

Progress in Business Intelligence System research : A literature Review

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Abstract—This paper reviews the literature of Progress in Business Intelligence System research. Relates articles appearing in the international journal like Proquest, Ebscohost, Emerald, Science Direct and IEEE Conference from 2000 to 2011 are gathered and analyzed so the following three question can be answered:(1)Which approached were most popular?(ii)Which the most popular BI integrated research. 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 %. The topic that integrated with BI research that is found in this research is Supply Chain Management, Customer Relationship Management, Data Mining, Data Warehouse, Decision Support System, Performance Scorecard, Knowledge Management, Business Process Management, Artificial Intelligence, Enterprise Resource Planning, Extract Transformation Loading, OLAP, Quality Management System, Strategic Management.

Keywords: *business intelligence, data mining, data warehouse, decision support system, supply chain management, artificial intelligence, quality management system*

I. INTRODUCTION

Business Intelligence is a process for extracting, transforming, managing and analyzing large data by make a mathematical model to gain information and knowledge to help make decisions in the complex. Elements of Business Intelligence are Data Warehouse, Data Mining and Decision Support System. There are many integrated topic that is integrated in Business Intelligence System research.

The general objective of this research is to make literature review of Progress in Business Intelligence System

II. INDIVIDUAL APPROACH

A. Business Intelligence System

46,67 % papers discuss about individual approach the theoretic, method, software of business intelligence system. The papers writes the definition, methodology, architecture, case study, software that used in business intelligence system.

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

research. This paper reviews the 60 journals of business intelligence. Relates articles appearing in the international journal like Proquest, Ebscohost, Emerald, Science Direct and IEEE Conference from 2000 to 2011 are gathered

The paper is organized as follows: Section 2 dan 3 describe the individual approaches and integrated approaches critically respective. Section 4 analysis the most prevalently used approaches discuss the most popular integrated research of Business Intelligence. Section 5 suggested for future work. Section 6 concludes the paper.

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. [55]

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. [17]

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.[33]

The critical success factor in business intelligence system success seeks to bridge the gap that exist between academia and practitioner by investigating.[48]

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.[50]

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.[19]

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. [7]

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. [3]

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.[41]

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. [47]

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. [46]

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 .[2]

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. [56]

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.[58]

The relate components of a business intelligence system gives a complete Business intelligence solution with Microsoft SQL Server 2005. [57]

How to deliver BI solution with BI stack is used by Microsoft business intelligence stack and BI products.[59]

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. [8]

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. [4]

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.[32]

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.[1]

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. [60]

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.[28]

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. [29]

The state-of-art concept of process-oriented business intelligence and analyzes its application architecture in manufacturing enterprises from the organizational aspect. An application case in manufacturing process is put forward to illuminate function and benefits of process-oriented business intelligence for manufacturing process users.[6]

The Internet changed the trading game by making market information instantly available to many more people, spawning a large population of day traders, bloggers, and market speculators. Information generation and analysis, long the province of well-funded, large financial institutions, has become fair game for all, even people with limited means, from college students to retirees. [11]

Mobile business intelligence tool (MBIT) aims to provide these features in a flexible and cost-efficient manner. It describes the detailed architecture of MBIT to overcome the limitations of existing mobile business intelligence tools. It discuss the benefits of using service oriented architecture to design flexible and platform independent mobile business applications.[42]

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. [35]

III. INTEGRATED APPROACH

A. Integrated between BI, Supply Chain

3,33 % papers discuss about integrated between BI and Supply Chain Management.

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.[24]

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.[45]

B. Integrated between BI, CRM System

6,67 % papers discuss about integrated between BI and Customer Relationship Management System.

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. [13]

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. [37]

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.[24]

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.[52]

C. Integrated between BI, Data Mining

5 % papers discuss about integrated between BI and Data Mining.

A data mining methodology called Business Intelligence-driven Data Mining (BIddM) combines knowledge-driven data mining and method-driven data mining, and fills the gap between business intelligence knowledge and existent various data mining methods in e-Business. BIddM contains two processes: a construction process of a four-layer framework and a data mining process. A methodology is established in setting up the four-layer framework, which is an important part in BIddM. A case study of B2C e-Shop is provided to illustrate the use of BIddM. [55]

Business intelligence is information about a company's past performance that is used to help predict the company's future performance. It can reveal emerging trends from which the company might profit. Data mining allows users to sift through the enormous amount of information available in data warehouses; it is from this sifting process that business intelligence gems may be found. [40]

The business intelligence explorer did optimize the search result or not, this paper chose three research objects, Google, Quintura, Clusty, and conducted an analysis of variance in terms of efficiency, effectiveness and usability. The result shows that visualization and clustering techniques offers practical implications for search engine users. [51]

D. Integrated between BI, AI (Artificial Intelligence)

3,33 % papers discuss about integrated between BI and Artificial Intelligence.

A business intelligence application of neural networks in analyzing consumer heterogeneity in the context of eating-out behavior in Taiwan. The data set for this study has been collected through a survey of 800 Taiwanese consumers. The results of our data analysis show that the neural network rule extraction algorithm is able to find distinct consumer segments and predict the consumers within each segment with good accuracy. [14]

A hybrid fuzzy-Delphi-AHP approach to propose a more comprehensive framework with specific business elements, and also points out six performance indices for firms to adjust business strategy. In order to reduce business risk in developing international markets, using the alliance model is a key strategy for information service firms. On the other hand, firms should handle more accurate business information to support their business intelligence (BI) system to make better business decisions. [30]

E. Integrated between BI and OLAP

3,33 % papers discuss about integrated between BI and OLAP.

The use of business intelligence and OLAP tools in e-learning environments and presents a case study of how to apply these technologies in the database of an e-learning system. The study shows that students spend little time with course courseware and prefer to use collaborative activities, such as virtual classroom and forums instead of just viewing the learning material.[9]

The importance of Intelligence Systems as well as the architecture of OLAP decisional interactive support systems. [39]

F. Integrated between BI, Knowledge Management

1,67 % papers discuss about integrated between BI and Knowledge Management.

The relation between business intelligence and knowledge management is analyzed. The conceptual maps, their objectives, components, construction failures, as well as their main advantages for a significant learning are defined as intelligence products. Finally, the execution of an intelligence product is illustrated by using mapping and geo-reference techniques aimed at facilitating a substantial learning on the part of its users. [38]

G. Integrated between BI, Business Process Management

3,33 % papers discuss about integrated between BI and Business Process Management

BPM implementation often combines financial with non-financial metrics that can identify the health of an enterprise from a variety of perspectives. BI and BPM applications implement multidimensional models, powerful models for data analysis and simulation. The present paper describes a multidimensional model that supports the construction of the master budget of an enterprise with simulation facilities.[43]

It is leverage the large data infrastructure investments (e.g. ERP systems) made by firms, and have the potential to realize the substantial value locked up in a firm's data

resources. Business investment in BI systems is continuing to accelerate, there is a complete absence of a specific and rigorous method to measure the realized business value, if any. It is developed a new measure that is based on an understanding of the characteristics of BI systems in a process-oriented framework. [30]

H. Integrated between BI and Strategic Management

3,33 % papers discuss about integrated between BI and OLAP.

How management of sustainability in organisations can be supported by business intelligence (BI) systems. One phase of any BI project, the information planning phase, i.e., the systematic way of defining relevant information in order to integrate it in reporting activities. Using grounded theory, the main contribution of this study is to propose a conceptual model that seeks to support the process of integration of socio-environmental indicators into organizational strategy for sustainability [27]

Evidence suggests that some factors can determine the successful implementation of strategic IT systems, i.e. Business Intelligence operations they are painstakingly difficult to implement. This paper identify some strategic and tactical actions that Chinese CEOs can use to foster a knowledge sharing culture that is conducive to BI systems implementation.[44]

Business intelligence (BI) is a strategic approach for systematically targeting, tracking, communicating and transforming relevant weak signs into actionable information on which strategic decision-making is based. Despite the increasing importance of BI, there is little underlying theoretical work, which directly can guide the interpretation of ambiguous weak signs. It gives an insight into the issue through a new strategic business intelligence system called *PUZZLE*. It describe this system and validate it by designing a prototype, test the system using in-depth interviews, and hold learning sessions in order to further knowledge about BI. [20]

I. Integrated between BI and ANP (Analytic Network Process)

1,67 % papers discuss about integrated between BI and ANP.

The electronization has enabled (BI) systems for the purpose of decision-making. It is important to clarify the impact factors of a BI system and find out a suitable assessment method to evaluate the performance of BI systems. An analytic network process (ANP) based assessment model was constructed to assess the effectiveness of BI systems. The results indicate that the most critical factors that impact the effectiveness of a BI system are: output information accuracy, conformity to the requirements, and support of organizational efficiency. [53]

I. Integrated between BI, Quality Management System

1,67 % papers discuss about integrated between BI, 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. Also, there is an analysis of the advantages and disadvantages generated by it for the organization. [5]

J. Integrated between BI, CRM and Data Mining

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. When the first Fingerhut company peaked in 1998, as many as 200 analysts and 40 statisticians mined the database for insights that helped predict consumer shopping patterns and credit behaviour. Data mining and BI helped Fingerhut spot shopping patterns, bring product offerings to the right customers, and nurture customer relationships. [36]

K. Integrated between BI, DSS (Decision Support System), Performance Scorecard

1,67 % papers discuss about integrated between BI and Decision Support System, Performance Scorecard.

Office of Higher Education Commission uses Microsoft SQL Server 2005 Business Intelligence Enterprise Data Integration Tool to develop OHEC DSS and develop a web application to develop the Executive Decision Support System (DSS). It is developed a Performance Scorecard, interactive and Business Insight Report after making BI [21]

L. Integrated between BI, AI, and Data Mining

5 % papers discuss about integrated between BI (Business Intelligence), AI (Artificial Intelligence) and Data Mining

The evolution of BI is divided into 3 stages: The existence of a business information system that covers the operational activities of the business and operational data, historical data has been separated from operational data into data warehouse designed to store and access data quickly, BI systems currently involve data mining techniques and artificial intelligence in the extract knowledge for decision making. [20]

This papers discuss about efficient data mining tools and presents an intelligent BI system framework based on many computational intelligence paradigms, including a predictor tool based on neuro-computing (cerebellar model articulation controller neural network, CMAC NN), a classifier tool based on neuro-computing (CMAC NN) and optimizer tools

based on evolutionary computing and artificial life (such as real-coded genetic algorithm and artificial immune system). [17]

Information about the benefits using Commercial Off-the-Shelf (COTS) business intelligence software tools to support aircraft and automated test system maintenance environments. By using these engineering cluster models produced earlier to develop and build more accurate predictive models, predictive algorithms are utilized to make use of the cluster results to improve predictive accuracy. Common industry business intelligence Decision Trees and Neural Network models are developed to determine which algorithm produces the most accurate models (as measured by comparing predictions with actual values over the testing set). After an initial mining structure and mining model is built (specifying the input and predictable attributes), the analyst can easily add other mining models. [12]

M. Integrated between BI, Data Mining, Knowledge Management

1,67 % papers discuss about integrated between BI, Data Mining and Knowledge Management

A novel model employing knowledge management in data mining process to reduce data, analysis and action latency of real-time business intelligence. [15]

N. Integrated between BI, Business Process Management (BPM), Knowledge Management (KM)

1,67% papers discuss about integrated between BI, BPM and Knowledge Management

That further opportunities for business value creation could be discovered through systematic analysis of the non-technical aspects of BI and BPM integration, especially in terms of strategy alignment, human-centered knowledge management and ongoing improvement of BI supported processes. The paper proposes a theoretical framework founded in the related research in BPM, BI and Knowledge Management (KM) fields and describes how it has been used to guide our empirical case study research in service organizations in the context of BI-supported customer-facing processes. [25]

O. Integrated between BI, CRM, SCM dan ERP

1,67 % papers discuss about integrated between BI, CRM, SCM and ERP

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. [52]

P. Integrated between BI, ETL and OLAP

3,33 % papers discuss about integrated between BI, ETL, OLAP

Business intelligence (BI) tools to take the mechanics out of the process. 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. The BI world is full of technical terms, such as extract, transform & load (ETL) and data warehouses. This may explain why the technology has not done well in organizations with no IT department. First, data must be extracted, usually from multiple sources, and transformed (cleaned up) for consistency and accuracy. Then it is loaded into a data warehouse that stores the data in a logical way. ETL can account for 50% of the total cost of a BI implementation. With an OLAP cube, you can interactively slice and dice the data across multiple dimensions and drill down for more detail.[26]

A process oriented to the addition of business intelligence (BI) elements at Universidad de Tarapacá (UTA), Arica, Chile. For the purpose, a data mart (DM) was implemented, focused on the Admission and Registration area of Academic Vice-Rector. Its development required carrying out activities such as to obtain business requirements, to investigate the area key performance indicator (KPI), to analyze several internal information sources and to develop a dimensional model based on the Kimball star schema. For proper implementation and integration of these data repositories, extraction, transformation and loading (ETL) processes were carried out from two data sources. The creation of this DM, allowed users of the Academic Vice-Rector to visualize the information they required through online analytical processing (OLAP) tools. [10]

Q. Integrated between BI, Data Mining, Decision Support System, Strategic Management

1,67 % papers discuss about integrated between BI, Data Mining, Decision Support System, Strategic Management.

A Business Intelligence process for ISP dealers in Taiwan to assist management in developing effective service management strategies. It is explored the customers' usage characteristics and preference knowledge through applying the attribute-oriented induction (AOI) method on IP traffic data of users. Using the self-organizing map (SOM) method, it is divided customers into clusters with different usage behavior patterns. It is apply RFM modeling to calibrate customers' value of each cluster, which will enable the management to develop direct and effective marketing strategies. With actual data from one major ISP, it is develop a BI decision support system with visual presentation, which is well received by its management staff.[23]

R. Integrated between BI, CRM and AI

1,67 % papers discuss about integrated between BI, CRM (Customer Relationship Management) and AI (Artificial Intelligence).

Many CRM researches have been performed to calculate customer profitability and develop a comprehensive model of it. This paper aims at providing an easy, efficient and more practical alternative approach based on the customer satisfaction survey for the profitable customers segmentation. 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.[17].

IV. OBSERVATION AND RECOMMENDATION

A. The most popular approach

The most popular approach is single approach Business Intelligence System with 46,67 % of paper discuss it.

They discuss about the theoretic, method, model, architecture, tools, system and case study of implementation of Business Intelligence.

There are Business Intelligence from Voice of Customer. There are Even Driven Architecture, process oriented and service oriented architecture.

There are many software that is used in Business Intelligence System research like SharePoint Server 2007, Microsoft SQL Server 2005, Microsoft business intelligence stack and BI products, and finally, describes how to deliver BI solution with BI stack, and open source Business Intelligence.

B. The most popular BI integrated research

The most popular BI integrated research is Integrated between Business Intelligence and CRM System with 6,67 % papers. Integrated between BI, Data Mining 5 % and Integrated between BI, AI and, Data Mining 5 %

The topic that integrated with BI research that is found in this research is Supply Chain Management, Customer Relationship Management, Data Mining, Data Warehouse, Decision Support System, Performance Scorecard, Knowledge Management, Business Process Management, Artificial Intelligence, Enterprise Resource Planning, Extract Transformation Loading, OLAP, Quality Management System.

Table 1. Topic that integrated with Business Intelligence System

NO	TOPIC	SUM	PERCENTAGE
1	Business Intelligence System	28	46.67%
2	Integrated between BI,Supply Chain	2	3.33%
3	Integrated between BI, CRM System	4	6.67%
4	Integrated between BI, Data Mining	3	5.00%
5	Integrated between BI, AI (Artificial Intelligence)	2	3.33%
6	Integrated between BI and OLAP	2	3.33%
7	Integrated between BI, Knowledge Management	1	1.67%
8	Integrated between BI and BPM	2	3.33%
9	Integrated between BI and Strategic Management	2	3.33%
10	Integrated between BI and ANP	1	1.67%
11	Integrated between BI, Quality Management System	1	1.67%
12	Integrated between BI,CRM, Data Mining	1	1.67%
13	Integrated between BI, DSS, Performance Scorecard	1	1.67%
14	Integrated between BI,AI and,Data Mining	3	5.00%
15	Integrated BI,Data Mining, Knowledge Management	1	1.67%
16	Integrated between BI, Business Process Management,KM	1	1.67%
17	Integrated between BI,CRM, SCM dan ERP	1	1.67%
18	Integrated between BI, ETL and OLAP	2	3.33%
19	Integrated between BI, Data Mining,DSS,Strategy Management	1	1.67%
20	Integrated between BI, CRM and AI	1	1.67%
		60	100.00%

C. Limitation of approaches

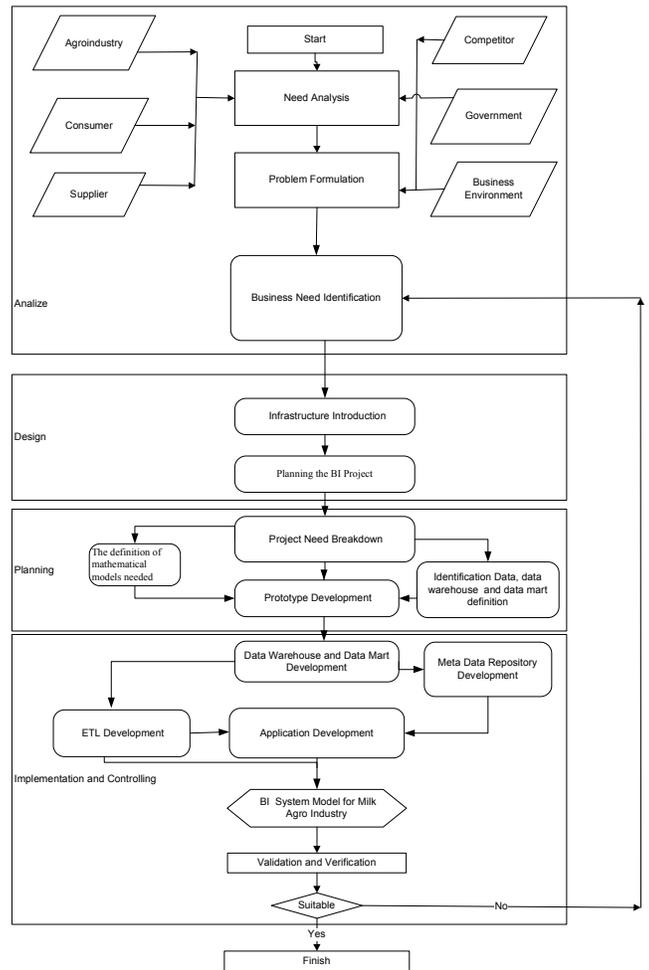
Limitation of approaches is sum of papers and the topic that related to BI research. The topic that integrated with BI research is in this research is Supply Chain Management, Customer Relationship Management, Data Mining, Data Warehouse, Decision Support System, Performance Scorecard, Knowledge Management, Business Process Management, Artificial Intelligence, Enterprise Resource Planning, Extract Transformation Language, OLAP, Quality Management System and Strategic Management

V. 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 and 12 steps to obtain the BI system prototype. The 4 stage is Analyze, Design, Planning, Implementation and Controlling. The 12 steps is Need Analysis; Problem Formulation; Business Need Identification; Infrastructure Introduction; Planning the BI Project; Identification Data, Data Warehouse, Data Mart Definition; The definition of mathematical model needed; Data Warehouse and Data Mart Development; Meta Data Repository Development; ETL Development; Application Development; Validation and Verification.

The research will integrated between BI, Data Mining, Data Warehouse, OLAP, Artificial Intelligence, Business Process Management and BI Scorecard.



ETL: Extract, Transformation and Loading
Figure 1 Framework for Research Design Business Intelligence System

VI. CONCLUSION

This paper reviews is based on a literature review on business intelligence approaches the 60 journals of business intelligence system. Relates articles appearing in the international journal like Proquest, Ebscohost, Emerald,

Science Direct and IEEE Conference from 2000 to 2011 are gathered

It was found 46,67 % research is in single approach Business Intelligence System. Integrated between Business Intelligence and Customer Relationship Management is the most popular evaluating criteria with 6,67 %. Integrated between BI, Data Mining 5 % and Integrated between BI, AI and, Data Mining 5 %

The topic that integrated with BI research that is found in this research is Supply Chain Management, Customer Relationship Management, Data Mining, Data Warehouse, Decision Support System, Performance Scorecard, Knowledge Management, Business Process Management, Artificial Intelligence, Enterprise Resource Planning, Extract Transformation Loading, OLAP, Quality Management System.

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