

Evaluating the Intangible Benefits of Business Intelligence: Review & Research Agenda

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Abstract

A Business Intelligence (BI) system is a technology that provides significant business value by improving the effectiveness of managerial decision-making. In an uncertain and highly competitive business environment, the value of strategic information systems such as these is easily recognised. High adoption rates and investment in BI software and services suggest that these systems are a principal provider of decision support in the current marketplace. Most business investments are screened using some form of evaluation process or technique. The benefits of BI are such that traditional evaluation techniques have difficulty in identifying the soft, intangible benefits often provided by BI. This paper, forming the first part of a larger research project, aims to review current evaluation techniques that address intangible benefits, presents issues relating to the evaluation of BI in industry, and suggests a research agenda to advance what is presently a limited body of knowledge relating to the evaluation of BI intangible benefits.

Keywords

Business intelligence (BI), evaluation, decision support systems (DSS), intangible benefits.

1. INTRODUCTION

The evaluation of information technology (IT) and information systems (IS) is a complex issue. Increases in IT expenditure have placed great focus on evaluation processes and techniques, and their effectiveness (or lack-of effectiveness) (Huerta & Sanchez, 1999; Smithson & Hirschheim, 1998). Operational and efficiency benefits aside, IT can offer payback on a strategic level, making the prospect of clearly identifying the benefits an even more difficult challenge. It is perhaps not surprising that many traditional evaluation techniques continue to fail, or provide misleading information (Clemons, 1991; Counihan *et al*, 2002; Saarinen, 1996), particularly when traditional evaluation methods are used to measure non-traditional benefits. Although many evaluation techniques are able to measure the tangible benefits of an investment, many have difficulty evaluating soft, or intangible benefits.

Examples of intangible benefits may be greater business knowledge, improved work processes or more effective relationships. These intangibles are difficult, sometimes impossible to quantify. They are however important, yet often overlooked sources of business value, particularly in regard to the use of information technology. Traditionally, the distinction between tangibles and intangibles may be pursued back to the 17th century where economists such as Adam Smith noted the differences between goods and services; where goods were material, and services were immaterial. The transitory nature meant that services could not be valued as assets, but goods may. This has led to a dominant theory that wealth may be defined as objects that are owned by a human (Murphy & Simon, 2002). This concept has also contributed to generally accepted accounting principles (GAAP) which place great focus on material goods when calculating profits and income. These principles fail however to acknowledge that in today's information economy, many organizational investments fall into the intangible category, and are a source of significant profits.

Business intelligence (BI) is one area of IT in which traditional evaluation techniques may perform poorly, as many of the benefits are strategic, and consequently not easily quantifiable (Irani & Love, 2001). BI is a relatively new term. Its adoption has been primarily driven by software vendors and consultants, and is used to

classify a broad collection of software platforms, applications, and technologies that aim to help decision makers perform more effectively and efficiently. BI supports a range of business applications such as data mining, querying, analysis, and management reporting. In contrast to operational information systems, many of the benefits of BI may not be realized for months, perhaps years after going into production. Strategic-level benefits might even be recognized in another area of the organization's financial statements, therefore the business value might not be attributed to the system directly. Strassmann (1990) notes that the direct benefits such as cost reduction and revenue growth appear quickly in financial statements and are easy to track; however indirect benefits such as risk reduction, cost avoidance, and competitive gain are more difficult to relate as being due to IT investments.

This paper describes the beginning of a research project that will study the evaluation of BI systems. The objective of this paper is to identify BI as an important area within decision support systems, discuss some issues regarding IT evaluation pertaining to intangible benefits, and their relevance to BI. Research questions concerning the evaluation of BI are identified and a proposed research agenda is suggested. The next section discusses the concept of BI and identifies some issues that make it worthy of research attention.

2. BUSINESS INTELLIGENCE

BI is designed to support the process of decision-making. It is not a new technology, rather a "natural outgrowth of a series of previous systems designed to support decision making" (Gray, 2003, p. 10). After spending years and possibly millions of investment dollars in ERP-style systems, many companies now store vast amounts of transactional data. The role of BI is to extract the information deemed central to the business, and to present or manipulate that data into information that is useful for managerial decision support. In their simplest form, these tools permit a decision maker to access an up-to-date, often consolidated, view of business performance. Vitt *et al* (2002) describe BI as a relatively new area, however, Luhn (1958) provided a definition of BI more than 40 years ago, with his selective dissemination of information (SDI) technique. Vitt *et al* do acknowledge however that the term is multifaceted and is 'used by different pundits and software vendors to characterize a broad range of technologies, software platforms, specific applications, and processes'. They define BI as "an approach to management that allows an organization to define what information is useful and relevant to its corporate decision making." (Vitt, 2002, p.13).

There is little consensus on a definition for BI; often it depends on who is defining it, and frequently, what they are selling. For instance, 'Business Intelligence: The IBM Way' (Whitehorn & Whitehorn, 1999) has a very specific focus on data warehousing and on-line analytical processing (OLAP). Not surprisingly, IBM's product suite (IBM Visual warehouse and DB2 OLAP server) fits in perfectly with their BI focus. Whilst acknowledged that there is little academic research on BI (Grey, 2003; Jagielska *et al* 2003), there is a growing body of literature, largely vendor and industry focussed. This literature tends to centre BI as the query, reporting and analysis functions of decision support systems, although these vendor definitions sometimes include analytical applications. This view is also supported by a number of the top BI vendors (Business Objects, 2003; Cognos, 2003; MicroStrategy, 2003; SAS, 2004).

BI is an important growth area in information technology, and as such, warrants academic attention. Despite the current IT slowdown in industry, BI software vendors continue to report substantial profits (Chen 2002; Lei 2002; Whiting 2003). As business profits decline, organizations are recognising that the provision of quality information is a key to gaining competitive advantage. Supported by increasing improvements in storage, data warehousing and OLAP solutions, the BI market is expected to continue to rise into the coming years. Forecasts predict the BI field will grow 23% annually, and report a total turnover of US\$3.3 billion dollars, in the Asia Pacific region alone (Giang, 2003). The worldwide market is expected to reach US\$12 billion by 2006 (Darrow, 2003).

The limited amount of academic research on BI makes it very difficult to determine whether the characteristics of BI are different enough to warrant new evaluation methods, and whether industry treats BI investment differently to other IT investments. According to a recent survey of 540 IT professionals, users, and consultants, intangible benefits outweigh many of the more tangible benefits, such as ROI and cost savings (Surmacz, 2004). Better information, better strategies, better tactics and decisions, and more efficient processes were among the top five benefits considered most important in BI development. Little research has been identified describing how (if at all) these intangibles are identified and weighed, who the participants are, and how this is incorporated into BI business cases.

3. IT EVALUATION

Understanding where the value of information technology lies, and how to measure that value, has remained an important issue for both managers and academics (Davern & Kauffman, 2000, p.122). Twenty years ago, most

IT investment was made to benefit organizations on operational levels. Large amounts of data could be processed at high speeds. Hardware was becoming extensible and compatibility with other systems was increasing. The popularity of business data processing systems was growing rapidly, and there was a dramatic increase in the number of computers being used in commercial applications. The quantitative benefits were clear and the associated adoption costs defensible. These systems could process many tasks much faster than past technologies; a business could save on manpower.

Unlike early IT adoption and the dot-com collapse, today's organization can no longer spend money on excessive infrastructure. Any technology that doesn't provide a quick impact on the business' bottom line will not be considered a viable prospect (Whiting, 2003). Typically, any potential investment will be carefully screened for perceived benefits and value for money. Management are distrustful in signing-off on a project unless there is a clear demonstration of growth or an improvement in efficiency.

Difficulties in identifying IT value has been particularly highlighted in debate over 'the productivity paradox' and has received significant attention from a number of researchers during the past decade (Brynjolfsson, 1993,1998; Lucas 1999, Dewan 1998; Bakos, 1995; Willcocks, 2001). Paradox proponents claim that investments in IT, although considerable, are yet to produce significant improvements in industrial productivity. Attention was first drawn to the debate in a study carried out by Morgan Stanley's chief economist (Brynjolfsson, 1998). The study noted the substantial increase in the amount of computing power per worker in the service industry during the 1970s and 1980s, yet identified that the productivity of the sector remained flat. Nobel Laureate Robert Solow stated 'We see computers everywhere except in the productivity statistics.' (Brynjolfsson, 1993). The conclusion reached was that despite the tremendous increase in computerization within the US, it had had little effect on the economic performance of the sector, particularly those areas with large numbers of 'information workers'.

Executives often face difficulty when attempting to determine the benefits that information technology brings to an organization (Tallon, *et al*, 2000, p. 146). Poor identification of the benefits of information systems may explain why the productivity paradox has endured (Changchit *et al*, 1998). Classical financial techniques such as net present value (NPV), and cost-benefit analysis (CBA), are not entirely suitable for the effective evaluation of IT (Parker & Benson, 1988). Willcocks (1992a) described the phenomenon of many managers feeling that they need to invest in IT for competitive reasons, yet economically they were frequently unable to justify it. There appears to be growing appreciation that if evaluation methods are to be developed, additional measures must be considered such as perceived value, the utility of IT in decision support, and increases in customer satisfaction (Katz, 1993; Murphy & Simon, 2002).

Saaty (1998) called for a shift in research paradigm, from financially based evaluation methods to techniques that accommodate other issues, including intangibles. This shift in paradigm might be of considerable importance for areas such as business intelligence. Irani and Love (2001) argued that traditional evaluation techniques are not suitable for evaluating projects with significant strategic benefits (Figure 1). Further, it is not uncommon for an IT initiative's value to become embedded in a new business process, and unless the evaluation methods used to assess the system are accurate and representative, managers may only see the resulting system maintenance costs, and no real added business value.

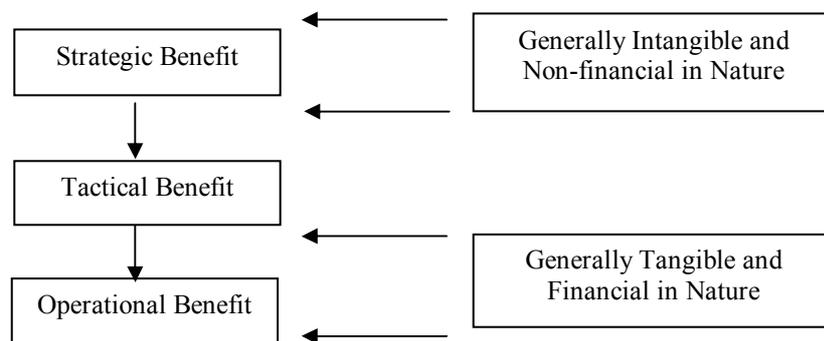


Figure 1. Nature of Strategic, Tactical, and Operational Benefits. (Adapted from Irani & Love, 2001.)

In summary, it is likely that the intangible benefits resulting from the use of BI systems are significant. The failure to adequately identify and measure these benefits might result in the system not being appropriately supported by executive sponsors, who are often looking for hard, return on investment measurements. The following section, a review of the current literature on IT evaluation, identifies a number of evaluation techniques that have been used to value the intangible aspects of various systems.

4. EVALUATING THE INTANGIBLE BENEFITS OF BUSINESS INTELLIGENCE

There are clear and well-established methods for calculating the benefit from operational systems where there are straightforward efficiency benefits. The problems lie when evaluating the intangible benefits from strategic systems, such as BI, where the benefits are often difficult to attribute to a single factor or identify in the balance sheet. Academics have made numerous attempts to classify these benefits using various frameworks, models and techniques, some providing a monetary measure of a particular benefit from a system, others giving a subjective quantification, using proxy indicators such as customer satisfaction. This section focuses on some popular, and also more recent evaluation techniques. None of these techniques have been established with a specific focus on BI. They have been chosen to give adequate representation of the techniques available. The intent here is to highlight techniques that might have some relevance to BI intangible evaluation.

Counihan, Finnegan and Sammon (2002), acknowledge the difficulty in the evaluation of strategic information systems, and propose a framework of six factors that aims to overcome the limitations of traditional evaluation techniques. Their framework acknowledges the problems associated with the identification and incorporation of intangible benefits into capital budgeting methods (Chapman, 1988). The framework was developed after the study of four organizations in the UK and Ireland, each of which attempted to overcome the problems associated with existing evaluation techniques in their data warehousing developments. The framework for evaluating investments in data warehousing (Figure 2) identifies six criteria (four management processes and two high-level analysis characteristics).

Critical Factors						
Problems	Economic environment analysis	Information intensity analysis	Commitment and sponsorship	Approach to evaluation	Time scale of benefits	Appraisal techniques
Evaluating intangible benefits	Determines criticality of intangibles	Separates customer requirements from internal intangibles	Shows high-level appreciation for importance of intangibles	Categorizes intangibles	Manage time scale to yield quick wins	Compliance
High level analysis			Managing the process			

Figure 2. Method for dealing with data warehousing intangible benefits. (Adapted from Counihan *et al*, 2002.)

The framework proceeds as follows: the economic environmental analysis aims to determine whether or not the system implementation is a strategic necessity and determines the criticality of the intangible benefits. If this analysis identifies a need for the system, then the analysis of the information intensity reveals the level at which the organization requires information about its customers. These two high level processes must provide adequate grounds for initiation before the development begins. Attaining commitment and sponsorship for the project facilitates a management understanding of the importance of the intangible benefits. Once sponsorship is established, and the key contributors to the project are chosen, evaluation is performed. This may be carried out enterprise-wide or in incremental stages. It is during this stage that the intangible aspects of the proposed system are identified. Time management, and a focus on short time horizons, keeps sponsors satisfied as they see results quickly. The framework then recommends that the developers consider three other appraisal techniques: case study, value analysis, and management by maxim.

The difficulties in assessing the costs and benefits of information systems has long been an topic of interest for DSS researchers. Keen (1981) introduced the concept of Value Analysis (VA) as an alternative approach to traditional cost-benefit methods. VA is a methodology for planning and evaluating DSS proposals. Keen identifies the key issues as: (1) a reliance on prototypes; (2) the absence of cost-benefit analysis; (3) the evolutionary nature of DSS development; and (4) the nature of perceived benefits. Rather than reducing all variables into monetary terms, the VA approach acknowledges that the perceived benefits of a DSS are significant determinants in justifying investment in the system. Money *et al* (1988) noted the inadequacy of cost-benefit approaches to evaluating the effectiveness of decision support systems (DSS), and demonstrated the use of Keen’s approach. Money *et al* (1988) justified the move away from cost based analysis to a focus on ‘value’ with two key points. First, they argued that the initial investment takes place as a research and development (R & D) project that is below the capital expenditure level (minimizing cost considerations); and secondly, they noted that the majority of DSS expenditure is relatively inexpensive, and therefore does not play a major role in the evaluation process. These points may not apply to modern BI. Many BI tools are large, expensive, and often invasive to the processes of the firm. Cost considerations are an important factor, even in the prototyping stages, as software license fees are often high. The VA method does however provide the ability

to establish agreed values for outputs, which may otherwise be classed as intangible and ignored. Value analysis may prove a useful technique in BI evaluation, particularly when evolutionary development is used. Anecdotal evidence suggests that this method would work in a BI environment, some BI vendors are already offering to install their software free of charge, using real data, into prospective client sites in order to more clearly demonstrate benefits.

Tayyari and Kroll (1990) noted that there are numerous intangible benefits and costs associated with IT projects, and that assigning a monetary value to such benefits is 'very difficult, even impossible'. They suggested that these benefits may be quantified by using surrogate or proxy indicators. For example, higher employee morale may be measured by the monetary values of its consequences (lower turnover or higher productivity). Unfortunately, this method provides little direction on how to go about choosing the proxy measures. Once the measures are chosen, it relies on proven financial calculations (such as return on investment (ROI) and net present value (NPV)) to determine their worth.

Anandarajan and Wen (1999) recognized that traditional accounting methods are inadequate for evaluating intangible benefits, resulting in their application only being appropriate for simple cost-benefit applications, not for evaluating complicated IT investments. They submit that many of the recent methods proposed to incorporate intangible benefits into the evaluation process are too obscure for use in industry. Their method aims to incorporate many intangible benefits through conducting discussions with employees from all divisions affected by the IT implementation. Through the use of a case study example, they demonstrated how many of the hidden costs may be quantified and incorporated into the decision-making process. The steps of the evaluation framework are: Step 1- Determining tangible and intangible benefits, Step 2- Determining the costs of different technologies, and Step 3- Identifying the net present values and risk. Whilst the method provides a straightforward process in which to measure and quantify intangible benefits, it does rely heavily on the opinion of the discussion participants, and could be adversely affected by bias and subjectivity.

The Quantification Technique (Hares & Royle, 1994) is a formal way of measuring intangible benefits. This technique is also known as "bridging the gap" and involves the following steps: (1) identifying the benefits; (2) making the benefits measurable; (3) predicting in physical terms; and (4) evaluating in cash flow terms. This approach requires a significant amount of judgment when performed, and thus the results are subjective and open to questioning. The identification of intangibles themselves will depend on the stakeholders involved. The third step of predicting in physical terms can be difficult, due to the large numbers of methods available to convert the measures into actual figures. The use of market surveys is the approach recommended by Hares and Royle, but it may not be applicable in many BI implementations.

Strassman (1990) developed the method of Return on Management (ROM), which is a performance measure based on the value added to the organization provided by management. This method assumes that the information costs of an organization are equal to the costs of managing the enterprise. The method is performed both pre and post IT implementation to obtain the technology's contribution to the organization. Using a number of calculations, the ROM is management value-added divided by the total costs of managing the enterprise. This method is not without its problems, the difficulty in distinguishing between the operational costs and the management costs of an organization has been identified as a concern (Willcocks, 1992a, p. 262). The suggestion is that ROM may only be an indirect measure of how effective management information is exploited. There are also concerns with its appeal to management and the usability of the approach.

Negotiation and imputation are methods of evaluating intangible benefits according to Remenyi (2000). The method involves asking managers using a particular resource to place a value on it. For example, "would this report be worth \$100 to you?", if yes then they are asked "would it be worth \$1,000 to you?" This binary search is continued until a value of the report is agreed on, and it is this value which may be considered the value of the intangible benefit. Although the method places an actual dollar value on the asset, Remenyi acknowledges that this method produces only subjective evaluations.

The Information Economics (IE) approach (Parker & Benson, 1998) builds on other traditional approaches, and is largely an investment feasibility framework (Willcocks, 2001, p 72). 'Value', rather than cost, is viewed as a combination of an enhanced return on investment, a business domain assessment, and a technology domain assessment. In order to assess the way technology contributes to business performance, the method classifies benefits into six classes: (1) return on investment (ROI); (2) strategic match; (3) competitive advantage; (4) management information; (5) competitive response; and (6) strategic IS architectures. The IE process is long and somewhat complex. In essence, the method first builds on traditional cost-benefit analysis and includes four other methods (value linking, value restructuring, value acceleration, and innovation valuation) for establishing an 'enhanced' ROI figure. The process then goes further to incorporate business and technological domain assessments. The critics of this approach argue that it might lack credibility with upper management as many of the measures are based on subjective scoring. The IE approach can be overly time

consuming. Despite its comprehensiveness and ability to be adapted to BI, Willcocks (1994) identified statistical problems with the scoring methods and how they are weighed.

Methods based on multi-objectives and multi-criteria (MOMC) attempt to create a measure of utility provided by a particular piece of IT within a business. In terms of their own preferences and opinion, users and stakeholders are required to evaluate the relative usefulness of different outcomes; they then rank those preferences by applying a weight to each. When many stakeholders are involved in the evaluation process, the preference that provides the highest aggregate utility, or highest overall measure of satisfaction, is considered the most viable. This method is useful when applied to complex projects, particularly if there are large numbers of stakeholders. This method also accommodates intangible factors but does not however provide any input for a traditional ROI calculation. MOMC methods are still in their infancy, but have already spawned a great deal of interest amongst researchers (Sylla and Wen, 2002).

Table 1 provides a summary of the methods discussed, including their focus and comments addressing their strengths and weaknesses.

There is an emerging body of literature from the field of knowledge management that might have some relevance in evaluating BI. The need for various knowledge metrics have been identified through the failure of current accounting practices, and the exponential growth of the knowledge economy (Peterson, 1999). There are a number of concerns with growth such as this. One such argument includes that severe cost cutting, which has worked well in the past, is not as relevant in businesses that are heavily knowledge-based and intangible asset-laden (Arthur, 1997). Downsizing staff without regard to the knowledge they possess is considered risky, and the use of knowledge metrics is suggested. There are a continuing attempts to quantify and measure human knowledge, and although results at this stage are suggestive rather than definitive, it may be an area worth consideration when addressing the evaluation of BI.

Evaluation Technique	Author/s	Research Type	Focus	Measures	Comments
Process Model with 6 critical factors	Counihan, Finnegan & Sammon (2002)	Multiple Case Study (4 firms)	Data Warehousing (DW)	Intangible, identified using critical factors.	This is a new approach acknowledging traditional evaluation problems. The data warehousing focus is closely related to BI systems, therefore may prove useful. The authors acknowledge that this framework requires further work and development. Testing this framework in a BI situation would be useful.
Value Analysis	Keen (1981)	Conceptual	Decision Support System (DSS)	Tangible and intangible. Intangibles made visible through the use of prototyping.	Assigns a 'value' to variables which would normally be classed as intangible and not included into traditional evaluation techniques. The benefits may be visualized through prototyping of proposed systems. The method allows for both monetary and utility measures of intangible benefits. Establishing these 'values' may be a drawn-out and costly process. There are often doubts about subjective measurement techniques that do not produce accurate financial measures.
Total Cost Analysis	Tayyari & Kroll (1990)	Conceptual	Computer Integrated Manufacturing (CIM)	Intangibles quantified using surrogate indicators.	After the measures are identified, traditional financial measures may be used to assign a monetary value to the benefits. Relies on subjective, proxy measures. No clear direction on how to undertake the identification of the surrogate indicators.
Combination Net Present Value (NPV) and Discussion with Personnel	Anandarajan & Wen (1999)	Single Case Study	Computer Integrated Manufacturing (CIM)	Intangibles quantified using discussion with personnel.	Aims to overcome 'esoteric' evaluation methods by using traditional Net Present Value (NPV) models. Relies heavily on the opinion of discussion participants. Might introduce bias into the categorization of intangibles.
Quantification Technique	Hares & Royle (1994)	Single Case Study example. Also in Murphy & Simon (2002)	General IT	Intangibles quantified into cash, using subjective measures.	The valuation of the intangibles is open to questioning, due to inevitability of judgment involved in applying the technique.
Return on Management (ROM)	Strassman (1990)	Conceptual	General IT	Tangible, the value of labour is added as intangible.	ROM is a thorough framework, provided the assumption that the organization's information costs <i>are</i> the costs of managing the enterprise. Distinguishing between operational and management costs can be difficult. A lack of use (Willcocks & Lester, 1991) in industry suggest problems with the

Evaluation Technique	Author/s	Research Type	Focus	Measures	Comments
					usability of the approach.
Negotiation and Imputation	Remenyi (2000)	Conceptual	General IT	Intangibles quantified using subjective measures.	This method relies heavily on subjective judgment. It provides an actual dollar value to the asset, rather than a 'comfort' statement.
Information Economics	Parker & Benson (1988)	Conceptual	General IT	Tangible and some intangible	Based largely on subjective scoring. Can be time consuming due to the number of steps involved. Includes both quantitative and qualitative measures.
Multi-objective, Multi-criteria (MOMC)	Kenny & Raiffa (1976)	Conceptual	General	Tangible and Intangible. Intangible measured by rank and weight of individual preferences.	Best applied to complex projects. Accommodates multiple stakeholders easily. Can incorporate intangible factors. This method does not include output for traditional ROI calculations.

Table 1. IT Evaluation Methodologies Addressing Intangibles

5. RESEARCH AGENDA

The primary goal of future study is to enhance understanding of the nature of BI evaluation. This paper proposes that there are significant intangible benefits provided by BI, and that these should be considered closely in any BI evaluation. Figure 3 outlines the intended research strategy for investigating this area.

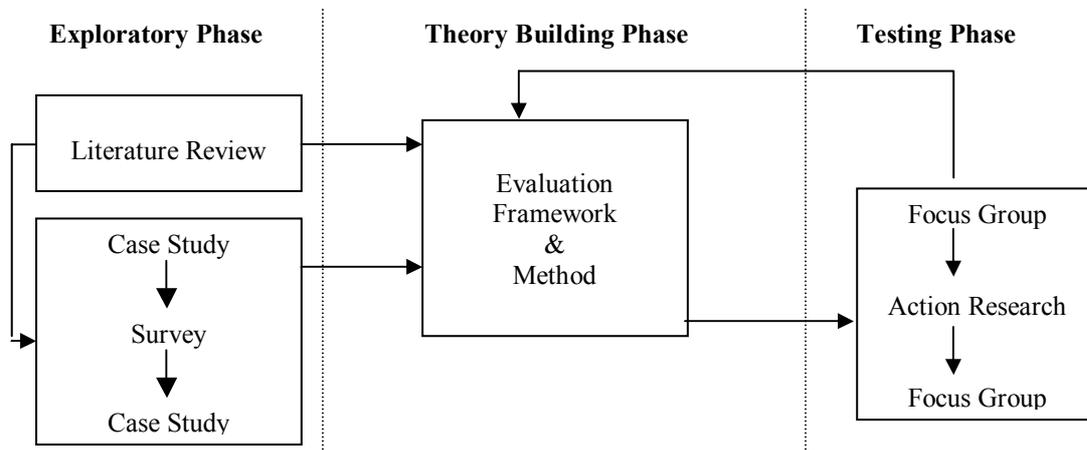


Figure 3. Proposed Research Strategy for Investigating BI Evaluation.

This research will consist of both conceptual and empirical components. The conceptual stages of the research are important in the formulation of the exploratory empirical research and in particular, specifying the evaluation framework and method. Conceptual study is a relatively unstructured, subjective research process in which the steps are not well-defined (Galliers, 1992). Conceptual phases involve a cyclical process of literature search and review, and concept development based on literature analysis; this includes the researchers' own opinions and beliefs. The empirical phases rely on experimentation or observation and include a number of methods such as the survey and case methods that will be used in this project along with laboratory experiments, simulation and forecasting (Galliers, 1992). This paper presents a research project that is in its initial exploratory stages. There are three major phases of the project. The exploratory phase is discussed in detail below, followed by an overview of the subsequent theory building and testing phases.

5.1 Exploratory Phase

The first stage of this research is exploratory and will clarify the nature of BI evaluation within the industry sector. The focusing question for the exploratory phase will be:

- What processes and methods are used for the evaluation of BI systems?

An important sub-question that arises from the discussion in the paper is:

- What is the role and importance of intangibles in the evaluation of BI systems?

In order to address these issues, a combination of literature review, survey research, and case studies will be used. The survey and case study components of the exploratory phase will follow a multi-informant design.

Multi-informant designs are proposed as a source of research triangulation for extracting improved contextual information (Earl, 1993). The application of multi-informant design is used frequently to highlight perceptual differences between key participants across different business areas within an organization. Within IT research it is used to obtain varying opinions amongst IT professionals and business perspectives (Tai and Phelps, 2000; Chan, 2002; Pervan, 1998). During this research's exploratory phase both the survey and case study components will draw upon two constituencies: business and IT. Obtaining data from key participants from both business and IT functions will enable an analysis of any difference in perceptions across roles. The participants targeted will be considered key to the business function under examination. The business demographic will consist of CEO's, CFO's, line managers and other significant employees. The IT sample will be made up of CIO's (or equivalent) and other important IT decision-makers.

The literature review phase will be ongoing and feed the other research components. Part of this paper provides an indication of the nature of the literature review in which this research is primarily concerned. The exploratory phase is made up of two case study components. Case study research is a widely used qualitative research method with the information systems field (Orlinowski and Baroudi, 1991). Case research is considered appropriate in a situation in which the boundaries between phenomenon and context are not clearly evident (Yin, 1994, p. 13). The case components will aim to investigate the nature of BI evaluation in an industry setting. The first stage of case study research will involve a number of small cases. The results of the cases will provide the data to help build the survey instrument. The cases will be Australian based to accommodate cost constraints.

The survey will be electronic and distributed via the Web. This will allow the survey to be available to a large international audience and keep expenses down. This survey will be descriptive and primarily based on fact gathering. The purpose of the survey will be to obtain a snapshot of BI evaluation practices and views in industry and will allow inferences to be made which may be further studied in the subsequent case studies. After the survey is performed, subsequent case studies will be carried out using the survey results as a guide for enquiry, the results of which will feed into the theory building phase of the research.

5.2 Theory Building and Testing Phases

Although it is too early in the research to predict the detailed nature of theory building and testing phases of the research strategy, the aim is to construct and test a framework and method for evaluating the benefits of business intelligence. The framework and method will be informed by the literature review, survey and case studies. This framework will be constructed through iterative development cycles of building and testing. Focus groups have been chosen as one of the research methods to be used during the testing phase. Focus groups consist of a group of individuals selected to discuss and comment on, from personal experience, the topic that is the subject of the research (Powell & Single, 1996, p.499). The focus groups will involve an organised discussion with both the business and IT demographics. This phase of research will obtain information about participant views on the framework and method being developed and provide feedback for further theory building.

Action research is has been selected as an appropriate method for the core of the theory testing phase. BI is heavily grounded in industry, therefore it is considered important to test the framework and method within this context. The production of solutions to real-life practical problems is seen as a definite benefit of action research. Action research focuses not only on research and the development of new knowledge, but is also concerned with problem solving in a business setting. A driving aim of this research is to improve BI evaluation practices in industry; action research supports this aim (Baskerville, R. & Wood-Harper, 1998; Morgan, 1998). The action research component will test the second version of the method and framework (that will be developed based on the outcome of the initial focus group).

Following action research, and the resulting evolution of the framework and method, another focus group will be conducted as a professional validation phase.

6. CONCLUSION

The strategic nature of business intelligence, the dispersion of benefits throughout the business, and its effect on business culture are some of the reasons why BI evaluation is difficult. This paper has discussed current issues with IT evaluation, and identified BI as a technology that might hold significant intangible benefits. It has addressed methods used to evaluate these intangible benefits and discussed their application to BI. It then proposes a research agenda to improve domain knowledge in this area. There has been little academic research on BI and its evaluation. The evolution of BI tools beyond simple DSS, and their current popularity surely justifies that this gap in the literature be addressed. As part of a larger research project, this paper is a step forward in addressing the issue.

The implications of this research in industry are threefold. Firstly, BI proponents are required to justify investment to prospective business sponsors. Improvements in the evaluation techniques used to review the effects of the system would help assess the business case. Secondly, executive sponsors require tools to assess any investment in BI to observe its performance. And thirdly, BI vendors need access to the techniques that identify the benefits of the software systems that they are trying to put to the market.

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