CHAPTER II

LITERATURE REVIEW

2.1. Inductive Study

There are several previous studies about BI. Vajirakachorn & Chongwatpol (2017) conducted a study about the application of BI in the tourism industry. The object of this research was the local food festival in Thailand. This study was focussed on integrating a business intelligence framework to manage and run data into insight for festival tourism. The framework of this research combined the architecture of database management, business analytics, business performance management, and data visualization to get insight from the visitor data.

Lennerholt et al. (2018) studied about the implementation challenge of self-service BI with focusing their research as literature review. This research argued that eventhough SSBI approach promises more benefits compared with traditional BI system, many organization fail to implement SSBI. The literature review presented in this paper discusses six SSBI challenges related to "access and use of data" and four challenges related to "self-reliant users". Awareness of these ten challenges can help practitioners avoid common pitfalls, when implementing SSBI, as well as guide SSBI researchers in focusing on their future research efforts

Bonney (2013) studied about the applicability of business intelligence in electronic health record. It is essential to use busines intelligence because the increase need of deploying Electronic Health Record (EHR) and Electronic Medical Record (EMR). The clicinicians and healthcare providers needs to have real-time decision supports by applying business intelligent. This research was conducted literature review to explore the key benefit, challenges, and obstacles for implementing BI technology into EHR.

Sangar and A.Iahad (2013) assessed the critical factors that affect the success of Business Intelligence Systems (BIS) implementation in an organization. This research was conducted because many BIS implementations are not implemented successfully because of time consuming and expensive. This research assessed the critical success factor into 3 stages such as pre-implementation, implementation, post-implementation. It is apparent that there are 2 critical success factors in BIS implementation which are managerial and technological.

Radenkovic et al. (2018) studied about harnessing BI in smart grids: A case of the electricity market. This research was analysed the analytical aspects of smart grids and transform insight into the development of business intelligence. Based on this research, it is stated that business intelligence leads to more effective market management in data-rich market.

Gaardboe et al. (2017) assessed the BI success applied to healthcare information systems. In this study, it was empirically tested on 12 public hospitals in Denmark. The result of this study shows that there are several factors affect the success of business intelligence success such as system quality, information quality, and user satisfaction.

Al-Aqrabi et al. (2014) studied about the Cloud BI: Future of BI in the Cloud. BI will face a resource crunch situation due to data warehouse storage and OLAP demands. Based on this research, Cloud computing has investigated that a new hope for future prospects. The result of this study shows that cloud server can efficiently process OLAP application demands on Cloud computing

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Silahtaroğlu and Alayoglu (2016) assessed the feasibility of BIsystem by study about using or not using BI and big data for strategic management: an empirical study based on interviews with executives in various sectors. This study conducted interview with the top executives of the firms which are doing business in various sectors. The findings of the study show that eight of the firms did not use any tools related to strategic management as it was anticipated before the study. Only two of the firms used such tools, nevertheless it may be categorized as partially usage of BI tools.

Banerjee and Mishra (2015) studied about the retail supply chain management practices in India using BI perspective. This study assessed the importance of BI in their operations. The findings of this research are that 9 dimensions of for Supply Chain Management (SCM) practices and 4 dimensions of competitive advantages are strongly related to each other. Information sharing is made competitive advantages between supplier and retailers.

Peters et al. (2016) studied about BI systems used in performance measurement capabilities: Implications for enhanced competitive advantage. The purpose of this study was to assess the quality of BI system improves the quality of management control systems. The result of this study showed that BI affects quality on performance measurement capabilities. These capabilities are positively associated with competitive advantage.

Zilli (2014) studied about self-service BI for higher education management. This study shows the development of SSBI as decision support system in higher education as part of an ongoing assurance initiative. There are several KPI's applied to this case study such as student enrolment, exam performance rate, coursework, undergraduate retention rate, graduation rate, and academic workload.

Kabakchieva (2015) studied about the application of BI for analyzing university student data. BI approach was used to analyze data and get profound knowledge of the students, their individual learning characteristics, and specific educational needs. This research was presented an example of BI implementation for student data analysis.

The research position is shown by Table 2.1. This table shows the related researches about BI system and applications.

Table 2.1 Research position

No	Author	Year	Self-Service	Business Intelligent	Performance Measurement	Design & Development	Critical Success Factor	Manufacture	Retail	Service
				Research Focus				Object		
1	Vajirakachorn and Chongwatpol	2017		✓		✓				✓
2	Bonney	2013		✓	✓					✓
4	Lennerholt et al.	2018	✓	✓			✓			
5	Sangar and A.Iahad	2013		✓			✓	✓		✓
6	Radenkovic et al.	2018		✓		✓		✓		
7	Gaardboe et al.	2017		✓			✓			✓
8	Al-Aqrabi et al.	2014		✓		✓				
9	Silahtaroglu and Alayoglu	2016		✓	✓			✓		✓
10	Banerjee and Mishra	2015		✓	✓				✓	
11	Peters et al.	2016		✓	✓			✓		
12	Zilli	2014	✓	✓		✓				✓
13	Kabakchieva	2015		✓		✓				✓
13	Rahman	2018	✓	✓		✓		✓		

2.2. Deductive Study

2.2.1. Information System

Information is the base-decisions within the value chain, making enterprises dependent on the implementation of modern information systems (IS) to stay competitive (Al-adaile, 2009). Traditionally, organizations implement information systems to solve internal business problems. As a result, a lot of information systems were become common sights in organizations. With the advancement of technologies that are outward in orientation (Rees & Hopkins, 2009), organizations see the need to integrate the information systems with new technologies. Previous research stated that the aim of information systems integration is to maximize business performance, productivity, and improvement (Bhatt, 2000).

One of the information system implementations is by enabling real-time data access or providing business intelligence functions. Simultaneously, the amount of business using the comprehensive IS were arises among others; the IS comprises e-commerce systems, knowledge management systems, and decision support systems. Therefore, many success models have been developed, complicating the validation and comparison of the antecedents of IS success. The most cited IS success model was developed by (DeLone & McLean, 1992). It introduced six alternate measures of IS success, which are system quality, information quality, user satisfaction, system use, individual impact and organizational impact. Figure 2.1 shows the D&M Information System Model.
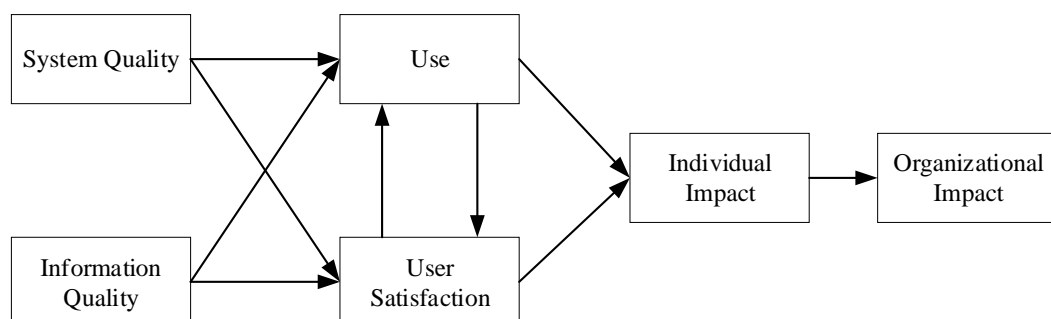

Figure 2.1 D&M Success Model

According to DeLone and McLean (1992), system quality is the quality measurement of information processing, while information quality is the quality measurement of the output from information systems. System use refers to recipient consumption of an information system while user satisfaction is the user response to the use of output of an information system. The individual impact is the effect the information has on the user's behavior including improving personal or departmental performance, and organizational impact refers to the effect of information on organizational performance.

2.2.2. Definition of BI

BI is defined as systems which collect, transform, and present structured data from multiple sources (Negash, 2008). BI is defined as the process of taking large amounts, analyze, and presents a high-level set of reports of data into the basis of business actions, enabling management to make fundamental daily business decisions (Stackowiak et al., 2007). Thus, a BI system can be called a decision support system (DSS). BI provides historical, current, and predictive views of business operations. Common functions of BI technologies are reporting, online analytical processing, analytics, data mining, business performance management, benchmarking, text mining, and predictive analytics.

BI tools are seen as a technology that enables the efficiency of business operation by providing an increased value to the enterprise information and hence the way this information is utilized. A good BI definition must encompass both business purpose and technical functionality. BI systems require, at a minimum, four specific components to produce business intelligence. These components are (Olszak and Ziemba, 2006):

1. Data Warehouses

   A subject-oriented, collection of data used to support decision making in organizations

2. ETL (Extraction Transformation Load) Tools

   Processes and tools used to extract data from legacy systems and external sources then transforming and pre-processing the data into a useful format to load into data warehouse structures.

3. OLAP (On-Line Analytical Processing) Techniques

Provides multidimensional, summarized views of business data and is used for reporting, analysis, modeling and planning for optimizing the business. OLAP techniques and tools can be used to work with data warehouses or data marts designed for sophisticated enterprise intelligence systems.

4. Data Mining

Tools specifically designed to identify patterns, relationships, and rules within the data warehouse.

2.2.3. Benefits of BI

BI is widely used, it is no doubt one of the most used systems in the modern business landscape. There are several benefits from the BI system, such as:

1. Faster decision making

BI helps the executive to make the decision by the executives faster. If there are no BI solutions, the decision-making process often involves a considerable amount of presumptions. By having BI solutions, the detailed report and analysis can be executed to faster the decision making of key executives.

2. Real-time Performance Measurement

BI tools continuously monitor the large amount of data generated by the company to analysing several performance metrics such as efficiency, sales figures and marketing cost in a real-time environment.

3. Improved Reporting Speed

BI users can access large amounts of unprocessed data in the form of organized and readable reports that present information in an interactive manner within a short amount of time. This eliminates the need to sift through loads of data and printing a pile of various reports.

4. Greater Insight into Customer Behaviour

BI can analyse sales figures and customer feedback to represent facts that tell a business a great deal about their customer's preferences and needs. Using IT products as the examples, logged customer information can be sent back to a company's servers to be analysed to get an idea of how the customers are responding to the design of a particular software product.

5. Identify New Business Opportunities

BI can identify new business opportunities resulted from the analysis appear.

2.2.4. General Architecture of BI

BI architecture is the framework to organize components and set up standards for develops BI system. It also includes the technologies and tools used to support the development process. Ong, Siew, & Wong (2011) proposed a five layered BI architecture. This architecture consists of data source layer, Extract Transform Load (ETL) layer, data warehouse layer, end user layer and metadata layer. The picture 2.2 shows the architecture of five-layered BI architecture.
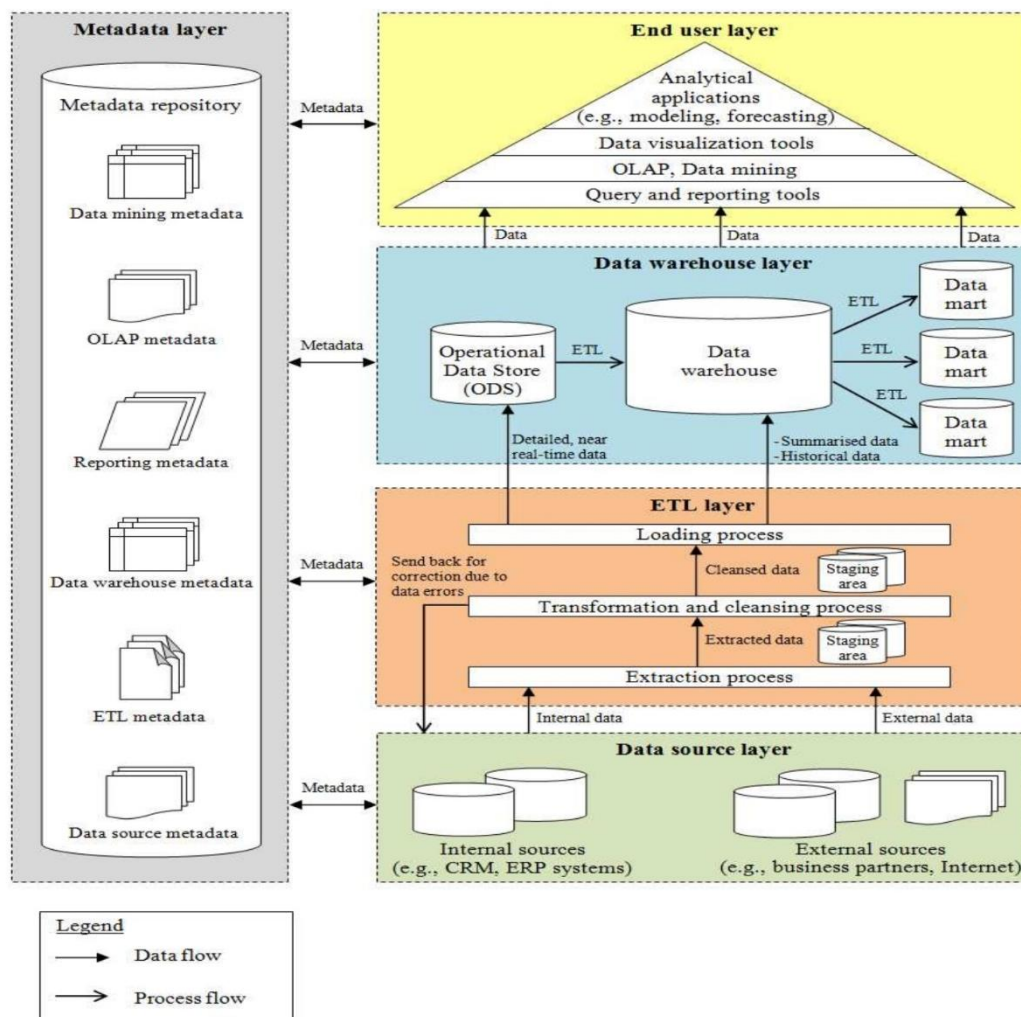

Figure 2.2 Five layered BI Architecture

2.2.5.   Self-service Business Intelligence

Self-service Business Intelligence is a concept that was proposed by Claudia Imhoff and Colin White. Imhoff & White (2011) stated that self-service BI is a facilities in BI environment that enables BI users to become more reliant and less dependent to IT department. Moreover, Self-service BI can also be called as Do-It-Yourself BI (DIY BI) which shows that the environment provided is easy to access, analyze and share data with less IT dependency.

There are four main key objectives of Self-service Business Intelligence: make BI tools easy to use, make it easy to access source data, make BI results easy to consume and enhance, and make DW solutions fast to deploy and manage. Picture 2.3 shows the main key objectives of self-service BI.
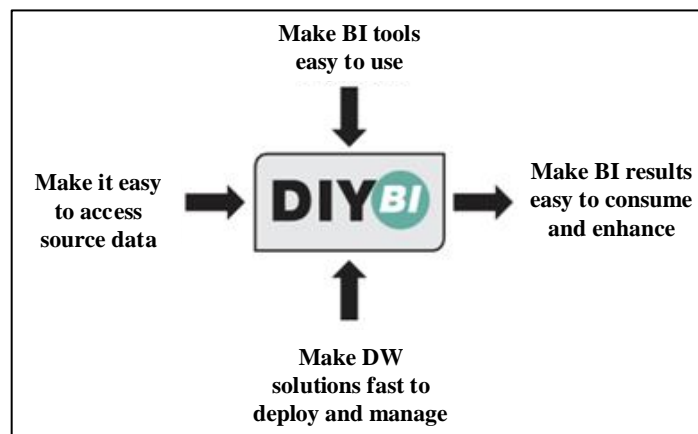

Figure 2.3 Four key objectives of Self-service BI

2.2.6.   Drivers for Self-service Business Intelligence

The emerge of Business Intelligence has gained lot of attention of business user. There are some drivers that drive the BI developers to strive for self-service BI (Imhoff & White, 2011):

1. Constantly changing business needs
2. IT's inability to satisfy new requests in a timely manner
3. The need to be a more analytics-driven organization
4. Slow or untimely access to information
5. Business user dissatisfaction with IT-delivered BI capabilities.

What are the main reasons for implementing self-service BI? (Select all that apply).

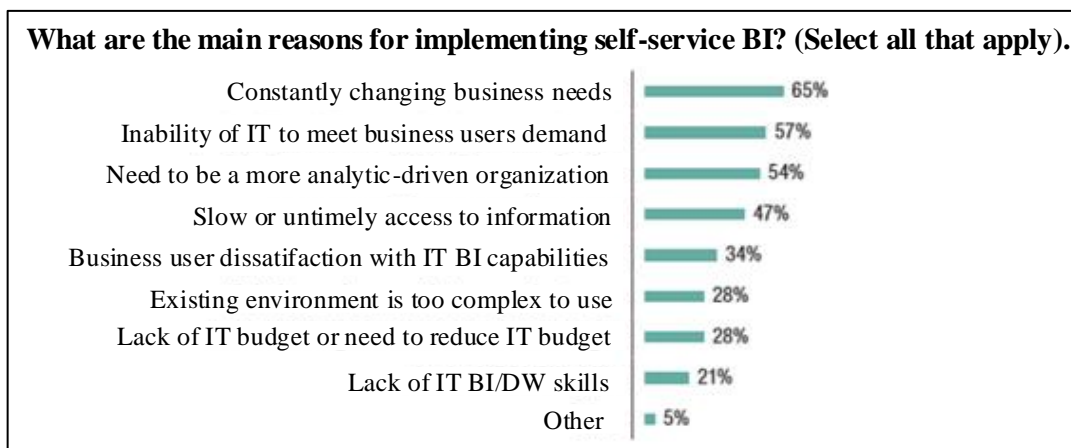|	
Constantly changing business needs	65%
Inability of IT to meet business users demand	57%
Need to be a more analytic-driven organization	54%
Slow or untimely access to information	47%
Business user dissatifaction with IT BI capabilities	34%
Existing environment is too complex to use	28%
Lack of IT budget or need to reduce IT budget	28%
Lack of IT BI/DW skills	21%
Other	5%

Figure 2.4 Drivers of implementing self-service BI

Picture 2.4 shows the drivers of implementing self-service BI. This survey was conducted from 1999 survey responses from 587 respondents.

2.2.7. Self-service BI (SSBI) vs Traditional BI

Although SSBI has lots of advantages that doesn't offered by traditional BI, it doesn't mean that SSBI substitute the traditional BI. These 2 approaches are support each other in many areas. For instance, the target of these 2 approaches are different, SSBI is suitable for business users who want to have less dependency on IT solution while traditional BI concern in contrast.

SSBI emphasizes on providing an easier tool to use with less IT involvement and usually it is a pre-defined package. SSBI let business users to have the direct access to data source, which enables a better and faster access than traditional way. In addition, SSBI allows end users to create personalized reports and analyses. IT professionals are no longer one of the key users in SSBI.

On the other hands, traditional BI is implemented according to the organization's own needs typically managed by IT professionals or a BI center. In traditional BI, IT department is not only a supportive role to help business users to understand what kind of data is available, but also one of the key roles in all tasks related to data from extracting to loading.