Components of BI

Figure 1 presents a schematic overview depicting the main components of BI. The components of BI are discussed in more detail in the following section, after which information systems (IS) support for BI is discussed.

It is clear from Figure 1 that BI is obtained in the form of structured and unstructured data from both internal and external sources. Internal sources typically comprise legacy systems (a term commonly used to describe historical systems that are still used because the organisation would not, or cannot, redesign them) as well as various operational systems, such as point-of-sale systems, online transaction processing (OLTP) systems and customer relationship management systems. Most internal data are structured or semi-structured.

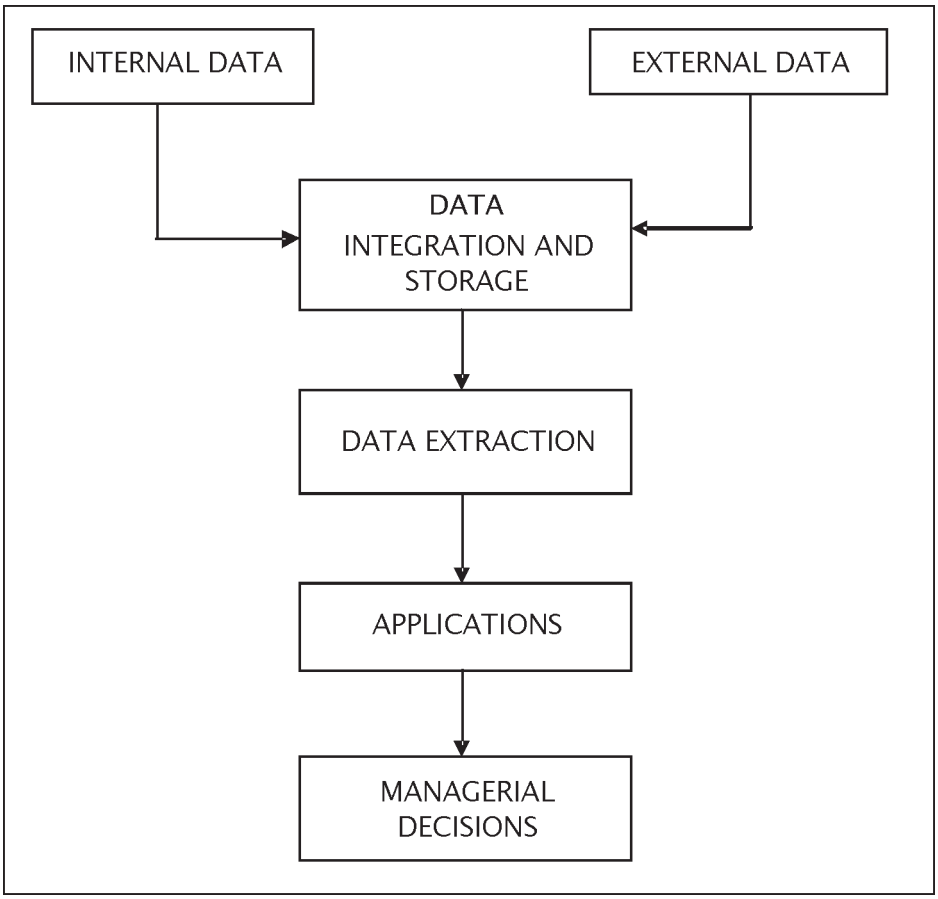


Figure 1: Components of business intelligence

External intelligence is typically obtained through competitive intelligence or market intelligence processes that produce mostly unstructured information about competitors and customers from primary and secondary sources. In addition, macro-environmental data from environmental scanning processes could also be an input into BI systems. Research conducted by Lackman, Saban and Lanasa (2000) suggests that the most useful primary sources of external intelligence are customers, manufacturers, dealers and distributors, research and development, the sales force, physical evidence (for example, a product or prototype) and market research projects. Several studies have indicated that members of staff are the most critical primary source of intelligence (for example, Wright & Calof 2006).

The data and information obtained internally and externally from various disparate sources are usually stored centrally and made available in a format that

allows easy extraction of data. This process could make use of technologies such as intranets, data warehouses or data marts (subsets of data with a specific functional focus). Decision-makers or their 'agents' (which could be a BI analyst) can extract data from the central data repositories in order to support decision-making. This can be done either as reports that are created and disseminated regularly without a specific request (for example, a weekly or monthly report with detailed sales for each of the distribution channels) or as an ad hoc requirement, in response to which the data repositories can be queried, and a once-off report can be compiled.

The BI process

Viviers, Saayman, Muller and Calof (2002) suggest that CI is above all a systematic process of planning, collection, analysis, communication and process management. The same process can be applied to BI. Against this background, the most important process components include the following:

- *planning,* which suggests that the BI process is not haphazard, but rather focuses on those issues that are of most importance to the organisation's management;
- *collection* of BI from various internal and external sources and in line with the priorities set during the planning phase;
- *analysis,* which is generally accepted as the phase where true intelligence is created; here, 'raw' information is converted into actionable intelligence on which strategic and tactical decisions can be based; and
- *communication,* which is the phase during which the actionable intelligence is disseminated to decision-makers to act.

One of the key challenges for CI is to create the *process* and *structures* to enable the organisation to execute these phases as effectively and efficiently as possible. Walker et al. (2006: 13) suggest that the following are examples of such procedures and structures:

- more detailed environmental scanning;
- continuous, real-time information systems;
- obtaining feedback from, and doing joint planning with, key suppliers and customers;
- decentralising strategic decision-making;
- encouraging entrepreneurial thinking among lower levels of management; and
- using interfunctional management teams to analyse issues and develop strategic initiatives outside the formal planning processes.

BI and organisational culture

It is evident from the previous discussion that there is a strong need for organisational awareness and market orientation in the organisation to facilitate the BI process as effectively as possible. Meehan (1999) concludes that virtually all companies are convinced of the importance of market intelligence and are indeed spending much time and effort on the rhetoric of 'being customer focused'. Most companies are also generating considerable market intelligence. However, a true market orientation requires more than rhetoric and the mere existence of information. In this regard, Meehan (1999) suggests the following as important elements in becoming truly responsive and creating continuous learning about the market (in other words, being truly market oriented):

- close customer contact to the extent that customer needs dominate the thinking of all employees;
- measurement and reward systems that are linked to customer satisfaction; and
- leadership (in other words, top management support and commitment).

In summary, the foregoing discussions reflect an organisational culture that is supportive of customer focus and a learning organisation that shares information and learning across the organisation. Other guidelines to becoming more market oriented (in other words, developing a culture that is conducive to BI) are provided by Hayden (1993: 33–46), Slater and Narver (1994: 25–27), Slater and Narver (1995: 71) and Herschel and Jones (2005). These guidelines include the following:

- Educate and gain the commitment of top management to a culture of market orientation. This would also ensure buy-in throughout the organisation. The views that CEOs hold and how they reward new ways of learning or using BI can be crucial to the success of a BI programme.
- Focus on a strong, open culture in which BI and knowledge are exchanged and such exchanges are rewarded. In such a culture, trust is crucial. As Hayden (1993: 37) points out, a strong, open culture leads to relatively uniform attitudes and behaviour with an external focus. In this regard, some practical guidelines for establishing such a culture include the following:
  - — understanding the philosophy of marketing and internal marketing throughout the organisation;
  - — using marketing research (as opposed to simply generating it);
  - — recognising the value of implementing market segmentation for the organisation;

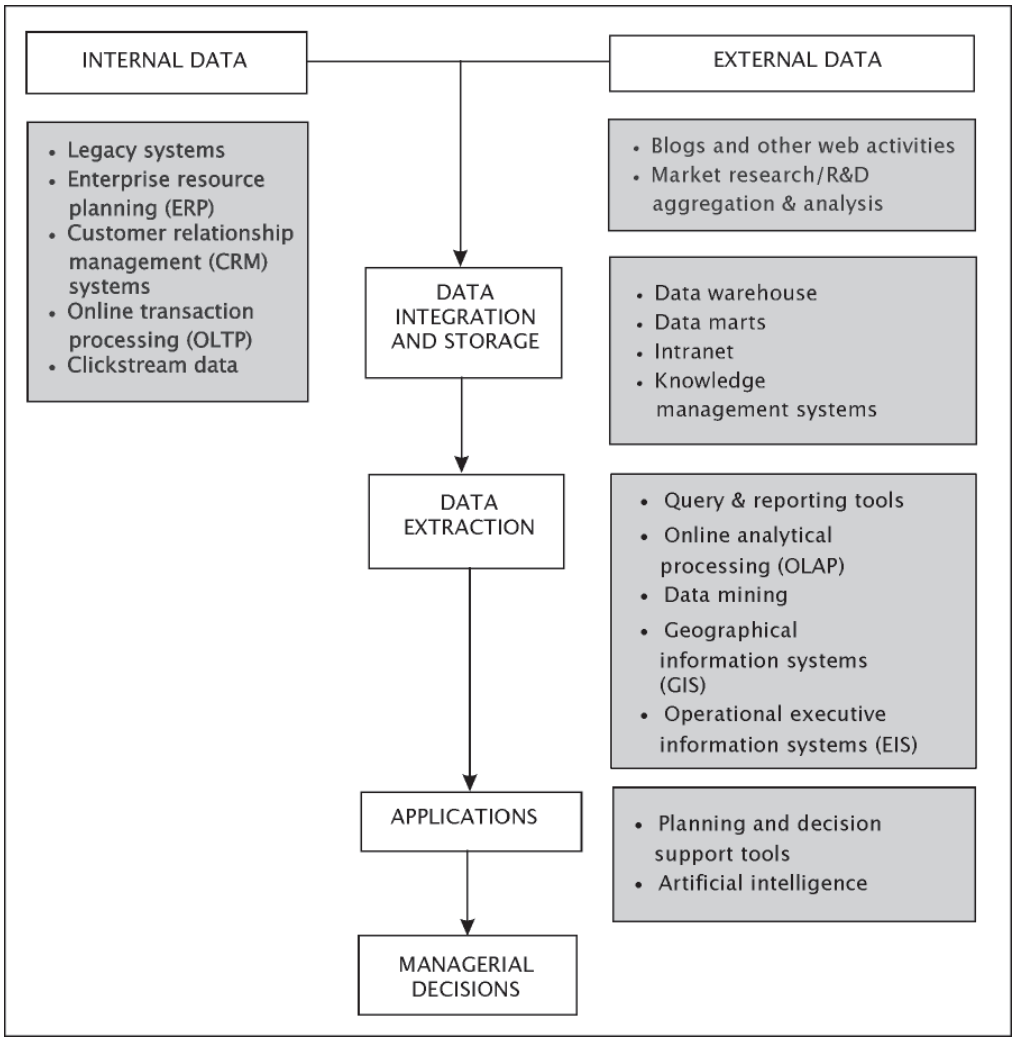
— working with suppliers to incorporate customer benefits into product and service specifications;
— making customer benefits part of contractual deliverables alongside financial control and activity (in other words, customer benefits provided need to be measurable);
— empowering all levels of consumers by providing them with a way to communicate with the organisation;
— selecting and rewarding staff on measurable, market orientation-based criteria;
— taking a marketing approach to strategic planning by making the market and customer focus the driving force of strategic planning;
— devolving management for service provision by bringing the managers closer to the customers – this may imply a flattening of traditional service provision structures; and
— investing in public relations for key stakeholders.

Because of its external focus and interactive nature, marketing in the organisation plays a vital role in creating an organisation that thrives on generative learning (in other words, the willingness to question long-held assumptions about its own beliefs). This in turn creates the most sustainable platform for organisational survival. In this, the potential role of market orientation as a philosophy based on learning, and the sharing of BI should be obvious.

BI technologies

Although a detailed technical discussion of BI technologies falls outside of the scope of this article, the following section serves to identify and put into context some commonly accepted technologies that support BI. Information technology (IT) in the form of hardware and especially software plays a key role in ensuring that BI is gathered, stored, analysed and presented in a simple, useful manner. The software promotes business performance management and assists in making more informed business decisions by making accurate, current and relevant information available as required by managers. Figure 2 outlines the most common IS support elements for BI.

A brief explanation of the most pertinent technologies reflected in Figure 2 is presented in the next sections.



Sources: Chou et al. (2005: 346), Dearstyne (2006), Metaxiotis, Ergazakis, Samoulidis & Psarras (2003); Daniel, Wilson & McDonald (2003)

Figure 2: Information systems support for business intelligence

Information systems and sources of internal data

Information systems and sources of internal data include the following:

- *Legacy systems* are systems that are historical and possibly 'outdated', but for some reason are still being used by the organisation (for example, the system may be too costly to redesign).

- *Enterprise resource planning (ERP)* systems are operational systems that have been developed over years to 'run a business' and generate operational information The focus of ERP is typically supply chain activities (Daniel et al. 2003: 839).
- *Customer relationship management (CRM)* systems are regarded as the marketing equivalent of ERP systems and serve to integrate the customer-facing functions such as marketing, sales and customer service (Daniel et al. 2003: 839).
- *Online transaction processing (OLTP)* refers to those systems that facilitate and manage transaction-oriented applications, for example, a bank's automated teller machines (ATMs).
- *Clickstream data* is the record of an internet user's 'virtual trail' that is left while surfing the Internet. It includes details of activity on the internet, for example, every website and every page of every website visited. These data are potentially valuable to internet marketers and advertisers (www.webopedia.com).

Information systems and sources of external data

Both Dearstyne (2006) and Daniel et al. (2003) argue that *web activities* could be better utilised for BI purposes. Dearstyne (2006) argues that weblogs (blogs) are company records and should be properly managed as such, making these a potential input for BI. Daniel et al. (2003) suggest that the internet is a potential source of new ideas, for example, through internet-based focus groups or other discussion forums. Daniel et al. (2003) further suggest that the *aggregation and analysis of market research and research and development projects* and findings are further areas that require IS support.

Integration and storage of data

Some businesses use *data warehouses* because they are a logical collection of information gathered from various operational databases for the purpose of creating business intelligence. The purpose of a data warehouse is to provide rich, timely, clean and well-structured information to BI analysis tools (Chou et al. 2005: 344). Similarly, *data marts* are small-scale data warehouses designed to meet a specific function or department's BI needs. (Chou et al. 2005: 347). A further tool is an *intranet,* which is a version of the internet confined to a specific organisation and is used to aggregate and disseminate information of interest to the members of the organisation. Finally, *knowledge management* (KM*)* is also widely implemented. KM involves "a systematic process of finding, selecting, organizing, distilling and presenting information in a way that improves an employee's comprehension in a specific area of interest. KM helps an organisation to gain insight and understanding

from its own experience. Specific KM activities help focus the organisation on acquiring, storing and utilizing knowledge for such things as problem solving, dynamic learning, strategic planning and decision making" (Herschel & Jones 2005: 45).

Data extraction

Query and reporting tools are the BI tools used to extract targeted information either on an ad hoc basis (query) or as regular reports in a specific predetermined format. In turn, *online analytical processing (OLAP)* is characterised by the fast, dynamic and multidimensional analysis of aggregate data (for example, from a data warehouse), and the ability to perform complex modelling with the extracted data to support managerial decision-making (Hart & Porter 2004: 47). Hart and Porter (2004) suggest that OLAP conforms to five characteristics:

- fast, referring to OLAP's goal of delivering user responses in five seconds or less;
- analysis, meaning the system's ability to handle any relevant business or statistical analysis for a given user;
- shared, meaning the ability of the system to enable concurrent shared use;
- multidimensionalilty, referring to the provision of a multidimensional, conceptual data view and supporting multiple data hierarchies; and
- information, meaning all data and calculated information required by the user.

A further useful tool is *data mining*, which is an analytical process designed to explore data (usually large amounts of data that are typically business or market related) in search of consistent patterns and/or systematic relationships between variables, and then to validate the findings by applying the detected patterns to new subsets of data. Hart, Davies, Barker-Goldie and Theron (2002: 41) cite the following definition of data-mining by Bradley: "an information extraction activity whose goal it is to discover hidden facts contained in databases, using a combination of machine learning, statistical analysis, modeling techniques and database technology, which infers rules that allow the prediction of future results". The ultimate goal of data-mining is prediction.

Hess, Rubin and West (2004) also advocate the use of *geographical information systems (GIS)* as a decision-support system for marketing. By extension, GIS is also a useful BI tool, as Hess et al. find that one of its strengths is its ability to integrate information from disparate sources and span multiple decision domains. Finally, *operational executive information systems (OEIS)* refer to ERP data summarised in

the form of charts, tables and reports for the purposes of management (Daniel et al. 2003: 839) and data extraction.

Applications

Planning and decision support tools refer to a variety of tools in several categories that may be used to support the planning and decision-making processes in organisations. This may include, for example, simulation tools and planning templates (Daniel et al. 2003: 839). Furthermore, *artificial intelligence (AI)* is a category of technology that simulates human thinking patterns. Metaxiotis et al. (2003) identify three main categories of application of AI, namely:

- Expert systems are computer systems with a well-organised body of knowledge that emulates expert human decision-making within an established set of rules.
- Artificial neural networks (ANN) simulate the working of the human brain, using a large number of interconnected 'neurons' to allow a computer system to 'learn' by example. One drawback of ANN is that it can only use data that are numerically presented.
- Intelligent agents are computer systems in some specified environment that are able to take autonomous action in order to meet design objectives. In the process, agents act autonomously, can reason about themselves and can be mobile.

The theoretical foundation presented in the literature overview provided a general overview of BI and BI systems. Findings resulting from this exploratory phase motivated the study to explore the means in which BI is understood and practised by South African organisations. The outcome of the research findings and methodology used to collect data from a sample of 222 medium to large organisations in South African are discussed in the following sections.

Research methodology

The research study was mainly exploratory and descriptive in nature, with the objective of providing an overview of the state of BI usage and needs in South Africa. The study utilised a quantitative survey methodology. Questionnaires were administered by personal interview. The first step was to design the questionnaire, and the following research items were included:

- *Company and respondent particulars* (for example, the size of the business and core business activity).

- *BI requirements and availability*. This section focused on a range of business intelligence requirements and needs. This included information types from the macro-environment, the market environment and internal environment. Firstly, the importance of 12 business intelligence requirements was measured. Concomitantly, the availability of these BI items to decision-makers was recorded. Finally, the overall satisfaction with the quality of BI was measured by the research model.
- *BI practices and processes.* This section contained 46 items measured on a five-point Likert scale, with 1 representing 'totally disagree' and 5 representing 'totally agree'. This section was used to measure BI practices and processes within the organisation.
- *BI tools and functions.* Various BI tools and functions were listed, and respondents had to indicate which were used in their organisations.
- *Organisational functions.* Finally, a number of organisational functions and the extent to which these functions benefit from BI were investigated in the research model.

The next step was to identify a sampling frame and to draw a sample. In the absence of a single comprehensive sampling frame of business intelligence users, a list of business organisations with the potential for business intelligence use was constructed with the assistance of the University of South Africa's Bureau of Market Research (BMR) and used for interviewing purposes. Personal interviews were conducted with respondents (business decision-makers) from various business areas, targeting businesses with more than 100 full-time employees. The main reason for excluding smaller businesses was that BI is generally more formal and organised in larger organisations. A total of 222 usable responses (from business intelligence users) were obtained from 155 sample units (businesses), with a maximum response of two business intelligence users (from different departments) per business. Participating businesses were mainly based in Gauteng (65.8%), while 14.0% were located in the Western Cape and 13.5% in KwaZulu-Natal. Respondents represented a range of management levels and business functions (as will be discussed).

To support comparative analysis, the research model design included four different research variables, which are discussed as follows:

- It is commonly accepted in management theory that the designation of the respondent plays a role in his/her information needs and usage. For example, top managers are theoretically more externally focused (and subsequently have a greater need for external information) than junior managers. In this research study, the comparison was mainly between top management, namely directors and senior managers, who comprised 51.8% of the sample, and middle managers

(37.4%). The remaining 10.8% of the sample (junior managers and functional specialists) were excluded from this analysis.

- The size of the business could also have an impact on the respondent's BI needs and practices. Larger businesses generally have more formalised BI processes and practices than smaller organisations. In this analysis, businesses with between 100 and 150 employees (31.1%), 101 to 350 employees (18.5%), 351 to 100 employees (28.4%) and more than 1 000 employees (22.1%) were compared.
- The business or functional area also determines the needs for BI and the way in which it is used. For example, externally focused functions such as sales and marketing should theoretically have a greater need for external information than more inward-looking functions such as operations. For this research study, the following categorisations were used:
  - externally focused functions (including sales, marketing and strategic planning) (43.7% of respondents);
  - internally focused functions (including operations, IT, human resources and finance) (47.4% of respondents); and
  - general management (5.4% of respondents).
- It could also be argued that the industry or sector within which a business operates determines the need for and usage of BI. For example, industries experiencing volatile change may have different BI needs from industries that are 'stable'. In this analysis, the following sectors or industries were compared:
  - primary sector (agriculture and mining) (6.8%);
  - secondary sector (manufacturing, utilities, construction, transport and communication) (55.9%); and
  - tertiary sector (wholesale, retail, hotels and restaurants, financial and real estate services, community and personal services) (36.6%)

The discussion of the research findings in this article is devoted largely to analysis of the research findings according the comparative criteria that have been highlighted and are discussed in the following sections.

Research findings

BI requirements and availability

The research model was designed to measure the importance and availability of various categories of information, as will be outlined:

- macro-environmental information (economic trends, technological trends, social trends and customer demographics and lifestyle);
- market environment information (direct customer feedback, competitor intelligence, sales forecasts, information on regulatory bodies and information on potential business partners); and
- internal information (internal financial information, analysis of sales data and operational performance data).

Using these categories, respondents were asked to rate the importance of each type of information and its availability within the organisation. In addition, respondents were requested to indicate their overall satisfaction with BI within the organisation. The outcome of these research findings are shown in Table 1 using both non-parametric and parametric statistical analysis approaches.

Table 1: Comparison of the importance and availability of information categories

	a. Importance (top-2-box %)	b. Availability (top-2-box %)	c. Gap (a–b)	d. Importance (mean)	e. Availability (mean)	f. Statistical significance of d–e
Direct customer feedback	85.6	73.9	11.7	4.27	3.63	.000
Sales forecasts	83.8	71.6	12.2	4.21	3.67	.003
Operational performance data	83.3	78.8	4.5	4.17	4.02	.153
Competitor intelligence	81.1	63.5	17.6	4.11	3.99	.000
Analysis of sales data	81.1	73.0	8.1	4.09	3.91	.271
Economic trends	75.2	63.5	11.7	3.95	3.65	.000
Internal financial information	75.2	72.1	3.2	3.99	4.01	.264
Technological trends	74.8	64.0	10.8	3.87	3.68	.009
Information on regulatory bodies	69.8	52.7	17.1	3.86	4.09	.000
Customer demographics and lifestyle	69.4	61.3	8.1	3.80	3.45	.017
Information on potential business partners	61.3	51.8	9.5	3.95	3.55	.026
Social trends	54.1	53.6	0.5	3.52	3.70	.333

Notes:

n = 222

Significance smaller than 0.05 (shaded areas) indicates a difference between means significant at a 95% level of confidence.

Table 1 compares only top-2-box scores (ratings of 4 and 5 on the five-point Likert scale). The list reflected in the table is ordered according to the top-2-box scores based

on the importance ratings of respondents. From the first two columns, a 'gap' was computed reflecting the difference between the top-2-box scores for importance and availability by information type. For comparison purposes, means (average scores) for the same variables were calculated, and a t-sample test analysis approach was used to firstly compare the mean scores of importance and availability of information and finally to measure any statistically significant differences between the variables. From a statistical point of view, it should be noted that, due to the nature of ordinal data, parametric statistical analysis should not be the primary analysis approach followed, although the findings from the use of parametric statistical analysis in this instance mirrored the findings from non-parametric analysis.

The following results are evident from Table 1:

- The five most important categories of information are dominated by information from the market environment, such as direct customer feedback, sales forecasts, competitor intelligence and analysis of sales data. Operational performance data (internal environment) were also identified as critically import. With the exception of economic and technological trends, information on the macro-environment was not considered to be as important as other categories of information.
- The biggest gap between the importance and availability of information is showed for market environment information. In this regard, competitor intelligence (17.6%), information on regulatory bodies (17.1%) and sales forecasts (12.2%) lead the way.
- Statistically significant differences between importance and availability ($t < 0.05$) were recorded for all variables except operational performance data, analysis of sales data, external financial information and social trends. In relative terms, these information categories are thus as important as they are available among organisations. For the information categories reflecting a statistically significant difference between importance and availability ($t < 0.05$), six reflect a desire for improved information. Categories where mean importance scores exceed availability scores, and statistically significant differences between means scores are evident, include direct customer feedback, sales forecasts, competitor intelligence, economic and technological trends and information and regulatory bodies. Ultimately, these categories reflect essential future information and BI demands of South African companies.

In considering the responses to the question regarding the overall quality of BI within South African organisations, only a few respondents rated this as 'excellent' (9.9%). However, 51.8% rated BI quality as 'very good', suggesting a relatively high level of overall satisfaction with a mean score of 3.63. This finding compares

favourably with that of Venter (2000: 233), who reported a mean score of 2.5 on the overall perceived quality of marketing intelligence among South African marketing decision-makers.

In order to further broaden the discussion, the next section presents the research findings across business size, business area, management level and sector. To determine the presence of statistically significant differences, the analysis applies a chi-square test for the top-2-box scores (see Table 2).

In comparing the survey findings across organisation size, organisations with between 150 and 350 employees seemed to express a lower need for certain categories of information (CI and information on potential business partners). Similarly (and perhaps for the same reasons), they seemed to be more satisfied than other cohorts with the availability of internal financial information. Also, and almost paradoxically, they are not particularly satisfied overall with the quality of BI available to them (56.1%). Large businesses seemed to be less satisfied than other cohorts with the BI available to them (49%). When compared by company size, Table 2 shows statistically significant differences only for the importance of CI. In fact, businesses with 151 to 350 employees regard CI as far less important when compared to other business categories.

Considering the fact that tertiary sector businesses (mostly services and trade) typically have more direct contact with end-users, it is not a surprising finding that they expressed a higher relative need for information that would help them understand customer behaviour better (for example, social trends, customer demographics and lifestyle, and the analysis of sales data). The importance of social trends, and customer demographics and lifestyle both show statistically significant differences across economic sectors, with the primary and secondary sectors recording much lower scores for these items than the tertiary sector. Similarly, and perhaps due to the greater complexity of service businesses and the measurement of service delivery, tertiary sector businesses seem to be less satisfied with the availability of operational performance data.

Counter-intuitively, middle management respondents attached a higher importance to some categories of macro-environmental data (economic and technological trends), while top management respondents regarded the analysis of sales data as relatively important. Middle managers were somewhat more satisfied with the availability of information on technological trends and sales forecasts than middle managers.

In considering the different business areas, externally focused functions (such as sales and marketing) and general management expressed a relatively high need for information on the market environment, especially customers (customer demo-

Table 2: Significant differences in the importance and availability of BI

Employee cohorts	100–150 employees (n = 69) %	151–350 mployees (n = 41) %	351–1 000 employees (n = 63) %	>1 000 employees (n = 49) %	Sig.
Importance: Competitor intelligence	82.6	65.9	85.7	85.7	0.028
Importance: Information on potential business partners	69.6	43.9	57.1	69.4	0.051
Availability: Technological trends	60.9	75.6	69.8	51.0	0.093
Availability: Internal financial information	65.2	80.5	71.4	75.5	0.051
Availability: Information on regulatory bodies	40.6	56.1	63.5	53.1	0.070
Overall quality of business intelligence	66.7	56.1	69.8	49.0	0.097
Economic sector	**Primary sector (n = 15) %**	**Secondary sector (n = 24) %**	**Tertiary sector (n = 83) %**		
Importance: Social trends	46.7	49.2	62.7		0.024
Importance: Customer demographics and lifestyle	40.0	66.1	79.5		0.005
Importance: Analysis of sales data	60.0	79.8	86.7		0.095
Availability: Economic trends	80.0	59.7	66.3		0.088
Availability: Operational performance data	86.7	83.1	71.1		0.076
Position	**Top management (n = 115) %**	**Middle management (n = 83) %**			
Importance: Economic trends	73.9	78.3			0.020
Importance: Technological trends	68.7	84.3			0.042
Importance: Analysis of sales data	85.2	77.1			0.068
Availability: Technological trends	62.6	69.9			0.075
Availability: Sales forecasts	71.3	72.3			0.024

(continued)

Table 2: (continued)

Business area	Externally focused functions (n = 97) %	Internally focused functions (n = 113) %	General management (n = 12) %	Sig.
Importance: Customer demographics and lifestyle	76.3	61.9	83.3	0.097
Importance: Direct customer feedback	91.8	78.8	100.0	0.023
Importance: Sales forecasts	87.6	83.2	58.3	0.095
Availability: Social trends	57.7	53.1	25.0	0.062
Availability: Customer demographics and lifestyle	64.9	59.3	50.0	0.092
Availability: Direct customer feedback	79.4	73.5	33.3	0.011
Availability: Competitor intelligence	60.8	68.1	41.7	0.074
Availability: Sales forecasts	72.2	75.2	33.3	0.002
Availability: Internal financial information	70.1	76.1	50.0	0.038
Availability: Analysis of sales data	77.3	72.6	41.7	0.012
Availability: Operational performance data	78.4	85.0	25.0	0.000
Overall quality of business intelligence	61.9	64.6	33.3	0.073

Notes:

Percentages reflect top-2-box scores

Sig. = Pearson chi-square coefficient, where <0.05 denotes a difference significant at a 95% level of confidence and <0.10 denotes a difference significant at a 90% level of confidence

graphics and lifestyle, as well as direct customer feedback). General managers attached less importance to sales forecasts, which arguably constitute a more tactical category of information. In several categories of information, general managers were comparatively less satisfied with the availability of information. Similarly, they were also less satisfied than other business areas with the overall quality of BI. This may be indicative of a BI quality problem experienced at executive level.

The key findings resulting from the foregoing discussion (see Table 2) suggest that there are some gaps between the importance and the availability of certain important categories of information required for decision-making. There are also some significant differences in the importance and availability of certain categories of information across respondent and organisation characteristics that may signify unmet BI needs.

In general, decision-makers seem to be moderately satisfied with the overall quality of the BI available to them, but there does seem to be a significant proportion of directors (60%) and general managers (49%) that are less satisfied than other management categories. This is a potential indication of BI quality problems at executive level.

The application of BI in the business

The application of BI in the business was measured in the survey research by using 46 different items, which covered the following areas:

- BI quality: accuracy, timeliness and right format;
- the BI process: collection, dissemination and analysis;
- responsiveness to BI: the extent to which BI is used;
- BI and information systems (IS): the extent to which IS support BI; and
- BI and decision-makers: the extent to which decision-makers value BI and apply it in decision-making.

The outcome of the research findings related to these items is analysed in Table 3. The table indicates the top-2-box scores and means for each item (statement), as well as the corresponding area category (as already outlined).

When it comes to *overall BI quality*, the results depicted in Table 3 suggest that most decision-makers are fairly satisfied with the accuracy of BI (top-2-box score of 83.3%). However, they were less satisfied with the timeliness of BI, receiving BI proactively, and the format in which they received it. In particular, they felt that they often had to process BI before it was useful to them.

Table 3: The application of BI in the organisation

BI and information systems	Top-2-box %	Mean
BI overall quality		
In our establishment BI is generally accurate	83.3	4.0
BI is usually available to me by the time I need it	69.8	3.7
I routinely receive BI relevant to my responsibilities without asking for it	68.5	3.7
BI is usually available to me in the format that I prefer	66.7	3.7
I often have to process BI before I can make decisions*	81.1	4.0
BI collection		
We meet with key customers at least once a year to find out what products or services they would need in future	84.2	4.1
The establishment has a structured programme to obtain the feedback needed to understand customers	83.3	4.1
We survey end-users at least once a year to assess the quality of our products/ services	82.4	4.2
Our establishment does a lot of market research	66.7	3.7
BI analysis		
We are constantly creating new knowledge about our business	89.2	4.1
This establishment has a good sense of its own strengths and weaknesses compared to its competition	88.7	4.1
The establishment regularly analyses data on customer satisfaction	86.5	4.1
We periodically review the likely effect of changes in our environment on customers	83.3	4.1
The establishment studies underlying trends or patterns in customer behaviour	82.9	4.0
Customer analysis is a key strength of this firm	82.9	4.1
This establishment has up-to-date profiles of key competitors	81.5	4.0
BI dissemination		
We have interdepartmental meetings at least once a quarter to discuss market trends and developments	88.7	4.3
Staff members at all levels regularly report back on customer needs	84.2	4.1
Senior management regularly discusses competitors' strengths and weaknesses	84.2	4.1
When one department finds out something important about customers or competitors, it is quick to alert other departments	82.9	4.0
There is a lot of communication between marketing and other departments about market developments	82.0	4.0
Marketing staff in our establishment spend time discussing customers' future needs with other divisions	80.6	4.1
In this establishment, we exchange a lot of knowledge with business partners (for example, suppliers)	76.1	3.9
Staff members at all levels regularly report back on competitor actions	70.7	3.7
I have a single point of contact in the establishment for all the BI I need	63.1	3.5
BI responsiveness		
The establishment is quick to respond to factors influencing its market	89.6	4.3
We consciously target customers or customer groups where we have or can develop a competitive advantage	89.2	4.2
A high priority is placed on implementing changes to improve customer satisfaction	88.3	4.2
If a major competitor were to launch an intensive campaign targeted at our customers, we would implement a response immediately	86.9	4.2
The establishment responds very quickly to negative customer satisfaction data	86.5	4.1
Several departments get together periodically to plan a response to changes in our business environment	86.5	4.1
The establishment often makes use of information that states customer preferences	83.3	4.1
Our establishment uses BI to gain a competitive edge	80.2	4.0
The establishment responds quickly to changing customer requirements	79.7	4.0

(continued)

Table 3 (continued)

BI and information systems	Top-2-box %	Mean
We frequently make use of targeted opportunities to exploit competitors' weaknesses	77.0	3.9
If customers complain, changes are made very quickly	75.2	4.0
Our business strategy drives our information systems strategy	83.3	4.0
Information systems really assist me in making better decisions	86.0	4.1
My BI requirements are always taken into consideration when IS are designed	71.6	3.7
Information technology makes it easy to get access to the BI I require	82.0	4.0
I make the most of information technology in making business decisions	83.8	4.1
Our establishment makes good use of information technology	85.1	4.1
BI and decision-makers		
Top management in this establishment attaches great value to BI in making decisions	87.8	4.1
This establishment really values the collective knowledge of the individuals working here	85.6	4.1
The activities of the different divisions in this establishment are well coordinated	82.0	4.0
In our establishment, BI staff really understand the information needs of business decision-makers	75.2	3.9

* = negative question

With regard to the *collection of BI*, respondents generally felt that their organisations were doing a lot to collect information from customers in order to better understand their needs. They were less convinced that their organisations conducted a substantial amount of market research (66.7% top-2-box score). The impression is that there are many 'informal' surveys and considerable interaction with customers, but less 'formal' market research.

Most respondents indicated that their organisations were doing a good job of *analysing BI* on both customers and competitors, with a top-2-box score range of 81.5% to 88.7%.

When it came to the *dissemination of BI*, respondents felt that there was substantial inter-departmental and intra-organisational sharing of BI. In particular, most respondents (88.7% top-2-box score) suggested that they have inter-departmental meetings at least quarterly to discuss market trends. Respondents were less convinced that they share knowledge with business partners (76.1%), that staff members across the board report back on competitors' actions (70.7%) and that they have a single point of contact for obtaining BI (63.1%).

Respondents generally felt that their organisations are quite *responsive to BI* stimuli and use BI to develop a competitive advantage by addressing customer needs and exploiting competitors' weaknesses or reacting to competitor initiatives.

Respondents were also fairly positive about the *role of IS in supporting BI*, but were somewhat less convinced that their BI needs are considered when IS are designed (top-2-box score of 71.6%).

With regard to *BI and decision-makers*, respondents were positive that top management makes use of BI, that the knowledge of individuals is valued, and that the activities of the business are well-coordinated. Although respondents included members of top management, no significant differences between different management levels were registered. Respondents were only slightly less optimistic (75.2%) about the extent to which BI staff understand the information needs of business users.

In order to broaden the 46-item analysis presented in Table 3, further comparisons of the item scores were done across business size, industry sector, respondent level and the business area in which the respondent works. This analysis indicated that the respondent level and industry sector did not contain many statistically significant differences, but with regard to business area and business size, some differences were evident. These are shown in Tables 4 and 5.

Table 4: Scale item differences across business area

	Externally focused functions %	Internally focused functions %	General management %	Pearson chi-square coefficient
BI overall quality				
I routinely receive BI relevant to my responsibilities without asking for it	63.9	72.6	66.7	.035
BI is usually available to me in the format that I prefer	62.9	73.5	33.3	.002
BI collection				
Our establishment does a lot of market research	66.0	69.9	41.7	.067*
BI analysis				
This establishment has up-to-date profiles of key competitors	80.4	85.8	50.0	.034
BI dissemination				
Senior management regularly discusses competitors' strengths and weaknesses	82.5	86.7	75.0	.013
BI and information systems				
Our business strategy drives our information systems strategy	82.5	87.6	50.0	.011
BI and decision makers				
Top management in this establishment attaches great value to BI in making decisions	87.6	88.5	83.3	.023

* = difference at a 90% level of confidence; all other differences are at a 95% level of confidence

Table 4 seems to indicate that internally focused functions are more satisfied than externally focused functions with respect to receiving BI without asking for it, and with respect to the format in which they receive it. This is possibly due to the fact that most BI systems are better geared to extracting and reporting on internal data (for example, financial results) than on external data (for example, customer satisfaction). Furthermore, general management seems far less convinced that their organisations do a considerable amount of market research, that they have access to up-to-date profiles of key competitors, or that their business strategy drives their IT strategy. Ironically, they are also slightly less convinced than other business areas that top management regularly discusses competitors' strengths and weaknesses, or that they attach great value to BI in their decision-making.

Table 5: Scale item differences across business size

	Up to 150 employees %	151–350 employees %	351–1000 employees %	>1000 employees %	Pearson chi-square coefficient
BI collection					
Our establishment does a lot of market research	55.1	70.7	69.8	75.5	.053*
Staff members at all levels regularly report back on competitor actions	72.5	68.3	77.8	61.2	.095
Staff members at all levels regularly report back on customer needs	91.3	87.8	81.0	75.5	.003
BI analysis					
This establishment has a good sense of its own strengths and weaknesses compared to its competition	87.0	78.0	95.2	91.8	.053*
BI responsiveness					
We frequently make use of targeted opportunities to exploit competitors' weaknesses	82.6	80.5	81.0	61.2	.046

* = differences at a 90% level of confidence; all other differences are at a 95% level of confidence

It appears from Table 5 that most differences occur in the areas of BI collection. Here, smaller organisations (less than 150 employees) feel less confident that they do enough market research (55.1%) compared to organisations with more than 100 employees (75.5%). This is understandable, as larger organisations would conduct more formal market research projects. However, smaller organisations seem more likely to receive feedback from staff on competitors and customers than larger organisations. Furthermore, larger organisations indicated that they have a better sense of their own strengths and weaknesses, while organisations with more than

1 000 employees feel less confident that they are frequently launching targeted campaigns to exploit competitors' weaknesses.

The use of BI tools and technology

Survey respondents were also asked about the use of tools and technology that support BI in their organisations. These results are shown in Figure 3.

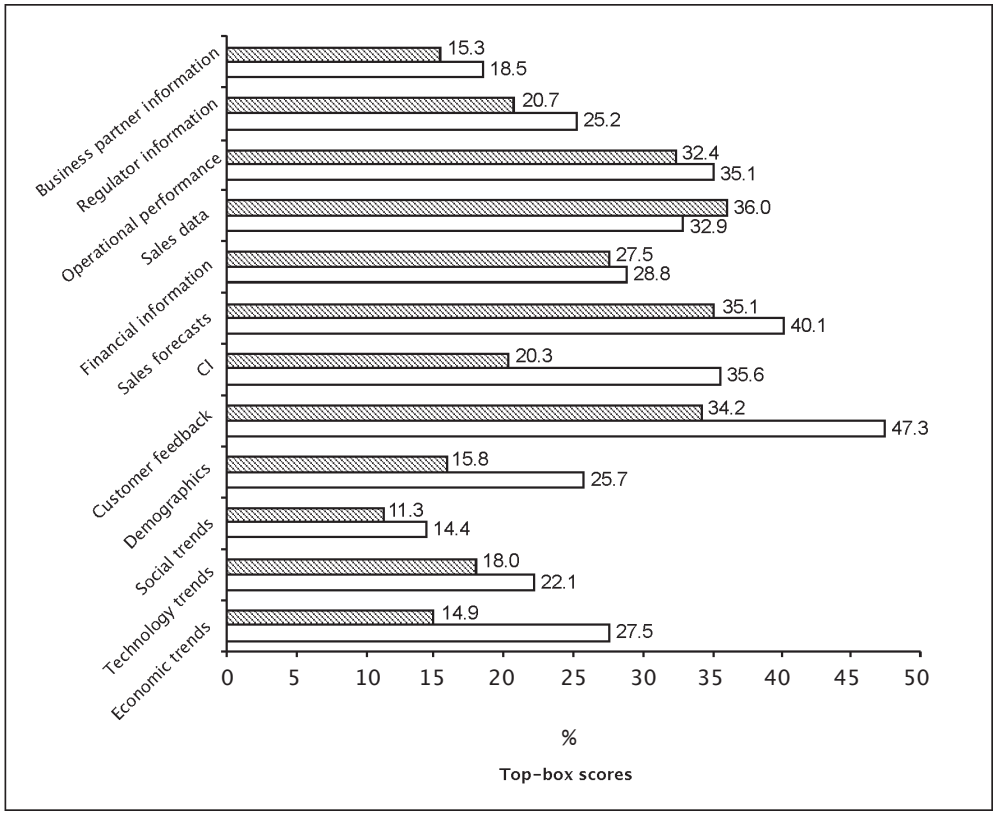


Figure 3: Importance and availability of information

While there appears to be significant investment in tools and technologies to collect, store and disseminate information, such as intranets, competitive intelligence, market research, data warehouses and CRM, the investment in more powerful analysis tools such as OLAP and data-mining seems to lag somewhat. As could be expected, larger organisations tend to invest more in tools and technologies,

especially those requiring substantial investments (for example, data warehouses). Table 6 contains an outline of the tools and technologies where statistically significant differences occurred.

Table 6: Tools and technology usage by organisation size

Tools and technologies	Up to 150 employees %	151–350 employees %	351–1 000 employees %	>1 000 employees %
Competitive intelligence	75.4	73.2	69.8	81.6
Market research	62.3	80.5	69.8	91.8
Intranet	73.9	87.8	90.5	95.9
Data warehousing	58.0	63.4	74.6	83.7
Enterprise resource planning systems	37.7	68.3	61.9	77.6
A knowledge management function	50.7	61.0	68.3	67.3
A business intelligence function	65.2	61.0	68.3	71.4
A customer relationship management (CRM) system	62.3	73.2	69.8	73.5
Online analytical processing (OLAP)	34.8	41.5	38.1	57.1
Data query software (e.g. SQL)	43.5	61.0	52.4	65.3
Data mining tools (e.g. SAS)	30.4	39.0	33.3	34.7
Planning support software	66.7	70.7	66.7	65.3
Executive information systems (EIS – e.g. performance dashboards)	49.3	48.8	50.8	63.3

The following findings emerge from Table 6:

- The comparatively low frequency of businesses with 350 to 100 employees indicating that they make use of key intelligence-gathering activities such as CI and market research is somewhat perplexing, especially when compared with smaller businesses. This trend was also observed with respect to ERP, OLAP, data-mining and data-query software.
- Given the current prominence of knowledge management, investment in establishing a knowledge management function remains comparatively low.
- Overall investment in data-mining tools is low across the board.

Conclusion

Despite the relatively high level of overall satisfaction with BI and its various aspects, certain problem areas have been identified in this article. Firstly, when it comes to the availability of information, it would seem that external information (such as CI) has the largest gaps between importance and availability, despite its high importance to decision-makers (especially those in externally focused functions). This finding is most likely due to the historical focus of BI on internal information and the fact that external intelligence is generally time-consuming and costly to collect and process. Furthermore, despite the fact that large organisations have more resources available to ensure that decision-makers have the information they need, it is worrying that those businesses with more than 1 000 employees are the least satisfied with the BI available to them. They also feel that they generally make less use of opportunities pointed out by BI, and feel less satisfied with certain aspects of BI collection. In particular, it would seem that coordination in large businesses is a problem (for example, these businesses are finding it harder than smaller organisations to get staff members to report back on customer needs and competitor actions).

There are some indications that those decision-makers in general management positions and those in externally focused functions, such as marketing and strategic planning, are not served as well by BI as their counterparts in internally focused functional areas such as HR and operations. They are generally less satisfied with the availability of certain categories of information, most notably external information categories. They are also less satisfied than other categories with certain aspects related to the quality of BI as well as various aspects of BI collection, analysis and dissemination. General managers (who are mostly in top management in secondary and tertiary sector organisations) are far less satisfied with the quality of BI available to them than any other business area. Again, the most obvious explanation for this is the historical focus of BI on internal information (for example, financial data and employee records). In addition, internal data are readily available and comparatively easy to report on. External information requires time, effort and comparatively high cost to collect, store and make available to decision-makers.

New technologies such as ERP, CRM and data warehousing have seemingly attracted substantial investment. At the same time, intelligence collection functions such as CI and market research enjoy high prominence. In addition, relatively high proportions of respondents indicated that they use BI functions and planning support software. Despite all of this, businesses seem not to have invested to the same extent in sophisticated analysis tools.

Overall, decision-makers seem to be relatively happy with BI and the way in which it is used in their organisations. However, BI quality is influenced by the fact

that decision-makers feel that they often have to process it before it becomes useful to them, and that it is not proactively available, when they need it and in the format that they require. This is especially true of general managers and externally focused functions.

From the research, three key opportunities for future research emerge, including:

- Factors other than business size, industry and decision-maker position play a role in the way in which BI is deployed in the organisation (for example, cultural issues). There is an opportunity to explore this further through qualitative research.
- Further research is required on measuring the value of BI in businesses.
- Finally, research on the integration of BI and knowledge management in the establishment can enhance the understanding of an emerging field.

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