

A PROGRESS IN BUSINESS INTELLIGENCE IMPLEMENTATION IN CRM (CUSTOMER RELATIONSHIP MANAGEMENT), SCM (SUPPLY CHAIN MANAGEMENT) AND QUALITY MANAGEMENT

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ABSTRACT

This paper reviews a progress in Business Intelligence Implementation in CRM (Customer Relationship Management, SCM (Supply Chain Management) and Quality Management research. Relates articles appearing in the international journal like Proquest, Ebscohost, Emerald, Science Direct, IEEE Conference and books are gathered and analyzed so the following question can be answered the definition of Business Intelligence:(1)Which paper suitable to the definition of business intelligence from managerial approach, technical approach, system approach?(ii)Which paper suitable to Business Intelligence research in Customer Relationship Management, Supply Chain Management and Quality Management.

Key words: Business Intelligence, Supply Chain Management, Customer Relationship Management, Quality Management

1. INTRODUCTION

There are many definition of Business Intelligence (BI) which integrate to topic that is integrated in Business Intelligence research. According to Rina (2011), it was found 50% research is in single approach Business Intelligence System. Integrated research between Business Intelligence and Data Mining is the most popular evaluating criteria with 6,67 % (Rina, 2011).

A general objective of this research is to make literature review of the progress of Business Intelligence (BI) Implementation in Supply Chain Management (SCM), Customer Relationship Management (CRM) and Quality Management. This paper reviews the journals and books of business intelligence. Relates articles appearing in the international journal like Proquest, Ebscohost, Emerald, Science Direct and IEEE Conference and books are gathered.

The paper is organized as follows: Section 2 describe the definition of Business Intelligence dan section 3 describe the Business Intelligence Evaluation Criteria. Section 4 analysis the most populat

Evaluation Criteria in of Business Intelligence. Section 5 suggested for future work. Section 6 concludes the paper.

2. DEFINITION OF BUSINESS INTELLIGENCE

There are three approach definition of business intelligence, managerial approach, technical approach and system approach.

A. Managerial Approach

From the engineering point of view, Business Intelligence according to Niu (2009) refers to a process to extract, transform, manage and analyze business data to support decision making. This process is based on large databases, particularly data warehousing, with a mission to spread the intelligence or knowledge in the entire organization, from strategic level to operational level and tactical.

Business Intelligence can be defined as mathematical models and analysis methodologies to exploit the data available to gain information and knowledge useful for complex decision making process. Business

intelligence according to Howson allows people at all level organization of an organization to access, interact with and analyze data to manage the business, improve performance, discover opportunities and operate efficiently (Vercellis, 2009).

With the potential to gain competitive advantage when making important decisions, it is vital to integrate decision support into the environment of their enterprise and work systems. Business Intelligence (BI) can be embedded in these enterprise systems to obtain this competitive advantage (Jalonen, 2009), (Seah, 2010).

(Lönnqvist, 2006) stated that the term, BI, can be used when referring to the following concepts: 1. Related information and knowledge of an organization, which describe the business environment, the organization itself, the conditions of the market, customers and competitors and economic issues; 2. Systemic and systematic processes by which organizations obtain, analyse and distribute the information for making decisions about business operations.

(Bose, 2009) also describes the managerial view of BI as a process to get the right information to the right people at the right time, so they can make decisions that ultimately improve the performance of the enterprise.

Business Intelligence or BI is a grand, umbrella term, introduced by Howard Dresner of the Gartner Group, in 1989, to describe a set of concepts and methods to improve business decision making by using fact-based, computerized support systems (Niu, 2009).

(Ranjan, 2008) considers BI as the conscious methodical transformation of data from any and all data sources into new forms to provide information that is business-driven and results-oriented.

Recently, (Jalonen, 2009) wrote that BI generates analyses and reports on trends in the business environment and on internal organizational matters. They explained that analyses may be produced systematically

and regularly, or they may be ad-hoc, related to a specific decision-making context.

Manufacturing resource management system (MRMS) analyzes the current situation of business environment and business intelligence systems framework at first, and studies the theoretic and methods about the business intelligence system and analyzes the necessity of an automated negotiation method in the based on the manufacture requirement and latency manufacturing resource state, order enterprise can find forwardly or passively some manufacturers satisfying it manufacturing tasks requirement taking into account justice, multi-topics influence genes, and negotiation both sides preference, etc. (Niu, 2009).

B. Technical Approach

The technical approach considers BI as a set of tools that supports the process described above. The technical view of BI usually centre on the processes or applications and technologies for gathering, storing and analyze data, and for providing access to data to help management make better business decisions.

The focus is not on the process itself, but on the technologies, algorithms and tools that enable the saving, recovery, manipulation and analysis of data and information (Nylund, 1999).

BI includes a set of concepts, methods and processes to improve business decisions, using information from multiple sources and applying past experience to develop an exact understanding of business dynamics (Larson, 2009).

BI system can be regarded as the next generation of decision support system, according to (arnott, 2005).

Moss and Atre define BI as being a collection of integrated operational as well as decision support application and databases that provide the business community with easy access to business data (Moss,2003).

Wu (2007) defined BI as a business management term used to describe applications and technologies that are used

to gather, provide access to, and analyze data and information about the organization to help management make better business decisions. In other words, the purpose of BI is to provide business systems with actionable, decision support technologies, including traditional data warehousing technologies, reporting, ad hoc querying and OLAP.

In some research, BI is concerned with the integration and consolidation of raw data into key performance indicators (KPIs). KPIs represent an essential basis for business decisions in the context of process execution. Therefore, according to (Bucher, 2009), operational processes provide the context for data analysis, information interpretation, and the appropriate action to be taken (Bucher, 2009).

Sharma (2011) in their managerial study, stated the effectiveness of Business Intelligence (BI) tools as enablers of knowledge sharing between employees in the organization. Lin (2009) designed a performance assessment model, and concluded that the accuracy of the output, its conformity to requirements and its support of organizational efficiency are the most critical factors in gauging the effectiveness of a BI system. They set forth the necessity of measurement indicators to show the performance of a BI system, but did not provide the means to evaluate the intelligence of the system.

(Lönqvist, 2006) discussed BI as a set of support processes and stated that most literature focuses on justifying the value of BI. This is an important issue when the usefulness of BI is under initial consideration, and also later when there is a need to determine if BI continues to provide valuable results. They encouraged practitioners and researchers to start applying the measurement of BI to their work.

(Kahraman, 2011) discussed the roles of intelligence techniques in enterprise information systems, to obtain a successful business strategy. Intelligence techniques are rapidly emerging as new tools in information management systems. They

stressed that intelligence techniques can be used in the decision process of enterprise information systems. They concluded that hybrid systems that contain two or more intelligence techniques would be used more in future; therefore, organizations need to take a sophisticated approach to the evaluation of the intelligence of their information systems.

According to (Larson, 2009) Business intelligence is the delivery of accurate, useful information to the appropriate decision makers within the necessary timeframe to support effective decision making. It uses Microsoft SQL Server 2008 to delivering business intelligence.

Office SharePoint Server 2007 features for business intelligence, data integration features of Office SharePoint Server 2007, and describes information presentation and reporting features of SharePoint Server 2007 (Ren, 2010).

The relate components of a business intelligence system gives a complete Business intelligence solution with Microsoft SQL Server 2005. (Ren, 2010). How to deliver BI solution with BI stack is used by Microsoft business intelligence stack and BI products (Ren, 2010).

The current applied status of business intelligence and multi-agent technology and design of the low-cost business intelligence system based on multi-agent is put forward, which is composed of the low-cost business intelligence system framework, the analysis of the core components' function and the operation mechanism of the system (Moss, 2003).

C. System Approach in BI Construction

Elbashir (2008) developed a new concept, based on an understanding of the characteristics of BI systems in a process oriented framework. They examined the relationship between the performance of business process and organizational performance, finding significant differences in the strength of the irrelationship in different industrial sectors. They concluded by stressing the need for a better

understanding of BI systems through evaluation.

Evolutional objectives of BI system in E-business, explores the application way of BI and the working mechanism of BI system in E-business, and more expounds the its operational framework of E-business intelligence system (Gartner, 2008)

CMMI (Capability Maturity Model Integrated) and makes a contribution on the empirical knowledge on CMMI. CMMI is developed to define different levels of software process maturity. The concepts underlying CMMI have been defined different maturity levels for a business intelligence process (Ko, 2007). The critical success factor in business intelligence system success seeks to bridge the gap that exist between academia and practitioner by investigating (Elbashir, 2008).

Even-Driven Architecture (EDA) based Right-Time Business Intelligence System Framework (EDA based RT-BISF), which combines RT-BI and the business process based on the EDA and Agent, to resolve the environment uncertainty, business dynamics and to meet the needs of dynamic adjustment of business solution for the enterprise in the fierce competitive environment (Ghoshal, 1986).

An Enterprise Marketing Campaign Automation (EMCA) system that can provide data for businesses to instantly assemble them for determining effective and accurate marketing campaign strategy. By generating a mailing list targeted to a specific group of buyers with reference to their buying habits can reduce marketing cost by just mailing the promotional items to the specific group of buyers (Berson, 1997).

A Business Intelligence (BI) development project applied to Homogeneous Diagnostic Groups (GDH) which are very specific and important for health management. The main goal of this project was make available data in a simple way for end users to have a support decision tool that increases the performance of decision making (Al-Natsheh, 2010).

How these scenarios impact information quality in business intelligence applications and lead to nontrivial research challenges. They describe the idea of uncertain events and key indicators and present a model to express and store uncertainty and a tool to compute and visualize uncertain key indicators (Maira, 2009)

The current situation of business environment and business intelligence systems (BIS) framework at first, and studies the theoretic and methods about the business intelligence system based on ontology. Based on ontology, this paper proposes an integration framework for business intelligence systems (Chen, 2010)

A first of a kind system, called business intelligence from voice of customer (BIVoC), that can: 1) combine unstructured information and structured information in an information intensive enterprise and 2) derive richer business insights from the combined data (Mircea, 2009).

The commercialization of a business intelligence application deploying computational intelligence techniques. Theoretical foundations are included where appropriate, along with implementation and comparative benchmark results. Discussions on technology transfer mechanisms are included, identifying a generic framework for the commercialization of technology innovations, with a particular case study from Jordan (arnott, 2005).

The application framework of enterprise business intelligence (BI), build a reference system of business intelligence application for enterprises. By analyzing technology implementation and data logic of a real enterprise IT planning scheme model, Hubei provincial branch of China National Tobacco Corporation (CNTC) BI planning, a feasible enterprise business intelligence design model is put forward in this article (Nylund, 1999).

By drawing on case law from analogous statutes to offer a test that courts could use to define the mens rea of the foreign benefit element in a way that limits the reach of the

law while respecting the text of the statute (Bolloju, 2002).

The utilization of competitive intelligence tools for effective strategic planning in higher education in the U.S and introduces a more marketplace and corporate mind-set into a setting driven by academic values and nonprofit culture (Barrento, 2010).

Many dimensions of business model innovation, focusing particularly on the relationship between a company and its customers, and the methods that companies use to grasp the bigger picture, or whole system perspective, that enables them to understand how their enterprise relates to the larger industry and broader economy in which it operates (Kahraman, 2011).

Business intelligence in advance exploiting an adaptive approach. The idea is to learn business strategy once new negotiation model rise in the e-market arena. It is used open source software that implements a fully distributed open environment for business negotiation (Aciar, 2009)

Specific case of business intelligence (BI) infrastructures, should be decided according to the speed of the decision-making processes, which are usually executed in real time. It is determine the flexibility rate at which the business can grow. Businesses grow but the key drivers can remain the same. It analyzes the elements required for an optimal deployment of smart decision architectures (Pina,2008)

An overview of the applied business intelligence methods with regard to the utilization of the information and data

necessary for further analyses. Covering the period from 1 January 2005 to 1 January 2007, the data on defects in all model ranges of the modern air-conditioned passenger carriages were collected, processed and analyzed by applying different methods. Based on the results of the analysis, the most important causes of defects in the air-conditioned carriages were identified (Ranjan, 2008).

The implementation of business rules, as an essential part in the development of BI systems, proper for the actual business climate and its underlying fluctuations. Business Intelligence (BI) is one of the instruments that offer support in getting beyond crisis. If properly developed and implemented, BI can lead to improvements in decision making and to operational efficiency (Wu, 2010).

Enterprise adoption of open source business intelligence (BI) is on the upswing, even in use cases where the solution is embedded into a mission-critical application. This paper will offer some key “do” and “don’t” tips to help the reader avoid common mistakes or missteps (Larson, 2009).

ERP software vendors such as SAP and Oracle have started to offer extended products, such as BI application, because they have realized the shortcomings of their system in providing decision making support.

In Table 1, BI definitions are sorted based on three approaches: a managerial approach, a technical approach, and an approach to BI as an enabler of enterprise systems.

Table 1. Business Intelligence Definition (Ghazanfari, 2011)

| Definition | Managerial Approach | Technical Approach | Sistem Approach |
|------------|--|--|--|
| Focus | Excellence of management decision-making process | Tools that support the process of BI managerial Approach | Value-added features on supporting information |
| Reference | [2,11,12, 14, 20, 24, 26, 28,31,34] | [2, 7, 9, 32, 35,50, 56,74,85,86,87] | [14,17,33,39, 48,64] |

BI EVALUATION CRITERIA

Business Intelligence can be evaluates by Supply Chain, CRM criteria.

A. Supply Chain

Business Intelligence, the basic technology of Business Intelligence, and the contents of Supply Chain Integration and focuses on the

analysis of the application of Business Intelligence in Supply Chain Integration to provide basis for enterprises to implement Business Intelligence (Liu, 2010).

Supply Chain Business Intelligence introduces driving forces for its adoption and describes the supply chain BI architecture. The global supply chain performance measurement system based on the process reference model is described. The main cutting-edge technologies such as service-oriented architecture (SOA), business activity monitoring (BAM), web portals, data mining, and their role in BI systems are also discussed. Finally, key BI trends and technologies that will influence future systems are described (Stefanovic, 2009).

B. CRM

CRM systems and Business Intelligence provides a holistic approach to customers which includes improvements in customer profiling, simpler detection value for customers, measuring the success of the company in satisfying its customers, and create a comprehensive customer relationship management (Habul, 2010).

A conceptual and a technological infrastructure was proposed and integrated into a Student Relationship Management (SRM) system associated with Business Intelligence concepts and technologies used to obtain knowledge about the students and to support the decision making process (Piedade, 2010).

In an in depth study of organizations across North America and Europe, IDC found the average return on an investment in business analytics was 431%. While more than 60% of organizations surveyed by IDC said they would spend part of their budgets on BI in the next 12 months. Maybe BI can take a page out of the CRM book when it comes to marketing and scale down solutions to meet the needs of companies that don't have the deep pockets of the financial services industry (Liu, 2010).

E-business intelligence aims to develop a tremendous spectrum of business opportunities and user's adoption of the business intelligence is very important and

relevant propositions are made (Stefanovic, 2009).

As more retailers evolve into customer-centric and segment-based business, business intelligence (BI) and customer relationship management (CRM) systems are playing a key role in achieving and maintaining competitive advantage (Phan, 2010)

Methods of raising corporation's decision-making ability which based on Web service are introduced in this paper. Several research results are also introduced here: the application of some business software, such as Enterprise Resource Planning, Customer Resources Management, Supply Chain Management and so on; the corporation's effective analysis of data; methods of building Business Intelligence network. Cooperation of business intelligence system and share of knowledge will be realized between corporations (Yujun, 2009)

Many CRM researches have been performed to calculate customer profitability and develop a comprehensive model of it. A multi-agent-based system, called the survey-based profitable customers segmentation system that executes the customer satisfaction survey and conducts the mining of customer satisfaction survey, socio-demographic and accounting database through the integrated uses of business intelligence tools such as DEA (Data Envelopment Analysis), Self-Organizing Map (SOM) neural network and C4.5 for the profitable customers segmentation. A case study on a Motor company's profitable customer segmentation is illustrated (Huang, 2010)

C. Quality Management System

Researches the application of Quality Management Systems in ISO-9001:2000-standard-based Business Intelligence Services. Some of the topics here in addressed are as follows: concepts of Business Intelligence, its services and products; ISO 9001:2000 Quality Management Systems (QMS), their characteristics, benefits/disadvantages; and the results of implementing an ISO-9001:2000-standard-based QMS in a Center

for Business Intelligence Services (Cartaya, 2008).

Gartner's leading BI analysts highlighted several major flaws: 1. Too many IT departments build a data warehouse on the assumption that once it is built, users will automatically see the benefit. 2. Reliance on spreadsheets. 3. Data quality (Maira, 2009).

3. BUSINESS INTELLIGENCE DEFINITION

There are three definition of Business Intelligence, from managerial approach, technical approach and system approach.

BI Evaluation Criteria

BI Evaluation Criteria can be divided into Supply Chain Management (SCM), Customer Relationship Management (CRM) and Quality Management System (Table 1).

Table 1. BI Evaluation Criteria

| No | Criteria Name | Related Studies |
|----|----------------------------------|-----------------|
| 1 | Supply Chain Management | 2,31 |
| 2 | Customer Relationship Management | 9, 26,17,34,28 |
| 3 | Quality Management System | 5,20 |

Limitation of approaches

Limitation of approaches is sum of papers and the topic that related to BI research.

FUTURE WORK

The study was conducted to Milk Agro industry scale Medium Enterprises in Indonesia. The systems approach combined with the design of BI systems which consists of 4 stages to obtain the BI system prototype. The 4 stage is Analyze, Design, Planning, Implementation and Controlling. The research will integrated between BI, UML (Unified Modelling Language), Data Mining, Data Warehouse, OLAP, Artificial Intelligence and BI Scorecard.

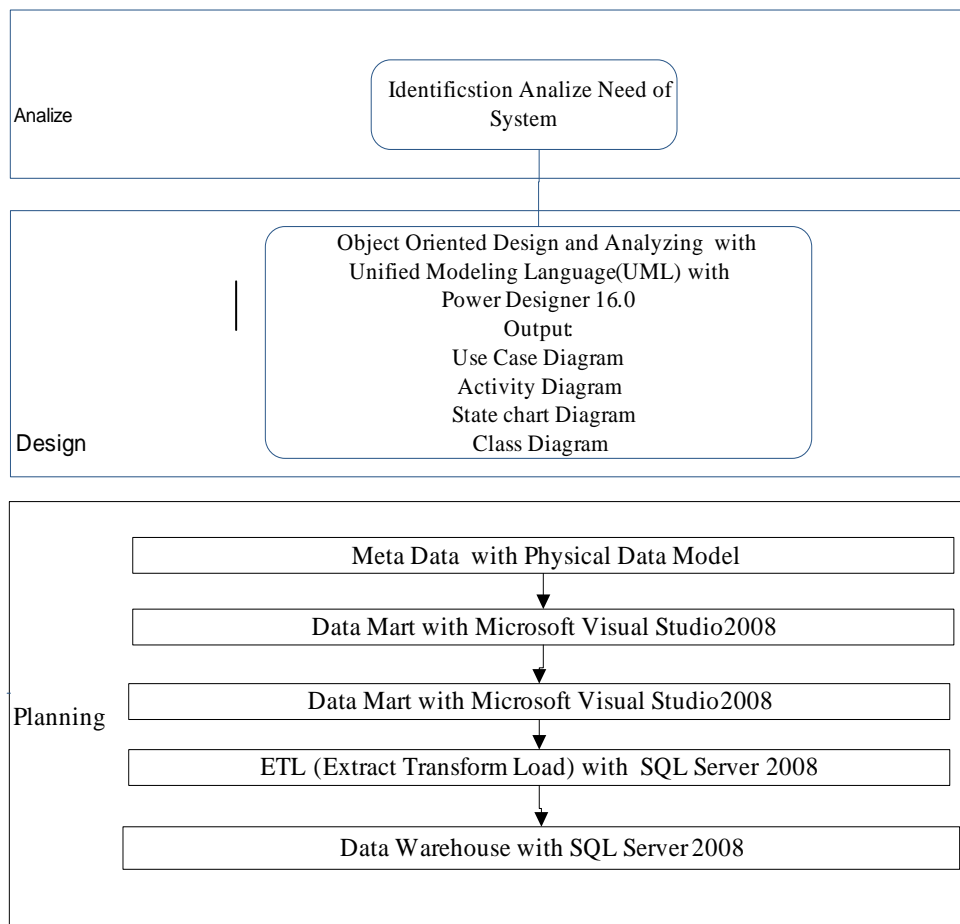


Figure 1. A Framework for research design business intelligence system

4. CONCLUSION

This paper reviews a literature on business intelligence approaches the journals and books of business intelligence system. Relates articles appearing in the international journal like Proquest, Ebscohost, Emerald, Science Direct and IEEE Conference and books are gathered.

There BI evaluation criteria that discussed in this paper are Supply Chain Management (SCM), Customer Relationship Management (CRM) and Quality Management System.

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