

Construction of Business Intelligence Model for Information Technology Sector with Decision Support System

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Abstract

Understanding and evaluating data is vital for making choices in a system. As the transactional system expands, it becomes increasingly difficult to execute analytical operations directly. Complex and huge datasets seem to be solved by analytical methods and their expansions. A lack of a clear and rigorous technique for measuring the realized value of intelligent business systems continues to be a problem, despite the fact that significant investment is being made in these systems. As a goal of the software program, an inventory management decision support system has been built. The method can be used by medium-sized industries or companies. Finding a suitable solution for the firm's size and adapting to business and decision-maker needs are the goals of this research work. Besides, the suitable solutions are measured and compared with reference data through Information Technology (IT) sectors by error computations. The computation has considered various types of errors in this research article. The proposed decision support system produces excellent results with the least amount of errors in the final output, as shown by the graphical depiction in the results and discussion section.

Keywords: Business Intelligence (BI), decision support system, information technology, Business management, business maintenance

1. Introduction

Data are collected, cleaned, processed, and analysed using Business Intelligence (BI), a high-level business application tool. The effectiveness of a decision-making system is based on how well the results can be evaluated and interpreted. Internal and external sources are used to gain information, and the accumulation of knowledge may lead to increased profitability [1-3]. Chief Information Officers (CIOs) consider BI tools to be a vital piece of technology because of their increasing variety and ease of use [4–11]. The primary goals of BI investments

are profitability and efficiency [12]. To put it simply, business intelligence is a way to build a system that helps people obtain results. Figure 1 shows the basic blocks of business intelligence system.

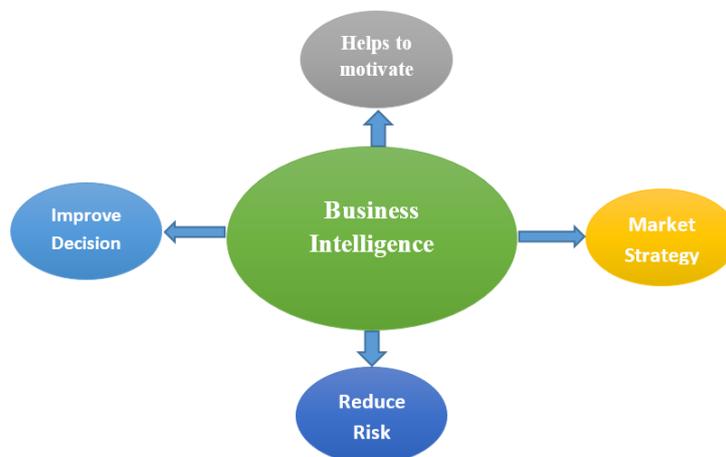


Figure 1. Business intelligence system

Some of the benefits of BI systems, like business process benefits, are intangible or qualitative in nature, and therefore cannot be measured objectively. Similarly, business data should be confidential through many strategies for achieving goals. Perception-based measurements are chosen for these reasons. It is possible to assess these "quality-related" business process advantages using perception-based measurement [13-18].

A broad range of behaviourally-oriented business and management professions employ perceptual metrics. When it comes to the influence of information technology on organisational performance, for example, senior and middle managers' views, perceptual metrics are a useful proxy [19]. Several studies illustrate how IT investments affect organisational features and results, how processing operations are conducted, and the potential of companies to leverage links between activities within and outside the company. Business intelligence systems are the kind of information technology investment that may help companies better understand the internal and external dynamics driving their business, and monitor and improve their performance [20-23].

1.1 Motivation for this research

Due to the inefficiency of transactional databases in handling the volume of information that has to be accessed, extracted, updated, and maintained, timely decision-making becomes challenging. Every industry is affected by this brevity. Therefore, this research work develops

a business intelligence system to address and provide an effective approach for business information.

2. Organization of the Research

This research article is organized as follows: Section 3 contains previous research on business intelligence. Section 4 provides the construction of a modern trend for intelligent business. Furthermore, it compares various application parameters of the proposed system with that of the previous work. The conclusion and future work are illustrated in the final section.

3. Preliminaries

Local repositories were used in [17] to process data before it is integrated into the global data warehouse, which distinguishes ETL from ELT [18]. Integration and validation of data from numerous sources were suggested in [19]. Finally, in [20], a method that improves performance and connects more with users was proposed.

Business process performance refers to the improved operational efficiency that BI systems allow in many business processes, such as cost reduction and productivity increase. The operational efficacy of BI systems in supporting diverse value chain activities was also considered a part of business process performance [21]. Organizational performance was projected to improve as a result of several business process advantages. Aside from these other aspects, it was also influenced by elements such as the scale and length of the business process, how important it is to the firm, and the competitive climate and rivals' activities [22]. Value effects throughout the full value chain were examined to resolve issues about the business process' breadth and character. In addition, the competitive and environmental implications of various businesses were examined by comparing their impacts [23].

A large-sample field survey was used to gather data for an in-depth instrument test. Purposive sampling was used to choose just those firms that utilized the focused technology for the research. The general organizations or various business units consider standard software tool to organize the region-based participation. These active technologies, focus on the smart activities for business intelligent [24]. The business strategy is to record the business intelligence system achievements. Besides, these were only included in the data collection process. This way, other BI systems from other BI providers, as well as fake responses, don't have an effect on the final result.

4. Methodologies

4.1 Existing Transactional System

Data processing and manipulation gets increasingly difficult as the amount of data and activity grows. In order to run the company's operations, existing information systems are built to move a substantial portion of the processing data load to a centralised system. It takes the place of the previous systems, which were made up of several unrelated systems and processes. The group was unable to grow because of this restriction. A pre-existing system was thus suggested to fit the needs of the firm. For a modern system, a standard solution is used, but unique solutions can be made to meet specific needs [25, 26].

4.2 Proposed Intelligence Approach

There are various phases to the project development process. In each step, there is a set of goals and needs. According to the nature of the work being carried out, certain areas get more attention than others. There are a variety of project development approaches to choose from. In software development, each step has its own set of rules and principles. Figure 2 shows this proposed system's block diagram of business intelligence system.

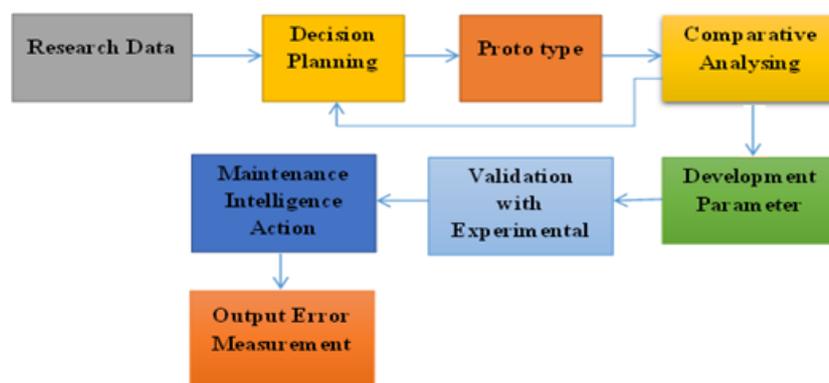


Figure 2. Proposed framework for business intelligence system

The prototyping technique is characterised by the active participation of project owners and users in the evaluation of prototypes valued above specifications and intended for later trash. One or more prototypes of the software product's first models may be included in the demo version. On the other hand, the methodology's strong characteristics are critical to the successful execution of software projects. It enhanced the user's experience by including the system's prospective users in the implementation process. Early input from users and the project owner helps to identify any duplicate or missing software needs, ensuring an accurate list of software requirements. Building a prototype increases programming work, which is one

of the key drawbacks of the prototype technique. The server services platform used for the research work says that, programming work will be cut down by using SAS pre-made functions and layouts, which makes it easier to build prototypes. Finally it measures the error from the output [27, 28].

4.2.1 Staging Method

The staging approach relies on constructing staging tables in the warehouse database to alleviate the performance hit associated with cross-database join operations. Using the staging approach, data are extracted from the sources and loaded directly into the warehouse. For future transformation procedures, it simply replicates and loads old data material into an analytical system. Extractions and transformations are combined in a single process. There's no need to save intermediate findings as a consequence of this. Because the overall amount of data isn't too huge to cause performance issues for a mid-sized business, the system's processing efficiency isn't that important. In this case, development and maintenance costs are far more important.

4.2.2 Application Components

The integrating services projects' frameworks may be used to build any kind of analysis model. Data are extracted and transformed in the same flow, and then loaded into a final destination model. Data redundancy and standard functions may be created as a result. Breaking down a system into its constituent subsystems is the goal of the top-down technique. It ensures that any extra capabilities can be implemented with little effort. The staging method eliminates the chance that standard functionality could be re-created through the use of intermediate stages.

4.2.3 Data Source Integration

It is possible to think of a backup data file as a digital copy of the database. Unlike the operating database, this one is produced at a certain moment and contains the same information as the operational database. Erroneous information from operational database is also included in this piece. In the absence of a data archiving system, these sorts of files may be used to recover data in the event of a system failure. There are several types of records that have been permanently erased. For analytical reasons, the data warehouse should keep previous data that are missing. Historical data that cannot be retrieved or is incomplete are referred to as "missed."

Much data were purged from the transactional system. Identification and separating this data is a need.

4.3 Data Quality Problem

Defining the criteria for data validation is the last stage in creating a data warehouse. During the data integration process, several inaccuracies might be discovered. Trying to figure out what caused the wrong data might speed up the process of getting rid of it. A system error may be defined as any erroneous data created by a system without human participation. Inaccurate data exists because the platform is unreliable. Table 1 contains the obtained errors in percentages.

Table 1. Obtained Results Errors

S.No	Errors	Traditional Method	BI without decision planning	Proposed BI System
1	Research Data Error (RDE)	0%	21%	80%
2	Transactional System Error (TSE)	26%	13%	3%
3	System Error (SE)	12%	32%	10%
4	Accuracy Error (AE)	62%	44%	7%

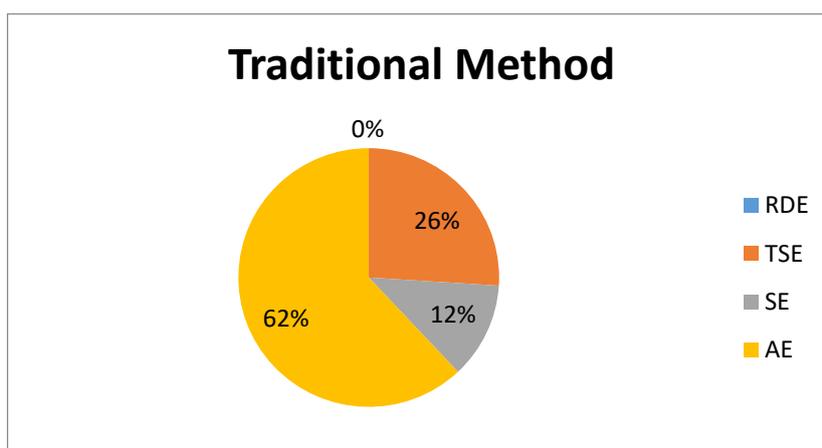


Figure 3. Error Map of Traditional Method

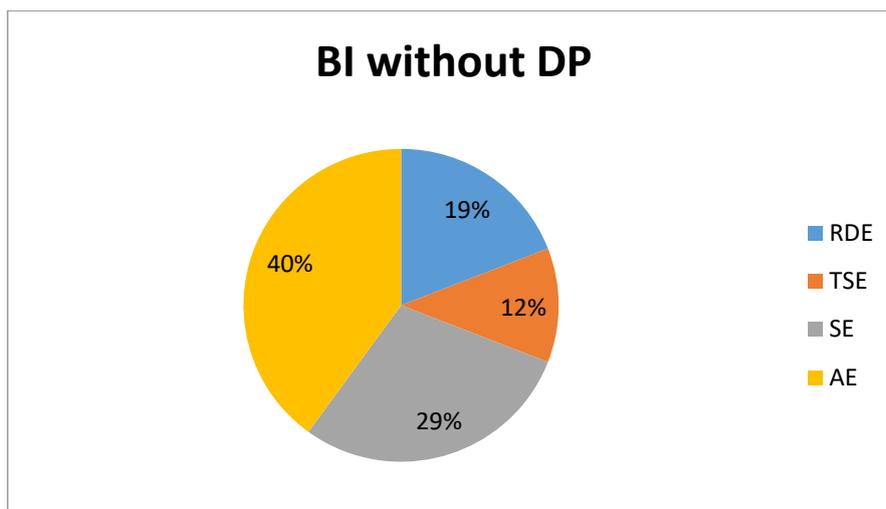


Figure 4. Error Chart for BI without Decision Planning

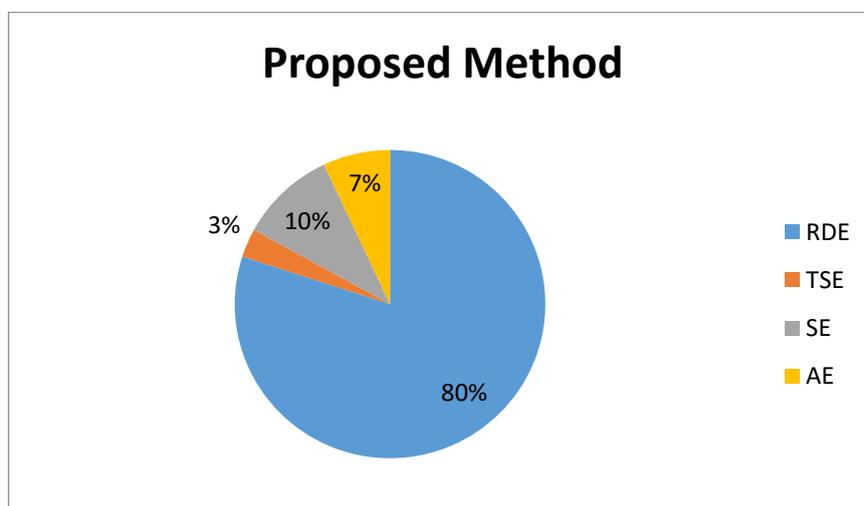


Figure 5. Graphical representation of errors in the proposed intelligence system

The term "system error" refers to a problem with how the system is modelled or written. Transactional applications are not affected by user errors. Because of this, it is imperative that these errors be spotted and corrected. Transactional system error is an issue in the model or code of a transactional system. Transactional applications are not affected by user errors. Because of this, it is imperative that these errors be spotted and corrected.

Because of the scarcity of research data, older approaches have higher accuracy mistakes, as seen in Figure 3. According to Figure 4, business intelligence without decision planning is subjected to higher levels of system and accuracy problems. Figure 5 depicts the suggested intelligence system, which shows that when properly configured with research data, the lowest possible error in accuracy and precision can be observed.

5. Conclusion

In the context of business intelligence, the term refers to a collection of approaches and processes that try to design high-level tools that assist in the decision-making process. After following the proposed concept, business intelligence solutions become flexible and accessible to all conceivable users. As a result, small and medium-sized businesses may now make use of such service. There are a lot of data to be studied by medium-sized organisations, but they can't afford to spend a lot of money. Extraction, transformation, filtering, cleaning, and loading are just a few of the many procedures involved in this research work. One of the most difficult responsibilities in IT is cleaning up the data.

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