BUSINESS INTELLIGENCE AND ITS IMPACT TOWARDS THE PERFORMANCE OF THE LOCAL MANUFACTURING ENTERPRISES.

BY

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Research report in partial fulfillment of the requirements for the degree of

Doctor of Business Administration

Universiti Sains Malaysia

2009

ACKNOWLEDGEMENTS

Praise the all mighty for giving me the strength and determination in completing this dissertation. The tenacity and perseverance that is required to complete this stage was instilled by my wife, Malathi Kunjuraman. Thank you for always being there to listen and provide your insights and supporting perspectives. I would not have made it without your moral support.

I would like to convey and express my deepest gratitude and thanks to my supervisor, Associate Professor Ramayah Thurasamy for his valuable guidance, suggestions and assistance in making this project materialize. He was always there for me in terms of support and guidance.

Secondly I would like to express my gratitude to all my DBA lecturers who have guided me through this program. It was really a great course and a great eye opener for me.

The self-confidence and the ability to overcome obstacles at numerous stages were instilled by both my parents, G.Subramananiam and Vasanthi Balakrishnan. To my boys, Gautam Nair and Kuhan Nair – although we had little time to spend together for this period of time but you guys were great in your understanding and support.

I dedicate this completion of my BDA program to all of you.

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ABSTRAK

Salah satu cabaran terbesar yang dialami oleh dunia korporat masa kini ialah mengurus informasi. Ini berikutan daripada masalah sumber informasi yang kurang, keperluan pelanggan yang disalah taksir serta ketidak pekaan terhadap situasi pasaran global.

Kombinisasi inovasi teknologi dan alam sekitar yang mengalami persaingan yang sengit memerlukan proses membuat keputusan dalam keadaan sahih serta dalam masa yang tertentu.

Peningkatan prestasi perniagaan bermakna informasi yang tepat dan kena pada masanya dan oleh itu komponen kritikal untuk sesebuah organisasi yang berjaya ialah keupayaan untuk mengumpul kesemua informasi yang ada. Business Intelligence telah menjadi satu alat kritik penting dalam membantu situasi membuat keputusan. Peranan utama yang dimainkan oleh BI ialah mengeluarkan informasi terkini untuk membuat keputusan strategik dan operatif. Ia juga di kenali sebagai proses, teknik atau alat untuk mempercepatkan proses membuat keputusan yang lebih baik atau berkesan. Kajian terperinci ini memfokuskan peranan BI dan impaknya terhadap prestasi sektor pengeluaran tempatan terutamanya sekitar wilayah utara semenanjung Malaysia. Keputusan kajian ini memenujukkan bahawa terdapat sebahagian sector pengeluaran tempatan menggunakan sumber sumber BI untuk meningkatkan proses membuat keputusan dan serta seterusnya meningkatkan prestasi.

ABSTRACT

One of the biggest challenges presently characterizing today's corporate context is the management of information due to scarcity of information, false estimation of customer requirements and ignorance on global market situation. The combination of constant technological innovation and increasing competitive environment requires decision making processes to be built on a reliable and timely information nature.

Improved business performance means timely and accurate information and therefore the critical component for the successfulness of these enterprises is its ability to take advantage off all available information. Business Intelligence in this dynamic and uncertain environment has become a critically important tool in aiding decision making.

The main pivotal role being played by BI is in producing up-to-date information for operative and strategic decision making and it is also commonly referred as the process, technique or tool to support speedier and better decision making. This study tests empirically the role of business intelligence and its impact towards the performance of the local manufacturing enterprises particularly in the Northern Region of Peninsula Malaysia. The finding shows that certain aspects of Business Intelligence sources are used by these local manufacturing enterprises to improve their decision making and thus improved performance. Business Intelligence was found to be playing the mediating role between Business Practice

and Business Performance particularly between Strategic Alliances and Internal

Business Perspective and Learning and Growth Perspective.

Chapter 1: INTRODUCTION

1.1 Introduction

Accelerated technological innovation together with revolutionary changes and increasing competitiveness in the manufacturing enterprise makes the management of information more complex and a challenging task. Increasing investment towards Information Technology (IT) and Information Management by these enterprises, as a technological platform, not only for the purpose of supporting all business processes but as well as to strengthen the efficiency of their operational structure. This is also in order to stay ahead of their competitors and as well as to have competitive advantage over them. Most enterprises are supposed to have reached a stage where the implementation of IT solutions for strategic levels becomes possible and necessary (Petrini & Pozzebon, 2005). This context explains the emergence of Business Intelligence (BI), which is seen as an answer or a solution provider to the current need in terms of information retriever, gleaning, manipulation and so on for a better quality decision making and thus improved business performance. The main pivotal role being played by BI is in producing up-to-date information for operative and strategic decision making and it is also commonly referred as the process, technique or tool to support speedier and better decision making (Hannula & Pirttimaki, 2003)

Management of technology presently is one of the biggest challenge characterizing today's corporate context and is becoming a difficult task due to the competitiveness nature of the industry and the manner how globalization is playing its role on the business environment. In order for the decision making process to be built on a reliable and timely nature requires the combination of constant technological

innovation and increasing competitive environment. Improved business performance means timely and accurate information and therefore the critical component for the successfulness of these enterprises is its ability to take advantage off all available information. (Cody at al., 2003)

1.2 Background of the Study

Some of the pertaining issues that the manufacturing enterprises face at times is the scarcity of information, false estimation of customer requirements, ignorance on global market situation and future perspectives (Arrieta et al., 2005), and currently, one of the biggest challenges according to Simmers (2004), being faced by today's corporate context is the management of information. The understanding of the enterprises that timely and accurate information can mean improved business performance is becoming a critical component for the success of these enterprises and its' ability to take advantage off all available information. As business profits dilute due to the competitive nature of the global market, organizations are recognizing the fact that one of the key component in gaining competitive advantage is quality information and this has been reflected in an increase usage of Business Intelligence software according to the study done by Whiting, (2003). Another study in the information technology literature proposed that knowledge acquisition information system might assists managers to systemize their thoughts during decision making (Jonas & Laios, 1993). This is a fact especially when environmental uncertainty requires a large body of information to be considered (Daake et al., 2004) and it is of critical importance in getting the right information to right person at the right time to produce the right processed information. The whole industry operates in a tight

competitive environment and the manufacturing industry faces the following uncertainties such as

1. Demands of customer that is increasing and diversified.

2. Fast sequence of new task and enhancing the role of one-of-a-kind production.

3. Increasing number and speed of communication channels.

4. Appearance of new technologies.

5. Frequent changing partnership such as suppliers, distributors, customers, and purchases.

6. Instability of market circumstances.

   Therefore adequate information retrieval and capture system is required that could provide the organization with the most up to date information and as well as awareness of their business environment that they are operating within not only for as survival but also to have the competitive advantage in the business environment they are operating.

Business Performance measurement has long been a traditional concept in an enterprise and also in BI literature. Authors such as Solomon (1996) and Business Intelligence system solution provider such as Viva Business Intelligence, Inc (2000) have identified that the measurement of BI is an important task but a difficult one to carry out (Gartz, 2004; Hannula & Pirttimala, 2003; Simon, 1998). Only a few organizations according to Marin and Pouller (2004) have any metrics in place to measure the value of Business Intelligence. This opinion as also shared by Kaplan and Norton (1996) and Neely et al., (2005), where performance of an enterprise is a complex issue in which the measurement objects are examined from different perspectives. Performance measurement according to Simons (2000) can be applied

for the following perspective such as (1) decision making, (2) control guidance, (3) education and learning, and (4) external communication and Neely (1998), clarified that business performance is a process of quantifying the efficiency and effectiveness of the purposeful action. Performance measurement can also be a tool in implementing an organizational strategy (Kaplan & Norton, 1996), and the most commonly used performance measurement tool in the business environment is the Balanced Scorecard (BSC). Measures are chosen to evaluate the success factors from different perspectives such as the customer, employees, internal business process and financial success and as well as the point of view of the past, current and future performance. In this way the different aspects of an organizations' performance can be measured and managed.

According to the Association of the Computer and Multimedia Industry of Malaysia (PIKOM), the ICT sector will remains at a double digit momentum with the sector set to grow by 12 % to 13% in 2008 (the Star, 2008). Meanwhile, IT spending in the country will increase from RM 40 billion last year to RM 42 billion in 2008 with the Small and Medium Businesses contributing 35% to the nation's GDP in 2006 and are expected to make an increased contribution of 37% to the national GDP by 2010. (the Star, 2008)

 The major factors in determining the pace of the economic activity in Malaysia is the transformation of the manufacturing sector and the sustainability of that sector. (Ninth Malaysian Plan 2006-2010)

The Ninth Malaysian Plan, the main focus in order to benefit from both global deployments of production and services network, the emphasis will be on transforming the manufacturing sector towards a knowledge intensified and a value creating entity. In effort to boost the manufacturing sector; the government on its part

formulated a number of policy measures and incentives to enhance the business and investment climate. To maximize the growth opportunities from the manufacturing sector, the focus concentration would be given to the expansion of supplementary business and services industry. Secondly a wide range of activities will be implemented in the manufacturing sector in order to commensurate with the growing and varied demands of increasing complex production, processes, as well as distribution, marketing and R&D operations. Among others it will be necessary to build up requisite infrastructure, info-structure and core competencies in key areas.

Strategic initiatives among which are related to this research is highlighted in the Ninth Malaysian Plan. They are: -

1. Strengthening the development of information hardware, promoting electronic documentation, encouraging e-commerce and improving Internet environment.

2. Creating an environment which is conducive for the accumulation and dissemination of new knowledge and reinforcing the protection of intellectual property rights.

Taking cognizance of the increasing technology and knowledge content in manufacturing industries, priority will be accorded to incentives to upgrade skills that promote intensive knowledge applications. Regard to industrial skills, ICT integration and utilization of bioinformatics that infuse the knowledge content into industries as e-management and virtual engineering services for high –end design activities.

Malaysia being a strong advocate of Information Technology and Internet has resulted in the establishment of the Multi-Media Super Corridor (MSC) at the cost of USD 20 billion (Samad, 2001). The main aim and intention of MSC is to provide the best incubator for high tech business and as well as to create an environment in which a

native high technology industry could take the root and boost the nation into the ranks of developed nation by 2020. MSC is designed to create an ideal environment for ICT related production and as well as to provide the backbone for an information superhighway. (ICT Policies in Malaysia)

1.3 Problem Statement.

Information fuels the new economy and plays an essential role in developing and maintaining a sustainable competitive advantage. Increased global competition, lower barriers to entry and lower profit margins are created thus resulting in an ever increasing need to access to data and these are the demands on today's business. The greatest asset of an enterprise is data and whether it comes from day-to-day operations such as enterprise resource planning (ERP) system, data warehouses, operational data stores or as any other sources, it is the key to understanding and managing your business performance (Gartner, 2007). Tremendous amount of data that are related to business operations and decisions are flooding into the business world and thus there is no doubt that data is one of the organization's most valuable resources. However, not all or many of the organization's according to Olszak and Ziemba, (2006), are able to utilize fully their available data to assist in the decision-making or daily operation; hence affecting their competitiveness in their business market. Evidence to date shows, that extensive schedule delays, quality issues, cost overruns, and increasing claims and litigation have caused serious harm to the enterprises in terms of performance. Secondly, information is abundant in enterprises and the problem of decision maker is not only finding information but selecting appropriate and correct information among the vast quantities in the market (Davenport & Beck, 2001).

Managers do not just seek any information as they require better information that is useful in aiding them towards decision making and hence, the search for effective tool to create, aggregate and share knowledge in an enterprise becomes the target of the management. Business Intelligence is a set of concept, method and process that not only assist in business decision but also supports in the realization of the organizational strategy. Business Intelligence has grown in importance, as enterprises increasingly perceive the value of their intellectual capital and potential profits in unlocking this capital. This intellectual capital comes in the form of processes, solutions, expertise, heuristics of individuals and groups within the enterprise. These have values in problem solving, identifying opportunities and threats, and thus improving organizational effectiveness through harvested data that is provided by Business Intelligence. The perceived value of some intelligence product, for example, is likely to differ depending on the subjective appreciation and the requirements of the person(s) to whom it is addressed. Value is assessed from the viewpoint of the enterprise using BI (e.g. improved profits) or the user of the intelligence (e.g. perceived usefulness). Secondly it may even be suggested that BI may have no value at all as such – that the value is created as a result of using intelligence, by carrying out actions based on it. Kelly (1993) also recognized that the conditional nature of the value of BI as in one of his survey; the respondents stated that information must be integrated into a decision in order for its value to be assessed. Many enterprises are not fully able to utilize their availability of data in assisting in their decision making process or daily operation thus affecting their competitiveness in the business environment (Wilson, 1997).

1.4 Purpose and Objectives

The study on Business Intelligence in the local scenario is considered something relatively new and the general objective of this research is to determine the impact and usage of Business Intelligence towards the local manufacturing enterprises and its influence on their business performance.

The stakeholder theory is applied as it conceptualizes the enterprise as a series of groups consisting of internal organizational members such as employees, managers and board members; external members, such as owners, customers, suppliers and competitors whom are engaged in the inter-organizational cooperative activity with the enterprise (Schneider, 2002). Stakeholders have the potential to influence or affect the firm, and or be influenced or affected by it (Freeman, 1984). Their influence on the enterprise is via their deeds and words, through the covert signals and overt protest, and most significantly, through their ability to assist or hurt the enterprise's ability to create value. Stakeholders are conceptualized as the various parties along the enterprise's value chain creation. Secondly the purpose of stakeholder theory is to both explain and guide the structure and the operations of the enterprise through various and diverse participants accomplishing multiple but not always congruent purpose. Business Intelligence will gather, analyze, and disseminate data and as well as information to these stakeholders on order to minimize threats and maximize potential benefits.

The findings from this study will be greatly useful for the local manufacturing enterprises as a whole for the purpose of enhancing their business performance through better decision making process or capability. Thus this study will attempt to achieve the following:

1. To determine to what extent the usages of Business Intelligence sources could enhance the performances of an enterprise?

2. To determine to what extent the usage of Customer Relationship Management towards Business Intelligence sources could enhance the performance of an enterprise?

3. To determine to what extent the usage of Strategic Alliance towards Business Intelligence sources could enhance the performance of an enterprise?

4. To determine to what extent the usage of Team Usage towards Business Intelligence sources could enhance the performance of an enterprise?

5. To determine to what extent the usage of Business Intelligence sources could enhance the performance of an enterprise?

6. To determine to what extent Business Practices could enhance the performance of an enterprise with Business Intelligence as the mediator

1.5 Research Questions

Based on the above problem identification and the objectives, thus this study seeks to answer to the following research questions:

1. To examine the relationship between business practices and business performance?

2. To examine the relationship between business practices and business intelligence?

3. To examine the relationship between sources of business intelligence and business performance?

4. To explore possible relationship between business practices and business performance with business intelligence playing mediator role?

In order to address these questions effectively, in context, new measures development is required, as the existing literature lacks systematic attention to BI systems. (Thomas, 2001; Cottrill, 1998). There are some case studies evidencing benefits generated by enterprises that are successful with the use of BI systems (Hesford & Antia, 2006; Edwards 2001), but with no prior empirically validated measures. Researches such as Lonnqvist and Pirttimaki (2006), Marin and Pouller (2004) in their studies have called for the development of a measure in evaluating the business performance effects of BI systems.

1.6 Definition of terms

1.6.1 Business Intelligence

One of the applications that enable both active and passive delivery of information is BI. Data and information is gathered from large scale databases providing the enterprises and managers timely answers to mission- critical questions. In other word the main objective of BI is to turn raw data into actionable intelligence (Kalakota & Robinson, 2002). Meanwhile Viva Business Intelligence Oy (1998) identified Business Intelligence as a continuous and systematic process, which produces knowledge, insights and forecasts to the operating environment of the enterprise. Figure 1.1 below indicates BI as the tool to aid in the decision making process of an enterprise.

Business Processes: Decision making processes

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┌──────┐   ┌─────────────┐   ┌───────────┐   ┌───────────┐
│ Data │ → │ Information │ → │ Knowledge │ → │ Decisions │
└──────┘   └─────────────┘   └───────────┘   └───────────┘
    ↑             ↑                ↑                  ↘
┌──────────────┐ ┌──────────────┐ ┌─────────────┐  ┌──────────────────┐
│ Collection and│ │ Analyses and │ │ Data Drilling│  │ Improvement in   │
│ consolidating of│ reporting    │ │             │  │ competitiveness  │
│ data          │ └──────────────┘ └─────────────┘  └──────────────────┘
└──────────────┘        ↑                ↑
       ↑         ┌──────────────┐ ┌─────────────┐
┌──────────────┐ │ OLAP, query  │ │             │
│ ETL, Data    │ │ languages,   │ │ Data mining │
│ warehouse,   │ │ query ad hoc │ └─────────────┘
│ databases    │ └──────────────┘
└──────────────┘
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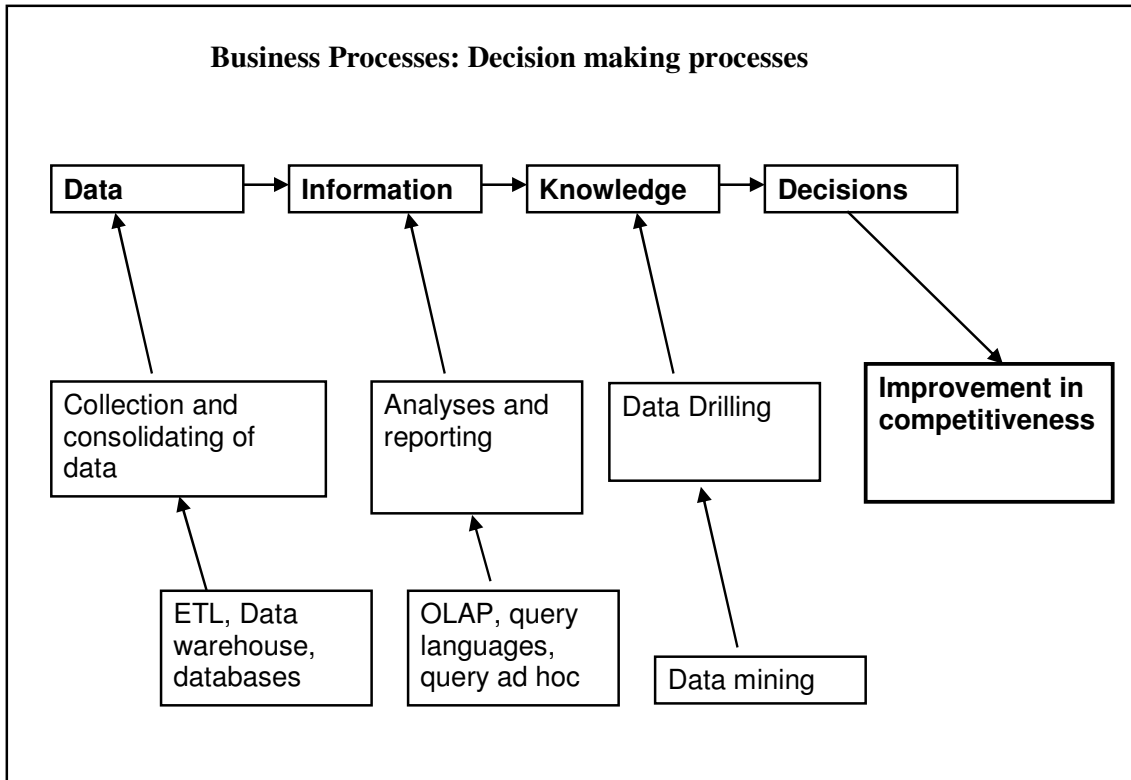
Figure 1.1: **The role of BI in decision making (Olszak & Ziemba, 2007)**

The Business Intelligence Process

Although numerous and different processes of BI have been presented by academics and BI systems service companies but in general they all have the similar characteristics and phrases. Most models are cyclical and have the same objective that is to refine usable intelligence to aid the decision maker from the gathered information as illustrated in fig 1.2 below.
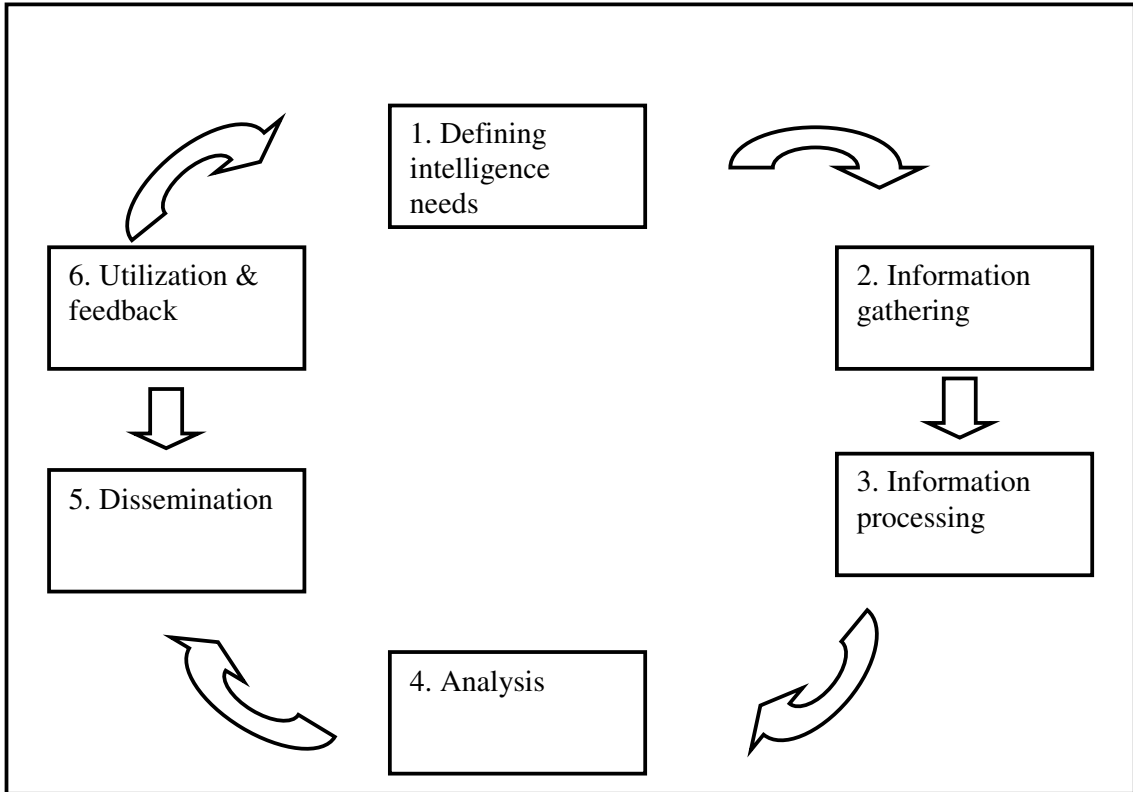
Figure 1.2: **Main phrases of a typical BI process (Salonen & Pirttimaki, 2005)**

The preliminary stage of a BI process is the intelligence needs to the decision maker and this must be defined by identifying the key intelligence topic and questions pertaining to the information needs or problems at hand. Following this, information is gathered from suitable sources of information and this information can be in the form of qualitative or quantitative in nature and can be collected from the enterprise's internal or external sources. The second stage after the information gathering phase is the information processing phase whereby the information is processed into structured form, the material is analyzed and enriched into usable intelligence using various analysis methods and tools. The third stage is where the intelligence products are disseminated through an organization to the personnel, whom the intelligence product

has an additional value in decision making. The dissemination can be in form of report, newsletter or through the portal or intranet of the enterprise and the final stage is the utilization of the intelligence created by the BI sources.

1.6.2 Customer Relationship Management

Customer Relationship Management (CRM) as defined by Kumar and Ramani (2004) as the process in achieving and maintaining an ongoing relationship with customers, across multiple customer touch points and thorough differential and tailored treatment of individual customers based on their likely responses. Meanwhile Boulding et al.,(2005) construed that the scope of CRM as an encompassing management strategy of dual value creation, usage of data and technology intelligently, customer knowledge acquisition and dissemination to appropriate stakeholders, appropriate development of (long-term) relationships with specific customers and the processes integration across many areas of the enterprise that collaborates to generate customer values.

1.6.3 Strategic Alliances

Strategic Alliances is considered as a form of cooperative business arrangements between business organizations. Business arrangements such as joint ventures, equity investment, licensing, technology and buyer-supplier relationship is known as strategic alliances (Lee & Bleamish, 1995). There are numerous reasons on why enterprises are entering into strategic alliances and these has been identified in prior literature such as minimizing costs, acquiring know-how, retaining and developing one's own resources by combining with partner's resources (Chan et al., 1997)

1.6.4 Extent of Outsourcing

Outsourcing is defined as a contractual agreement or relationship between an external vendor and the enterprise in which the vendor assumes the responsibility for one or more business function of the enterprise (Baily et al., 1998)

1.6.5 Team Usage

Team usage is defined as a system that uses resources such as time, people, skills and problems and transforms them into outputs such as work, solution and satisfaction. (Ingham et al. 1997)

1.7 Business Performance (BSC)

The balanced scorecard balances these four perspectives across short-term and long-term objectives, and between the fundamental objectives and performance drivers of these objectives (Kaplan & Norton, 1996). The balanced scorecard measures emphasize the causal relationships in the supply chain among suppliers, employees, customers and stakeholders. (Kaplan & Norton, 1996; Donovan et al., 1998). Kaplan and Norton (1996) argued that the balanced scorecards should reflect four types of measures that is (1) financial and non financial; (2) external (financial and customer) and internal (critical business processes, innovation, and learning and growth); (3) inputs/drivers and outcomes/results; and (4) objective, easily quantifiable measures and more subjectively, judgmental measures.

1.7.1 Financial Perspective

The strategy of growth, profitability and risk from the perspective of the shareholders'. (Kaplan & Norton, 2001)

1.7.2 Customer Perspective

The strategy for creating value and differentiation from the perspective of the customer. (Kaplan & Norton, 2001)

1.7.3 Learning and Growth Perspective (Future Perspective)

The priorities to create a climate that supports organizational change innovation and growth (Kaplan & Norton, 2001)

1.7.4 Internal Business Perspective

The strategic priorities for the various business processes that create customer and shareholder satisfaction (Kaplan & Norton, 2001)

1.8 Significance of the study

Not many studies have been conducted in Malaysia using the stakeholder theory of business intelligence in Malaysia towards the business performance of an enterprise. Stakeholders have the potential to influence or affect the firm, and /or are influenced or affected by it (Freeman 1984) and he defined the stakeholder as any group or individual who can affect or is affected by the achievement of an enterprise's objectives. Enterprises that manage stakeholder relations and social issue in a proactive and accommodative fashion have better economic performance compared to those who are reactive and defensive (Clarkson, 1988).

Since the purpose of the stakeholder theory is to both explain and guide the structure and operations of the enterprise through which numerous and diverse participants accomplish multiple and not always congruent purposes, the theory can be integrated with the literature regarding BI. Effective BI will gather, analyze, and

disseminate data and information on and to these stakeholders to minimize threats and maximize potential benefits.

1.9 Organization of the Remaining Chapters

To conclude, the primary focus of this study is to determine the usages of BI sources and its impact towards the business performance of the enterprise. This dissertation is divided into five chapters. The present chapter discusses the background of the study, its objectives and purpose, its relevance and significance and the theory underlying the study that will be explored further have been discussed. The remaining of this dissertation has Chapter Two elaborating on the theoretical context of the problem by reviewing the literature, chapter three describing the methodology employed, chapter four reporting the findings of the study and finally, chapter five analyzing the findings, providing interpretation and conclusions related to the research hypothesis, and discussion on the implications of these results for the future research and practice.

CHAPTER 2

LITERATURE REVIEW

Research literatures in Business Intelligence, Customer Relationship Management, Team Usage, Strategic Alliances, Outsourcing and Business Performance with the perspectives of the Balanced Scorecard, set the content of this study. This chapter therefore presents the review of the literature that describes the theory leading to the studies that directly investigate the role of business intelligence, its sources, usages and influence towards the performance of an enterprise.

2.1 Introduction

Daily decisions are being made by humankind and although how complex the decision making process might be, is it must be well understood by the decision maker. In order to derive to a qualitative sound decision, decision makers need to understand and know a great deal about the industry, the social and business environment in which they are attached to (Simon, 1987). Decisions of quality nature are decisions that give rises to positive outcomes to decision makers as they have met only the objectives of the decision maker but the enterprise as well. The same principle applies to an enterprise as the success of an enterprise depends on its advantage in maximizing the utilization of data and information as part of its decision making process. This is mainly due to the complexity and voluminous nature of data and information both internally and externally towards the enterprise that makes the utilization more complex (Cody et al., 2003). These new economics of information is provoking the enterprise to an unparallel environmental change as Porter (1985), argued in the 80's that the determinant of an enterprise's economic success is due to

its improved usage of information source and freed information. Similarly, in response to the dynamic and volatile condition of the business environment, enterprises need to process relatively a large amount of relevant information in order to develop its understanding towards issues that are complex (Huber et al,. 1975). Based on this interpretation, high level of information processing system fosters the generation of new alternatives and possible leading to a better decision making and finally to an ultimately business performance enhancement (Daft et al., 1988). Leveraging for competitive advantage, enterprises are investing in information technology or systems as an effort to gather and analyze information that could be used to support the process of decision making. Studies have shown that enterprises that are heavy users of business information are the one's that are most likely to employ innovative practices compared to the ones that do not (Hall, 1994). Business Intelligence (BI) being an important component of this investment acts as an amalgamation of reporting, data mining, on line analytical processing applications (Cody et al., 2003). Thus Business Intelligence provides access to data that can be integrated, gleaned in order to be analyzed, manipulated, transformed and combined into new insights that aids in decision making. Decisions that have met the objectives of the enterprise and give rises to positive outcome to the decision maker are known as quality or good decision. According to Simon (1987), a quality decision relies on the decision making process to the extent that the decision maker organizes, prioritizes, seeks and sorts the information. Effective Business Intelligence then increases the quality of strategic and operative planning, thus reducing the time used for decision making (Hannula & Pirttimaki, 2003).

2.2 Uncertainty in Decision making

Every decision making involves a certain amount of risk taking, thus limited decisions are made with absolute certainty because complete knowledge about all the alternatives is seldom possible. According to Harris (1998), every decision is made within a decision environment and an ideal decision environment is defined as a collection of information, alternatives, values and preferences available at the time of the decision. A quality decision relies on the decision making process in which the decision maker organizes, prioritizes, seeks and sorts the information (Simon, 1987). Scanning which is a data seeking process and which is part of the decision making process as it involves acquiring and processing voluminous amount of information (Daake, Daway and Anthony, 2004). However it seems that the growing uncertainty of business environments still raises the need for efficient Business Intelligence system to support scanning and interpreting the information so that the valuable intelligence is conveyed to the senior management.

In the rational decision making process, one of the elements that has positive relationship with organizational performance is environment scanning (Daft and Weick, 1984; Venkatraman, 1989). Numerous studies have been conducted in the area of decision making in conjunction with environment scanning and the main purpose of these studies is to assist decision makers in making better decisions in an environment that is complex, volatile and uncertain. The gathering of data, the transformation of data into information, and the communication and storage of information in the enterprise database is generally defined as information processing (Galbraith, 1973; Tushman and Nadler, 1976). According to Massaro and Cowan (1993), information processing is referred on how information is modified so that it eventually influences

the decision making and based on the definition of Larkey and Sproull (1984), information processing approach towards an enterprise as a means to understand and predict how the enterprises perceive, stimuli, interpret, store and retrieve and transmit the information, generates judgments, and solve problems.

Researches such as Huber (1991) and King (2006) regarded information processing as part of organizational learning where the acquired knowledge is the process in which the knowledge and information is obtained either through scanning, focused search or performance monitoring. This knowledge and information is then used, shared or distributed within the enterprise and any unused knowledge and information is then stored in the data base for future retrieving.

On the other hand Flynn and Flynn (1999), King (2006) and Nicolou (2004) argued that the information processing process refers to the paradigm of information systems, involving in the collection of data and its transformation into more valuable and useful explicit information. Information processing also includes application programs that transform data into valuable information that relates to particular decision or function of an enterprise. The decision making perspective analyzes enterprises as a rational decision making systems and according to Simon (1957) information is processed in order to reduce or avoid uncertainty.

Enterprises to a certain extent must face uncertainty; uncertainty about the market, suppliers, shareholders, government agencies, and so on (Galbraith, 2003). According to Choo (1991), uncertainties occur due to lack of information, the complexity, dynamism and the variability of the external environment. Thus Galbraith (1973) indicated that there exists a relationship between the amount of uncertainty faced by an enterprise and the amount of information processing that goes around the enterprise. The involvement of the

enterprises' to process information in order to reduce uncertainty will lead to organizational effectiveness. Based on the research by Simon (1957) and Galbraith (1973, 1977), enterprise information process theory was build in order to increase the effectiveness of the enterprise thus leading to a performance enhancement.
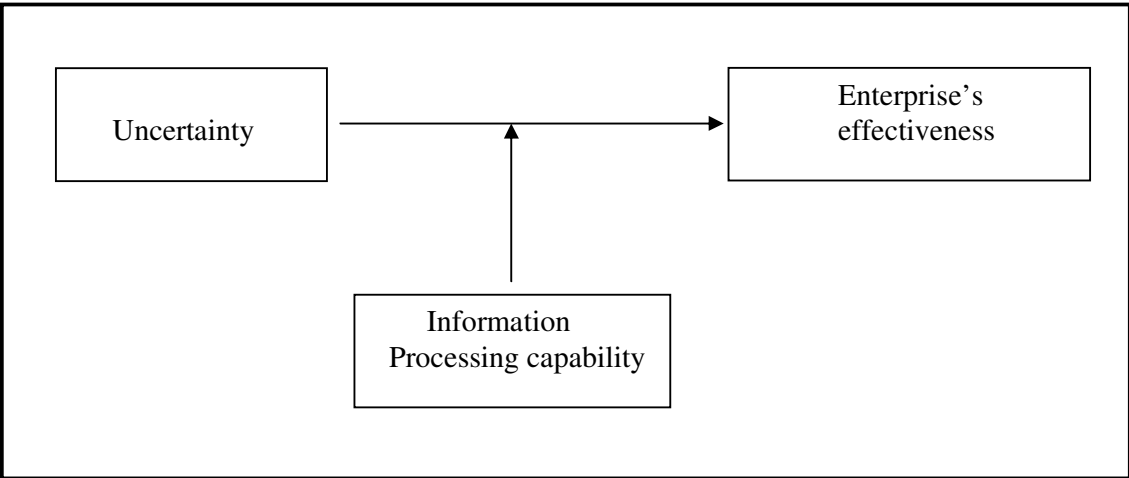

Figure 2.1: **Information Processing and Contingency Concept (Galbraith, 1973)**

Those enterprises that fit their information processing capabilities (such as for gathering, transforming, sorting and communication information) to the amount of uncertainties they face is known as organizational effectiveness and this is related to the quality of decision making they make (Egelhoff, 1991). In order to reduce or resolve equivocality or ambiguity, information is only then processed (Weick 1988). Meanwhile Galbraith (1977) and Weick (1988) respectively suggested that an enterprise processes information in order to reduce uncertainty and equivocality in the environment and therefore information processing in an enterprise involves obtaining data to reduce this uncertainty and interpreting equivocal situations. Gabraith (1973) and Tushman and Nadler (1976) have shown in their research that how enterprise

structures and support systems can be tailored to provide the correct amount of information in order to reduce uncertainty. Meanwhile Daft and Lengel (1986) took a step further by arguing that organizational design can provide information of suitable richness to reduce equivocality as well as provide sufficient data to reduce uncertainty. Enterprises investing in information systems and technologies are often justified as a necessary strategy in coping with the increased complexity and information needs in today's business environment (Flynn and Flynn, 1999). Flynn and Flynn (1999) in their research on testing the role of various information processing alternatives particularly in coping with increased environment complexity found that increased investment in information systems and technology is positively related to the need to handle increased amounts and complexity of information that is inherent in complex enterprise's environment. Efforts by senior managers or decision makers to assess uncertainty and identify opportunities in their environment are known as 'scanning behavior". Scanning has become one of the most vital tasks for senior managers to implement as the business environment is often volatile and increases dramatically. Numerous literatures documented show that scanning is implemented for a variety of strategic purposes such as to reduce uncertainty in the business environment (Elenkov, 1997; May et al., 2000), secondly to achieve competitive advantage through superior information gathering (e.g. Beal, 2000; Kumar, et al., 2001), thirdly to gain knowledge about stakeholder priorities and demands that can be used to develop effective response strategy (e.g. Kumar et al., 2001), and finally to develop strategies in order to improve the overall financial performance (e.g. Kumar and Subramaniam, 1998; Venkatraman 1989). Daft and Weick (1984), based on Anguilar's work have developed a general model of organizational scanning behavior looking into two

dimensions that is analyzability (can we analyze what is happening in the environment?) and intrusiveness (do we intrude actively into the environment to collect information?). Refer to figure 2.2 on the model of organizational scanning.
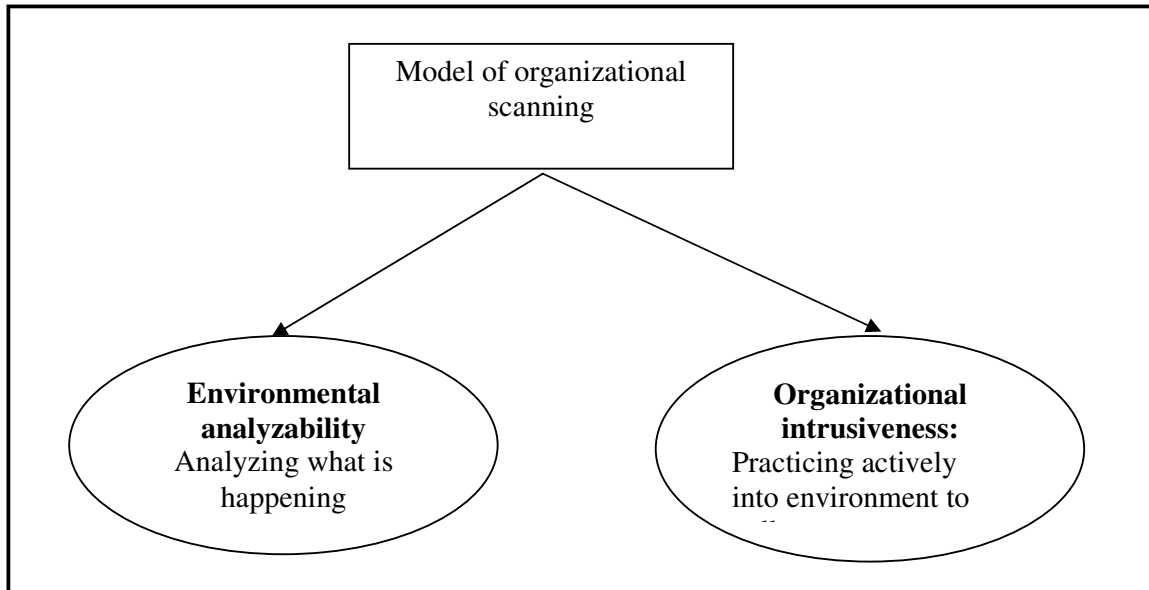
Figure 2.2: **The model of organizational Scanning (Daft and Weick, 1984)**

2.3 Business Intelligence (BI)

Globalization, market internalizations, trade liberations, deregulations, knowledge economy, e-business and new forms of organization (such as network enterprises, virtual enterprises) that are phenomenally interrelated to each other pose a new challenge to the enterprises (Raymond,2003).

Now under a new name; Business Intelligence, these environmental scanning activities constitute a fundamental mode of organization learning to the extent these enterprises' adaptation to the changes that occurs in its environment (Beal, 2000). Many enterprises are scanning their environment in order to upkeep with competition

and in some cases to survive in the business environment they are attached. Concurrently they are also keeping a close eye on their competitors and similarly attempting to understand their customers. Information from the business environment is gathered by these enterprises to make educated decisions and one term of the environmental business information they gather and analyze is BI (Fuld, 1991; Fahey, 1989).

Environment scanning process enables the enterprise to adapt to its environment (Daft & Weick, 1984) thus reestablishing and enhancing the organizational performance (Venkatraman, 1989). Venkatraman (1989) also found positive relationship between scanning and performance and in addition, it has been found that successful enterprises differ from unsuccessful enterprises as they do more scanning and have a broader scope of scanning (Daft, Sormunen and Parks, 1998). Coping with uncertainty is one of the central issues whenever enterprise adapt to environmental changes. Information becomes a valuable input in decision making as the potential increment in uncertainty may lead into more information seeking, and consequently may impact the decision making of the enterprise. Based on the above, Choo (2001) has constructed a conceptual framework for environment scanning behavior as depicted in figure 2.3