Introduction

Knowledge gives organizations power. In the current turbulent environment to survive and succeed in global competitions having timely and efficient information is essential for business (Cheng, et al., 2009). Accordingly, a holistic approach to business functions, suppliers and customers which will be represented by the development of information technology infrastructure is essential for resources and productivity management (Čech & Bureš, 2006). Business Intelligence (BI) is an IT platform focused on gathering, providing access to, and analyzing data which is in an organization to extract knowledge from them. Companies need a business intelligent system to perceive their competitive environment and preserve their intellectual wealth (Jr., 2001).

Due to growth of technology, complexity of processes and the need for new products development, being ahead of your competitors is difficult in this competitive world. Managers need to have intelligence to respond to the ever changing environment (McBride, 2014). So, organizations use Business intelligence to make better decisions in order to gain competitive advantages, to understand their customers' preferences, and to lead business processes efficiently (Bonney, 2013). Business Intelligence is a way to analyzing data and procedures to stay competitive in a global market (McBride, 2014).

The importance of research

Managers today confront excess of disjointed data (Hostmann, 2007). In order to predict market tendency and develop business performance, analyzing data is crucial to survive in a competitive business (Azvne, et al., 2005). Thus, a BI system can help executive managers to effectively manage corporate activities and support their decision making processes (Cheng, et al., 2009). Business Intelligence provides an environment for effective decision making and strategic thinking and is a basis for making decision in the area of sales, marketing, finance, capital management and etc (Olszak & Ziemba, 2007). The benefit of BI for a company is presenting required information so users have access to specific tools that enables them to analyze data (Rubio & Crawford, 2008). It also allows performing comparative reports such as on historical data, efficiency of distribution channels and advantages of particular offers (Olszak & Ziemba, 2007).

problem statement

In this study the following research questions are expressed:
- What are the parts of a business intelligence system?
- What requirements are there in the bookstores which databases alone are not able to meet them?
- How can a Business Intelligence system cover these requirements?
- What are the benefits of using a Business Intelligence system in bookstores compared with reporting through databases?

Research Objectives

According to the research questions, this study aims to design and implement a Business Intelligence system in order to address the problem of analyzing massive amounts of data which have been gathered from traditional systems in bookshops. So that it facilitates forecasting customer requirements, reordering and replenishment, marketing, customer service processes, and customer segmentation. The rest of this paper is organized as follows. We discuss about theoretical framework of a Business Intelligence system and describe the proposed system in section 2. Section 3 is devoted to research methodology, Data Warehouse schema, and multi-dimensional queries. In section 4 we depict the results of implementing the system and finally, conclusion, limitations of the study and some recommendations for future work are mentioned in section 5.

Theoretical framework
Business Intelligence (BI) system is a set of tools which help business management and focuses on the management of the required data to make decision (Rubio & Crawford, 2008). The concept of BI software includes Extraction, Transforming and Loading (ETL), Data Warehouse (DW), Data Mart, Multi-dimensional queries, Online Analytical Processing (OLAP), and Data Mining. As illustrated in Figure 1, in order to support decision making in a BI system, data extracts from various databases and after transforming and loading to a Data Warehouse users can perform ad-hoc queries. In the following we will describe each of the tools of business intelligence systems:

- **Data Mining**: A set of tools that allow users to understand hidden principles among data repository (Olszak & Ziembia, 2007).
- **Data Warehouse**: It is like a large database which includes information collected from several data sources and analyzed from business environment (Olszak & Ziembia, 2007). Data Warehouse contains organized data at different time intervals thus facilitate business performance (Davenport & Harris, 2010).
- **Data Mart**: Data mart is responsible for an action or process in an organization. It can be either a separate database or a certain portion of a repository.
- **Extract, Transform, Load**: This process involves three steps:
  - Extract: This step involves collecting data from various resources and realizing its structure.
  - Transform: After cleaning the extracted data it is transformed into a standard format.
  - Load: The output of Transform phase is loaded into a Data Warehouse, Data Marts or other integrated databases.
- **Online Analytical Processing**: It enables experts and decision makers to analyze and manage multi-dimensional data models in an organization (Lee, et al., 2007).
- **Online Transaction Processing**: This application processes a large number of an organization daily transactions (Purchasing, Inventory, Accounting, Production, etc.) that have been recorded in a relational database and also checks data consistency (Pechenizkiy, 2006).
- **Data Cube**: In order to report and analyze various dimensions of time, place, etc, OLAP tools store data in the form of data cubes. In general, data cube is a multidimensional modeling (Trujillo, et al., 2002).

Up to now, for various applications different Business Intelligence systems have been implemented. One of the first efforts in providing an efficient Business Intelligence for enterprise systems has been done by Luhn (1958). He has offered an automated system for disseminating information to different parts of the organization. This intelligent system identifies the necessary information and shares them as a document between people who might need. The main purpose of this system is to disseminate useful information to support certain activities which are done by individuals, departments, or even the larger units in an organization.

He uses data processing machines so that each document receives a serial number and is written both on a microfilm and a magnetic tape. This tape is sent to auto-encoding and auto-abstracting devices to select certain sentences from documents and provide an abstract text. Next, the statistical data obtained from the analysis of the text are processed to derive a model of the information contained in that document. On the other hand, each part of the organization gives some information about their functions and the information that may be needed. So the system compares them with the texts to determine that the document is related to which part. This system has comprehensive functionalities for enterprises as well as its ability to check whether a document is recorded twice (Luhn, 1958).

Dyk and Conradie (2007) proposed a Data Warehouse from transactional systems to support action researchers (who use course management systems (CMS) data to make decision and draw courses) decision making processes in institutions to assess their analyses validation in the form of a Business Intelligence system. The structure and concept of BI in higher education, action researcher’s ad-hoc analyses and the effect of BI on them, the way to standard action researcher’s queries to improve Business Intelligence, and the advantages of this approach are the issues which they studies in this research. To address these items, a data mart is created from CMSs and student information systems (SIS) data. They facilitate the design of queries from CMSs, which action researchers draw them manually, through a business intelligence approach (Dyk & Conradie, 2007).

Cheng and et al. (2008) follow the implementation of a financial knowledge management system based on an ontology approach for Business Intelligence applications. This system has the ability to do extraction, transforming and loading data, creation and retrieval data cubes, statistical analyses, data mining and etc. Also it disseminates and shares data to provide decision making support. In this bond ratings model the enterprise bonds are classified by domain experts and data mining tools. Clustered data which include each bond’s features are stored to use for forecasting bond ratings changes or determining rating for new bonds. They believe that as regards there are thousands of knowledge sets in knowledge bases, using Intelligent ontologies, knowledge dissemination and rating performance will lead us towards a stronger knowledge (Cheng, et al., 2009).

In order to make the data available to characterize the marketing strategy effectively and accurately Yee (2010) introduces an automated system which can share data for business functions. For instance, by basket analysis and predicting low and peak sales seasons brings profits both for enterprises and customers and facilitates planning for effective and efficient marketing strategies. Through identifying customer preferences the system helps organizations to provide appropriate product and services for each customer (Yee, et al., 2010).
Wang (2012) to estimate probabilities of products being considered by customers has proposed a two-step approach to Business Intelligence. In the first phase, it assigns consumer belongings to “positive” and “negative” classes and then calculates consideration probability through weighted probability approach. An experimental result obtained from different online shopping scenario suggests that this approach is effective and performs better than traditional models (Wang, et al., 2012).

A literature review has been done by Bonney (2013) to provide better services for healthcare delivery performance through considering the issues which are associated with Business Intelligence technology into Electronic Health Record (EHR). He has discussed the importance of using Business Intelligence with EHR and benefits which BI provides for healthcare providers. According to the review, he has explored that several challenges are facing the implementation of Business Intelligence in clinical practice. Thus healthcare providers and IT vendors must be aware of the value of information and exploit Business Intelligence systems to discover knowledge (Bonney, 2013).

Singh and et al. (2014) address to the issue of Churn in a competitive industry like telecom and the benefits of implementing a Business Intelligence system for Churn management. They also proposed a conceptual framework for this purpose. When using a Business Intelligence system, managers must take into account both tangible and intangible benefits. The strategic value of firm assets can be improved through the way a BI system helps in Churn management. So, it will bring a new insight to organization's competitive advantages (Singh & Samalia, 2014).

In this research, a system has been designed for a set of bookshops to solve traditional systems problems. These may include lack of coherent data structure, book accumulation and high inventory cost due to lack of sufficient and accurate information for making decisions. For this purpose, a database of books, customers, vendors, and bookshops information and all related items has been created. There was only possible to perform on-line transaction processing. Therefore, to build a Data Warehouse and have an on-line analytical processing, data extracted from databases and through ETL process loaded into a Data Warehouse. This includes all information about book sales in different dimensions such as: which book (including title, author, subject or ISBN), when and where, with which currency, by whom has been purchased and by whom has been sold. In comparison with traditional systems, the proposed system has the capability of executing multi-dimensional queries.

**Methodology**

This paper is considered as an applied research in which both quantitative and qualitative approaches are used simultaneously. Its output is in the form of reports which includes qualitative information (e.g. who from which store, through which seller and when has bought which book(s)) and quantitative information (e.g. total sales of all books have been sold by a specific vendor on a given date in a given store).

In the previous sections we have answered research question 1 and 2. To address research question 3 and 4 a Data Warehouse is designed on data available in bookstores databases. Whenever data is logged into the system, “Extract, Transform, Load” process is done and a new record is added to the Data Warehouse. Then, through requesting a report users receive the information they need to make decision. The proposed system analyzes the input data in the shortest time and answers immediately in the form of complex reports on thousands of data to allow experts to adopt efficient and accurate decision in different situations.

**Requirements**

In order to implement the proposed Business Intelligence system, we used SQL Server Data Generator to generate data and SQL Server Data Tools to implement Data Warehouse. The user Interface has been designed by Visual Studio 2010.

**Data collection**

Owing to the lack of real data, SQL Server Data Generator has been used to generate large amount of unique data. It is a random sampling where we select a group of subjects from a larger group and perform our queries on them.
Data Warehouse schema
Multi-dimensional data modeling has been done in the form of Star Schema. As you can see in Figure 2 there is a large central table called Fact Table which is associated with a set of Dimensional Tables [24]. Here dimensions are Location, Date, Customers, Vendors, Currency and book information which are connected via a foreign key to Fact Table. After designing Data Warehouse schema through "Extract, Transform, Load" process required data is passed to data cubes. This is done manually by writing and performing a particular piece of code. Thus, the Data Warehouse is ready to execute different queries.

Figure 2: multi-dimensional data modeling

Multi-dimensional queries
Based on Data Warehouse schema analytical queries are done. These multi-dimensional queries link Fact Table's data to several Dimension Tables. In the proposed system queries are made in Microsoft Visual studio 2010 and after referring to Data Warehouse the results are displayed on the screen. In order to facilitate reporting process and considering that each user may request different dimensions, various queries come together to send to the Data Warehouse. Thus, the user is not involved in writing codes. So that only primary keys are sent and the system automatically generates the query. Furthermore, queries are written via drill-down operation. For instance, to calculate monthly sales of a bookshop the query is generated as follow; “Total sales, total sales in each city, total sales of each bookstore in each city, monthly sales of each bookstore in each city.”

The following code is a general format of the query which is generated based on the information the user enters on the form. It shows the report of total sales of a certain book in a given location:

```
Select totalSales as [Total Sales], [Currency], [BookAuthor], [BookTitle], [BookYear], [BookSubject], [BookPrice], [BookPub], [BookISBN], Country, City FROM dbo.ReSale
WHERE "MainQuery"
```

Results
In order to display reports and results of queries, a user interface has been designed. As illustrated in Figure 3, the user enters information that is required to prepare a special report. If the input is correct, the system goes to the "Extract, Transform, Load" phase and sends the query which is generated automatically to the Data Warehouse to show the final results to the user. So, many reports are taken from the proposed Business Intelligence system. The full list of them is given in Table 1.

Table 1: The proposed BI system reports list

<table>
<thead>
<tr>
<th>Reports</th>
<th>Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Total sales of all books.</td>
<td>10 Total sales of a certain book have been purchased by a specific customer.</td>
</tr>
<tr>
<td>2 Total sales of a particular book.</td>
<td>11 Total sales of books have been purchased by a specific customer on a given date.</td>
</tr>
<tr>
<td>3 Total sales of all books have been sold at a given date.</td>
<td>12 Total sales of a certain book have been sold by a specific vendor on a given date.</td>
</tr>
<tr>
<td>4 Total sales of all books have been sold by a vendor.</td>
<td>13 Total sales of a certain book have been sold on a given date in a given location.</td>
</tr>
<tr>
<td>5 Total sales of all books have been purchased by a specific customer.</td>
<td>14 Total sales of a certain book have been sold by a specific vendor and have been purchased by a specific customer.</td>
</tr>
<tr>
<td>6 Total sales of all books have been sold in a given location.</td>
<td>15 Total sales of a certain book have been sold by a specific vendor in a given location.</td>
</tr>
<tr>
<td>7 Total sales of a certain book have been sold on a given date.</td>
<td>16 Total sales of a certain book have been sold by a specific vendor on a given date in a given location.</td>
</tr>
<tr>
<td>8 Total sales of a certain book have been sold in a given location.</td>
<td>17 Total sales of a certain book have been purchased by a specific customer on a given date in a given location.</td>
</tr>
<tr>
<td>9 Total sales of a certain book have been sold by a specific vendor.</td>
<td>18 Total sales of a specific book have been sold by a specific vendor to a specific customer on a given date in a given location.</td>
</tr>
</tbody>
</table>
It should be noted that this system has been designed in such a way that if the user does not enter the name of book, date, vendor name, customer name or location, the final report respectively shows all books, dated, vendors, customers and locations.

Discussion and Conclusion

The purpose of this paper has been to design and implement a Business Intelligence system for bookstores which provides reports in real-time. We discussed about its literature, our methodology, research requirements, data collection, designing steps, and the system's results. A Business Intelligence system extracts critical facts from operational data. Therefore, it can distinguish useful functions in a company to improve business performance (Luhn, 1958). Also, like the proposed system by Yee (2010), it brings customer loyalty and accuracy in forecasting sales. Or as Wang (2012) expressed, a BI system follow sales analysis to forecast customers future trends [19, 22, and 23]. On the other hand, the need for having an integrated structure for data, inventory cost, and the need for having complex reports to have efficient managerial decisions are the problems which traditional systems in bookstores could not solve. In this research we leverage BI to cover most of these issues.

The main advantage of proposed system is generating quick reports on almost ten million data. The system shows requested reports immediately after user enters information to the user interface. These accurate and comprehensive reports will help experts to make appropriate and effective decisions. For instance, by analyzing them decision makers can forecast demand in different regions and estimate replenishment frequency. This decreases inventory cost (books remain in stores for a short time) and helps to identify customer preferences, customer segmentation and customer relationship management.

Due to unavailability of massive amount of data we used SQL Server Data Generator to generate unique data. However, if we had access to actual data the accuracy of results was increased and generalizing it to real-world problems was more precise. Also, by using data mining techniques as well as adding decision functionality there would be no need to analysts. Thus, the system automatically uses the knowledge of experts to explore various reports and make decision.

In future work, the design of a Business Intelligence system for the statistics of Statistical Center of Iran and government can help to make important decisions like "basket of goods" and "subside" plans. Furthermore, by using "self-adaptive" approach the system will analyze environmental, political and economic circumstances without human intervention and decides on the number of persons eligible to receive "basket of goods" as well as "subside" in each period of time.

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