

Analysis and Comparison of Open Source Business Intelligence to Commercial Business Intelligence for SME in UK

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Received: 28 November 2017; **Accepted:** 16 December 2017

Abstract:

Business Intelligence (BI) is a technological tool for competitive advantage and the beneficiaries in business have being large organizations, these organizations can afford to purchase, implement and maintain business intelligence solution. This has left a wide competition gap between large organizations and SMEs which make up for over 90% of EU enterprises. This research investigates open source (OS) BI tools, with the view of considering it as a substitute for commercial BI tool. This research used several factors to compare both open source BI and commercial BI. These factors include, long term cost, functionalities available, results given and back end support. The target audience for study is Lyca and Lebara mobile. The data collection methods used was survey/ questionnaire and interview. The data was analyzed using a two tailed test and correlation using SPSS package. The research was able to arrive at the following conclusions: Open source offers cost effective solution both in the short and long term.

Keywords:

Business Intelligence, Business Data Analysis, Open Source, Commercial Software, Data, Small and Medium Scale Enterprise

1. Introduction

The accessibility of data has been increasing swiftly because of low-price data storage and connectivity, this improvement has opened new questions within the organizations how to arrange effectively and analytical methodologies which can be used for analysis with the goal of optimizing commercial enterprise performance. Business Intelligence (BI) combines data, analytical equipment, methodologies, and new data given from records, with enterprise expertise, and goal them into choice making process. Over the past decade, analyzing business performance has become much easier, due to the widespread availability of business intelligence (BI) solutions. BI works by extracting data from multiple transactional and operational systems (such as orders, service, sales and shipments) and combining the data into a single dedicated database or repository. An array of BI tools then makes it possible to mine, query and

report on data, helping to identify trends, patterns and exceptions. BI databases offer the ability to analyze data across numerous dimensions and provide information for decision making. Organization for Economic Co-operation and Development (OECD 2000) reported that, the general economy continues to indicate a shift from industrial to postindustrial knowledge based economy and are more strongly dependent on the production, distribution and use of information than ever before thus the economy is increasingly referred to as a knowledge based economy. Hence developed countries are as a matter of priority, preparing the transition to a competitive, dynamic and information based economy (European Council 2000). About four decades ago development in this area started with methods for data collection in the '60s. In the '70s, hypotheses were developed and the execution of financial planning systems after which spreadsheet Decision Support System (DSS) came along in '80s. During this period the system could provide basic data collection that concerned past data which was referred to as information discovery.

Over the years a rise in amount of data led to the formation of big data, data bulge in Warehouses, Online Analytical Processing, Executive Information Systems, and Business Intelligence in '90s. There are knowledge unearthing techniques which include knowledge-motivated Decision Support System, data mining and the execution of Web based DSS. Business Intelligence, describes a wide group of application and technology used to collect, store, analyze, and generate useful data (Turban, E., Sharda, R., Arosen, J. E., & King, D. 2008). A good source of business intelligence will consist of information from Decision support system, executive information system, and knowledge management systems which may be open source or commercial. Open Source Software refers to software which is made available at no cost, redistributable and contains the source code. A 2006 survey of information technology and line of business professionals conducted by Ventana Research concluded that the adoption of open source BI is widespread and growing, driven primarily by cost considerations. Business Intelligence (BI) an ICT tool that allows its users to leverage the best use of data, summarizing and aggregating information. BI tools provide aggregation, analyses and reporting functions on the organizations' data. As such BI facilitates achievement of mission objectives through providing required information or intelligence to the decision makers with regard to the evaluation and control of predefined metrics.

Organizations have always aspired to improve operational intelligence, forecast and predict patterns with accuracy. Depending on the nature of the organization, it may seek to gain competitive advantage by gaining lead information or analyze information to reveal areas of needed attention. BI is a technology that is available to provide information and supply organization with some level of astuteness (Negash, 2004). Such BI systems come as standardized software packages from vendors, allowing customers to adapt them to their specific requirements (Yeoh et al., 2008). BI is also considered a multi-dimensional concept concerned with the effective deployment of organizational practices, processes, and technology to construct and analyze an information base to steer and support the organization (Olszak & Ziemba, 2012). In recent years BI has been considered a key tool for providing comprehensive information for policy makers and government officials (Coman, 2009; Boselli et al., 2011). The multi-dimensional analysis capability of BI tools, where multiple data sources are processed to produce key information, aid decision makers to develop government plans and formulate decisions (Coman, 2009). While initiating a BI project, it is emphasized to examine the decision environment and how BI capabilities

can be leveraged to achieve optimal BI fit (Isik, et al., 2013). BI in this research is accordingly viewed as a decision support system.

1.1. Categories of BI

Strategic Business Intelligence makes performance statistics available to both executives and management. It is usually referred to as performance management. Tactical Business Intelligence, which is referred to as traditional or analytical BI, is the use of business intelligence tools to analyze current trends in business, constantly comparing an exact metric such as transactions or expenditures to the same metric from a preceding month or year. In many organizations, there are generally not too many analysts in the various departments who use online analytical processing (OLAP) and core query to execute this task. Today, BI tools are majorly used to analyze historical business data to find out trends or anomalies that need attention. Operational Business Intelligence brings information to the exact user in the business who needs it this implies it aids in the front lines of a business where information is used as part of an operational process. A good example is, when a person calls a customer care line to speak with a customer service representative about his or her TV bill, the representative will usually refer to the caller's past transaction (such as payment record and history of billing) with the organization.

1.2. Comparison of Business Intelligence Characteristics

This section shows a descriptive approach of Business Intelligence which is shown through the different types of benefits it brings. This approach best suits this research because it allows for comparison of diverse benefits of Business Intelligence systems without assigning monetary values. Rajeev Rawat (2007) has a criteria for assessing Open Source Business Intelligence in a unique way which is accepted as a model for explaining the characteristics influencing gross value. For the benefit of this research only the relevant criteria have been selected, since the initial list has many criteria for the valuation of Business Intelligence set up which includes business needs, risk assessment, etc. Rawat's list of criteria for Open Source Business Intelligence illustrates different assessment which is listed below;

Three major criteria categories as shown below have been selected from Rawat's list of criteria for Business Intelligence system comparison:

1. Business Intelligence Functionalities
2. Solution Maturity
3. Price

The first and second criteria categories clearly analyses the benefits of Business Intelligence solution, while price which is the third category overlaps with the cost.

1.3. Comparison of Business Intelligence Functionalities

As can be seen in the preceding chapter, Business Intelligence is a word which comprises of a lot of procedures or set of enterprise applications. Several commercial vendors have various understanding of Business Intelligence and what it should include, although there are some important components which exist in both commercial and open source business intelligence.

1.4. Comparison of Business Intelligence Maturity

Maturity is a key criterion, when putting open source BI in view. For the purpose of further description and measurement it has been broken down to sub criteria examples include measurable criteria such as the period in which the product is present in the market and number of clients frequently using the product as well as its level of maturity.

1.5. Comparison of Business Intelligence Costs

In this case, adding up the initial and maintenance costs will not give an accurate cost for business intelligence setup because it includes many other costs. Hence a different method called Total Cost of Ownership which was brought by Gartner Group is used. Cost of Business Intelligence set up includes cost of acquisition, cost of operations, and cost of control.

1.6. Business Intelligence in SMEs

There are several studies on business intelligence success factors. Hwang et al. (2004) identified features in the following key areas: administration, background, and task Scheduling, there are however tough administrative features. In the same light, previous works revealed that technical issues are key (Wixom & Watson 2001; Joshi & Curtis 1999; Rudra & Yeo 1999) and also employees and training (Rist 1997). Though, a few results may not be applicable for small and medium scale enterprises. A good example, Hwang et al. (2004) discovered the most significant factor to be the support given by the top management. In preceding sections it is revealed that, in small and medium scaled enterprises top management usually decides on IT projects. Thus, top management backing in small and medium scaled enterprise is the key to business intelligence systems success in the organization.

Current study reveals that small and medium scaled enterprise, while making use of other information technology system, are reticent in embracing business intelligence solution Levy & Powell (1998). This comes as a surprise because several researches have shown that the use of information is key in the performance of small and medium scaled enterprise Lybaert (1998). Though, a likely justification could be the fact that commercial BI suites are perceived as expensive and although open source BI is free to use the cost of set up may also discourage SME's Hwang et al. (2004). Bergeron (2000) states that commercial BI suite programmers are focused majorly on large enterprises and may not exactly fit the requirements of SME's. There is a broken connection in business intelligence acceptance by small and medium scaled enterprise with a focus on backend support, benefits which it is expected to bring and the benefits it actually brings. However, it is important to bear in mind both the tangible and intangible benefits of BI which include but are not limited to decision support. The outcome of this research hopes to build that bridge between hopeful BI implementation and its further use.

1.7. Risks Involved

Despite its many advantages, open source is not totally risk free. A study of top IT personals reveals that fifty two percent stated that the absence of backend support is a huge factor limiting open source BI implementation. In order to fix this factor, key vendors such as Dell, HP, IBM, Oracle and Sun are beginning to support open source projects Koch (2003).

Other risks include getting required expertise to implement open source BI and which of the open source to choose.

1.8. Skill Set

Skill Set, several small organizations who find the commercial BI solutions expensive just may imagine that the cost of setting up open source BI is similarly expensive. It is also possible that these SME's may not have skilled staff who can implement and maintain open source BI solutions, and feel open source products will be a "backdoor" for potential malicious users and a source of programming errors and inefficiency. For instance, a SME which has only a few staff employed in its IT department whose job may be simple maintenance, these employees main job description is to maintain email servers, backup systems, security management, and provisioning employees. These employees may not have the required skills to implement and maintain a business intelligence suite.

According to European Commission small business ventures are employing lower than fifty people and making less than ten million Euros in yearly turnover. Small and medium scale enterprises (SMEs) are the backbone of the world's economy; more than ninety percent of enterprises in most economy fit into the group of SME, sixty-five percent of the total labor force are employed by about 140 million SMEs in 130 countries (World Bank 2006). SMEs need to be able to ensure they can "access" data in much the same way as big players or competitors can. A challenge facing SMEs is that they may not have the same capacity as larger players to "analyse" the new data sets, or even to build up in house teams that can do this job. This challenge will be particularly acute for established SMEs, which have been operating for a few years already (Andy 2014). There are already a number of studies on BI success factors. Gartner (2007) identified factors in the dimensions of organization, environment, and project planning. They find especially strong support for organizational factors. In addition, earlier works discovered the importance of technical issues as well as personnel, educational, and business issues (Rawat 2007). However, some results might not be adoptable for the special case of SMEs. For example, Gartner (2007) found the most significant factor to be the support it provided to top management. There is therefore a need to study open source BI tools in comparison to commercial BI tools.

1.9. Purpose of the Study

The purpose of this study was to find out if open source BI tools offer adequate business value to small business ventures and if they can substitute commercial BI solution. Specifically, the study determined:

1. If open source BI offers a value good enough to make it a good substitute to commercial BI.
2. If open source BI offers cost effective solution as compared to the commercial Business Intelligence solution.

1.10. Research Questions

1. Does an open source Business Intelligence offer adequate business value for small ventures such that it serves as a good substitute for the commercial Business Intelligence solution.

2. Does an open source Business Intelligence offer cost effective solution in contrast to the commercial Business Intelligence solution.

2. Methodology

The population for the study consists of two medium scaled telecommunications firm, which are Lyca mobile and Lebara Mobile. These organizations use Business Intelligence at various levels of management which include operational level, management level and top level management. Available record from Lyca Mobile and Lebara Mobile showed both companies having staff strength of 4000 and 1400 respectively in Europe. The data collection method which used was a survey conducted via questionnaire covering a range of questions which are expected to be answered to the aims of this research. Previous works on BI success as a framework for the development of our SME-focussed items were used as guidelines to design the questionnaire. Thus a conclusion was reached that items were sensible and nomenclature was properly understood.

2.1. Sample Size for the Study

The sample size was 80 employees of both Lyca and Lebara Mobile with a focus mainly on employees who use Business Intelligence tools to perform their Jobs. Multistage sampling was used with a focus on Middle and top level management. Purposive and random sampling techniques were also used for selecting the sample at various stages.

2.2. Instrument for Data Collection

A structured questionnaire was developed based on literature and purpose of the study. The instruments for the study were subjected to validation by two experts from the Information technology department, London school of commerce. The experts were served with copies of the instrument and were requested to vet the items for appropriateness, adequacy, clarity and correctness of technical terms, in measuring what they are set to measure. The questionnaire was divided into two parts (A and B). Part A, personal data of the respondents while Part B was further structured to gather the responses of the respondents on the items in line with the research questions of the study. The questions had 4 point scale of Strongly Agreed (SA), Agreed (A), and Disagree (D) Strongly Disagreed (SD).

2.3. Data Collection and Analysis

Eighty copies of questionnaire were distributed to respondents. 70 were retrieved, only 63 were properly completed. This represents 87.5 percentage returns. Data collected were analyzed using Mean and standard deviation.

3. Findings of the Study

Key: \bar{X} = Mean, SD = Standard deviation * = Significant at 0.05 level of significance, ** = agreed.

Table 1. Mean and Standard deviation of the response on open source Business intelligence offering adequate business value for small ventures such that it serves as a good substitute for the commercial Business Intelligence solution.

		Mean	N	Std Deviation	Std. Mean Error
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Pair 1	My organization uses open source BI	2.81	63	1.293	.163
Pair 2	My organization uses Commercial BI	2.81	63	1.148	.145
	I have all the required functionalities to perform my tasks in open source BI	2.10	63	.962	.121
	Commercial BI tools has Other functionalities need	2.92	63	1.112	.140

The results shows there was a significant difference in the scores for having all required functionalities to perform tasks in the open source BI (M=2.1, SD=.121) and needing some other functionalities on the commercial business Intelligence tools (M=2.92, SD=0.14) conditions; t (62) =.003.

Key: \bar{X} = Mean, SD = Standard deviation *=Significant at 0.05 level of significance, ** = agreed.

Table 2: Mean and Standard deviation of the response to open source Business Intelligence offering a cost effective solution in contrast to commercial Business Intelligence.

		Mean	N	Std Deviation	Std. Mean Error
Pair 3	Commercial BI has improved organization growth	2.65	63	.901	.113
Pair 4	open source BI has improved organizations Sales	2.27	63	.653	.082
Pair 5	Open source BI is more expensive than Commercial BI tool		63	.690	.087
	Open source BI in the long run is more affordable than commercial BI		63	.685	.086

The result shows that: Open source BI has improved the organizations growth with a mean of 2.14 and Standard deviation of 0.106. Commercial source BI has also improved the organizations growth with a mean of 2.65 and Standard deviation of 0.113. Open source BI has improved the organizations sales at a mean of 2.27 and Standard deviation of 0.082 similarly commercial source BI has improved the organizations sales at a mean of 2.84 and standard deviation of 0.116. Open source BI has improved both organizations profit at mean value of 2.10 and Standard deviation 0.103 for open source and while commercial source BI has improved the organizations profit by a mean value of 2.97 and Standard deviation of 0.252. It can also be observed that Open source BI has improved the organizations customer satisfaction at a mean of 2.57 and Standard deviation of 0.115, commercial source BI has also improved the organizations customer satisfaction at a mean of 2.32 and Standard deviation of 0.093.

4. Discussion and Finding

One of the aims of this research was to find out if an open source BI tool has all required functionalities to perform tasks as compared to commercial BI tools. Table 1 showed the mean and standard deviation scores for having all required functionalities to perform tasks in the open source BI as (M=2.1, SD=.121) but there is still room for improvement since the mean is just 2.1 and needing some other functionalities. The results therefore shows the respondents agree they have all required functionalities to perform tasks in the open source BI. This is line with Rajeev Rawat (2007) who revealed that there is no difference in the functionalities provided by open source BI and commercial Business Intelligence Functionalities. Based on this analysis yes open source will be a good substitute for commercial BI suite bases on functionality comparison.

The research also sought to find out if open source BI can improve the organizations growth, customer satisfaction, sales and profit. The results in table 2 revealed; Open source BI has improved the organizations growth by a mean score of 2.14 and standard deviation of 0.106, similarly commercial source BI has improved the organizations growth by a mean score of 2.65 and standard deviation of 0.113. Open source BI has also improved the organizations sales by a mean score of 2.27 and standard deviation of 0.082 while commercial source BI has improved the organizations sales by a mean score of 2.84 and standard deviation of 0.116 likewise in terms of profit Open source BI has improved the organizations profit by a mean score of 2.10 and standard deviation of 0.103, commercial source BI tools has also improved organizations profit by a mean score of 2.97 and standard deviation of 0.252. Customer satisfaction has also improved with the use of Open source BI with mean scores of 2.57 and standard deviation of 0.115 while commercial source BI improved customer satisfaction by mean scores of 2.32 and standard deviation of 0.093. These analysis show that there is no significant difference between open source BI tools and commercial BI tools in terms of functionalities, organizations growth, customer satisfaction, sales and profit. Based on this analysis yes open source offers a cost effective solution because when the benefits were analyze using in line with Gibson and Arnott (2003) who stated that open source BI tool would be cost effective solutions for SMEs.

5. Conclusions

In Conclusion;

- These results in table 1. Suggest that open source has all functionalities required and there is really no extra functionality needed which commercial BI provides. Rajeev Rawat (2007) revealed that there is no difference in the functionalities provided by open source BI and commercial BI as shown in table 1. Business Intelligence Functionalities. The analysis of this table has being able to find out if open source BI offers a value good enough to make it a good substitute for commercial BI suite. Based on this analysis yes open source will be a good substitute for commercial BI suite based on functionality comparison.

The analysis of table 2 has being able to find out if open source BI offers cost effective solution as compared to the commercial Business Intelligence solution. Based on this analysis yes open source offers a cost effective solution.

- Analysis of results as shown in both tables shows that open source BI is recommended as it offers adequate business value to small business ventures and they can serve as a good substitute because not only are they cost effective in the short and long term, they offer matching functionalities for the most required functionalities, organizations growth, customer satisfaction, sales and profit.

- However it should be noted that organizations hoping to embark on implementing open source BI implementation should get experienced hands to help set up and manage as there are no free back end supports for open source BI.

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