Abstract - Cloud computing is a colloquial expression used to describe a variety of different types of computing concepts that involve a large number of computers that are connected through a real-time communication network. The cloud also focuses on maximizing the effectiveness of the distributed resources. Cloud computing has become a prominent now a days and has changed the present architecture by pioneering the novel design principals built on the concept of various services. As some of the countries are suffering from economic crises, needs for additional information technology industries have developed. Business Intelligence has proved the solution for this. It also expects the future of the association and can be evaluated with the other related organization. These results can be used for future development of the organization. Business intelligence plays an important role extracting valuable information and discovering the hidden patterns in interior as well as exterior sources of data. Business Intelligence delivers the appropriate data at the proper time and in the meticulous arrangement. It offers user-friendly information openly to users where they can work, team up, and make resolutions. The contribution of this review is that is presents a Role of cloud computing in business intelligence.

Keywords— Cloud computing (CC), Business intelligence (BI), Cloud business intelligence (CBI).

I. INTRODUCTION

Computing within less cost has always been a concern for IT development. Grid and Distributed computing offers high performance by using the concept of dividing and allotting large processes to different systems. The IT sector has always been in search for that computing model, which could provide availability to computing resources from anywhere, anytime with its infinite resources within less time and less cost. Cloud computing is one of them. Utility computing (Cloud computing) uses the theory of “pay as you go” and reduces the processing cost. This virtualization technology presents various independent virtual systems to from one physical system. But the performance of cloud computing has become a serious problem.

Cloud computing is the rescue of computing services over the Internet. Cloud services authorize individuals and businesses to use software and hardware that are managed by third parties at remote locations. Cloud computing realizes computing as a utility. It provides a pool of resources which can be allocated to users dynamically according to their requirement.

Thus both the users and providers are benefited: providers can reuse their resources and users acquire and release resources according to their requirement [1]. The cloud provide on demand self-service in which user can provision the resource whenever required without human interaction. Computing facilities are available over the internet which can be easily accessed by the devices like mobile phones, laptops, PDAs anywhere and at any time.

Business Intelligence is a highly resource intensive application which requires large scale parallel processing and huge storage capacities in data warehouse. The data warehouses are regularly updated at frequent intervals through appropriate queries executed on the business processing and transactional databases. In future a difficulty might arise for companies to keep on adding resources to data warehouses. Cloud computing has instigated a new hope for future prospects of Business Intelligence. The objective of Business intelligence is to improve the timeliness and quality of information, and facilitate managers to be able to better understand the position of their firm as in comparison to competitors. Business intelligence plays an important role extracting valuable information and discovering the hidden patterns in internal as well as external sources of data. However majority of organizational knowledge is in unstructured form or in the minds of its employees. Business Intelligence delivers the appropriate data at the proper time and in the meticulous arrangement. It offers user-friendly information openly to users where they can work, team up, and make resolutions.

Cloud business intelligence is the fastest and most cost-efficient way for associations to access and process business intelligence software. It represents a way for reporting and analyzing solutions to be developed installed and consumes less cost. Cloud delivery enables rapid deployment – most businesses can build an initial BI environment in days or weeks compared to months with traditional Business Intelligence solutions. Organizations now realize that high investments and Total Cost of Ownership of conventional on-premise BI makes these solutions impractical and unattractive. Cloud BI solutions hosted by service providers and accessed by users over the Internet, offer all of the capabilities of traditional BI solutions while substantially improving the economic bottom line.
Cloud solutions provide powerful and flexible business insight, but are faster, easier, and less costly than custom “behind the firewall” solutions. The business benefits of Cloud BI are compelling and real. The cloud-based business intelligence platform constitutes of various types of services. Some of them are: infrastructure-as-a-service (IAAS), platform-as-a-service (PAAS), software-as-a-service (SAAS).

The rest of the paper is organized as follows. Section 1 discusses basics of cloud computing, business intelligence and cloud business intelligence. Section 2 describes related work which has been performed in recent years on cloud business intelligence. Section 3 describes benefits of cloud business intelligence. At last, Section 4 includes the conclusion.

II. BASIC DEFINITIONS

2.1. Cloud Computing

NIST (National Institute of Standard and Technology) defines cloud computing [2] as: “A model for enabling on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

2.2 Business Intelligence

According to Reinschmidt and Francoise [3], Business Intelligence (BI) is "an integrated group of tools, technologies and programmed products that are used to collect, integrate, investigate and make data available". The core function of a Business Intelligent system includes “intellectual investigation, integration, aggregation and a multidimensional analysis of data originating from various information resources”.

2.3 Cloud Business Intelligence

Cloud BI is a new concept of delivering business intelligence capabilities —“as service” using cloud based architecture that comes at a lower cost yet faster deployment & elasticity. Software as a Service (SAAS) BI is also being used by many small and medium sized enterprises who seek to speed up their businesses with BI and analytics tools [4].

III. RELATED WORK

3.1 Cloud Computing

Gartner [5] defines Cloud Computing as a style of computing, where massively scalable IT-enabled capabilities are delivered ‘as a service’ to external customers using Internet technologies.

3.1.1 Characteristics of Cloud Computing

Cloud model is composed of five essential characteristics.

- On-demand self-service: A consumer with an instantaneous need at a particular timeslot can avail computing resources in an automatic (i.e. convenient, self-serve) fashion without resorting to human interactions with providers of these resources.
- Broad network access: These computing resources are delivered over the network (e.g. Internet) and used by various client applications with heterogeneous platforms situated at a consumer's site.
- Resource pooling: Computational resources of provider are integrated which becomes service to users, by incorporating multi-tenant model and dynamically allotting various physical and virtual resources based on customer demands. The inspiration for setting up such a pool-based computing model lies in two important factors: economies of scale and specialization. The outcome of a pool-based model is that physical computing resources become 'invisible' to customers, who in general do not have control or knowledge over the location, configuration, and originalities of these resources (e.g. database, CPU, etc.) . For example, customers are not able to tell where their data is going to be stored in the Cloud.
- Rapid elasticity: Capabilities can be rapidly and elastically provisioned, in some cases robotically, to quickly scale out and rapidly released to quickly scale in. To the client, the capabilities accessible for provisioning often appear to be unrestricted and can be purchased in any quantity at any time.
- Measured Service: Although computing resources are pooled and shared by multiple consumers (i.e. multi-tenancy), the cloud infrastructure is able to use appropriate mechanisms.
3.1.2 Service Model

Three service models to categorize the cloud services:

- **Software as a Service (SaaS).** Cloud consumers release their applications on a hosting atmosphere, which can be accessed through networks from various clients (e.g. web browser, PDA, etc.) by application users. Cloud consumers do not have control over the Cloud infrastructure that often employs multi-tenancy system architecture, explicitly, different cloud consumers' applications are ordered in a single logical environment on the SaaS cloud to get economies of scale and optimization in conditions of rapidity, security, availability, disaster renewal, and maintenance. Examples of SaaS consist of Salesforce.com, Google Mail, Google Docs and so forth.

- **Platform as a Service (PaaS).** PaaS is a development platform supporting the full "Software Lifecycle" which allows cloud consumers to develop cloud services and application (e.g. SaaS) directly on the PaaS cloud. Hence the difference between SaaS and PaaS is that SaaS only hosts completed cloud applications whereas PaaS offers a development platform that hosts both completed and in-progress cloud applications. This requires PaaS, in accumulation to supporting application hosting atmosphere, to possess development infrastructure including programming situation, tools, configuration management, and so forth. An example of PaaS is Google AppEngine.

- **Infrastructure as a Service (IaaS).** Cloud consumers directly use IT infrastructures (processing, storage, networks, and other fundamental computing resources) provided in the IaaS cloud. Virtualization is extensively used in IaaS cloud in order to integrate/decompose physical resources in an ad-hoc manner to meet growing or shrinking resource demand from cloud user. The essential strategy of virtualization is to set up independent virtual machines (VM) that are isolated from both the underlying hardware and other VMs. Notice that this strategy is different from the multi-tenancy model, which aims to transform the application software architecture so that multiple instances (from multiple cloud consumers) can run on a single application (i.e. the same logic machine). An example of IaaS is Amazon's EC2.

3.1.3 Deployment Model

More recently, four cloud deployment models have been defined in the Cloud community:

- **Public cloud-** A public cloud is the basic infrastructure model of cloud computing concept, in which Cloud vendor or service provider makes all the resources such as storage, applications and platforms, available to general public users over the Internet network. In the market, there are many public clouds which are providing services for free or a significant fee with using "pay for what you use" concept. For example, Gmail is a free mail management application from Google, CRM applications from Salesforce.com need purchasing [6].

- **Private cloud-** In the cloud, some organizations might need more specific cloud environment which is specialized just for their own company and own business workflows. For this demand, Cloud computing has got Private cloud infrastructure model. Private clouds are built for the exclusive use of specific clients, providing a high level control over data, quality of servicing and security procedures. The organizations own the infrastructure resources (IT and Software resources) and have control over how the system will work, and how applications will be deployed on system. Private cloud maintains and encapsulates all corporate data in resources under control of the contractual and legal umbrella of the organization. This maintenance eliminates the legal, security and regulatory concerns related with data which is being processed on third party computing resources. (Carolan, J., June 2009) Larger enterprises may think that private clouds are more economical to develop future state architectures internally to deliver the benefits of Cloud computing to internal “subscribers”.

- **Community cloud-** The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security prerequisite, plan, and compliance considerations). It might be managed by the organizations or a third party and may exist on premise or off premise [7].

- **Hybrid cloud-** Each cloud infrastructure model (Public cloud and Private cloud) has been providing different abilities and resources environments. But sometimes, organizations may need both of these models for their businesses. In this condition Cloud Computing has offered a third cloud type, Hybrid clouds. Hybrid cloud combine both of infrastructure models, public and private clouds. The promise of the hybrid cloud is to provide the local data benefits of the private clouds with the economies, scalability, and on-demand right to use of the public cloud [8].

430
The term Business Intelligence (BI) can best be explained by the definition given by Negash (2004): “BI systems merge data assembly, data storage and knowledge management with logical tools to present complex internal and competitive information to planners and judgment makers”. The scheme that business intelligence systems present actionable in sequence delivered at the right time, at the right position and in the right form to support decision makers. The purpose is to improve the timeliness and quality of inputs to the decision process, hence facilitating managerial work (Negash, 2004).

Business Intelligence (BI) is one area of the Decision Support Systems (DSS) regulation and refers to information systems aimed at integrating structured and unstructured data in order to convert it into useful information and knowledge, upon which business managers can make more informed and consequently better decisions [9].

Business intelligence as the set of tools and processes that generate data from several sources, organize them, process store, present them to end users in order to improve the decision making in the organization and to generate value through information and knowledge. The business intelligence can be simple or complex depending on the company, its data sources and its analysis needs [9]. The main four business intelligence stages are [10]:

Extract Transform and Load (ETL): Before data can be analyzed for business purposes, the data should be inserted into a data warehouse. The ETL capability is concerned with automated extraction of data from a source system(s), transform this data into useful information (i.e. following a predefined format) for the target data warehouse and load this transformed data into the data warehouse.

Data Warehouse (DW): The core of business intelligence solution, according to Bill Inmon, recognized as the “father of the data warehouse”. Data warehouse is "a business-oriented, integrating, time-variant and non-volatile collection of data in support of management decision making process". A good data warehouse plan must consider the present and future user needs of information and at the equal time, be optimized for speedy and interactive access. Also, the data warehouse has to be flexible enough to support the rapid data growth and changes in the organization.

Online Analytical Processing (OLAP): A tool for fast and user friendly analysis of the multidimensional data in the data warehouse is Online Analytical Processing or shortened OLAP.

The key operations available in OLAP include rollup and drill-down along one or more dimension hierarchies, slice-and-dice, and pivot. Rollup will perform generalization to see a concise overview of the data and drill-down will decrease the level of aggregation to specialize on a particular part of the data and thereby increasing the level of detail. Slice-and-dice will focus on a particular aspect of the data by selection and projection. And the last, Pivoting, will be used for re-orienting the multidimensional view of data. OLAP, together with Data Warehousing and Data Mining are seen as the most important BI capabilities.

Data Mining (DM): Define the scientific field of data mining as: “The science of extracting useful information from large data sets or databases”. This precisely depicts what the data mining potential encompasses. The data mining capability gives you the ability to explore, observe, and analyze large amounts of data in the data warehouse and extract useful information from it, which can be done by direct querying or using a data mining interface. Many researchers address data mining as one of the basic abilities of BI.

4.1 Business Intelligence Infrastructures

In order to fathom the impending of Cloud BI, the structure and characteristics of the precious, infrastructures need to be measured. [11] The foundation of the following discussion is the three layer architecture introduced by Baars and Kemper (2008) (Figure 1). In the following, the layers are discussed in further detail.

4.1.1 The Data Layer

The data layer is responsible for storing structured and unstructured data for management support. Regarding structured data, the central component is the data warehouse (DWH). A DWH is commonly defined as a “subject-oriented, included, time-variant, and non volatile set of data in support of management’s executive process”. Many current realizations of DWHs are based on so called core DWHs. Core DWHs are usually not used as a direct source for investigation systems, but rather distribute data to individual Data Marts. It keeps excerpts of application specific data. More recently; there has been a shift towards DWH infrastructures that are integrated with functioning systems. This is usually achieved by the introduction of an Operational Data Store (ODS) that is designed to keep real time data on a transactional level for time significant tasks. ODS/DWH architectures allow to build Closed-loop and Active Data Warehousing solutions.
To supply the various data storages, ETL (Extract-Transform-Load) tools are needed. ETL tool supports the extraction and transformation of data from heterogeneous source systems. The transformation includes filtering out syntactical and semantic errors, matching data from different sources, as well as aggregating and enriching it. For the storage and administration of unstructured data, Content Management Systems (CMS) and Document Management Systems (DMS) are inserted into the data layer [12].

4.1.2 The Logic Layer

The Logic Layer provides functionality to analyze structured data or unstructured content and supports the distribution of relevant knowledge among different users. The most prominent tools in BI surroundings are reporting, data mining, and OLAP tools. Reporting tools present quantitative data in a report-oriented format that might include numbers, charts, or business graphics. OLAP denotes a concept for interactive and multidimensional analysis of aggregated quantitative business evidence. Data mining tools support the identification of hidden patterns in large volumes of structured data based on statistical methods like association analysis, classification, or clustering. Data mining and similar model-based tools are also referred to by the term Advanced Analytics [13].

4.1.3 The Access Layer

The Access Layer allows the user to correctly use all applicable functions of the Logic Layer in an integrated fashion within the confines of defined user roles and user rights.

4.2 Business Intelligence Application Areas

- Financial Analysis that involve reviewing of costs and revenues, calculation and relative analyses of corporate income statements, analyses of corporate equilibrium sheet and profitability, cash flow statement, analyses of financial markets and sophisticated controlling.
- Marketing Analysis that involve analyses of sales receipts, sales profitability, profit limit, gathering sales targets, time of instructions actions undertaken by competitors, stock exchange quotations, and market identification and segmentation [14].
- Customer Analysis that concern time of maintaining contacts with customers, customer profitability, modelling customers' behaviour and reactions, client satisfaction, shake analysis etc.
- Production Management Analysis that make it possible to identify production 'bottlenecks' and delayed orders, thus enabling organizations to examine production dynamics and to compare production results obtained by departments or plants, etc [15].
- Logistic Analysis that enable to identify partners of supply chain quickly, reverse logistics analysis and handling.
- Wage analysis analyses of wage related data including wage component reports made with reference to the type required, reports made from the perspective of a given enterprise, wage reports distinguishing employment types, payroll surcharges, personal contribution reports, analyses of average wages, etc.
- Personal data analysis that occupy examination of employment turnover, employment types, presentation of information on individual employee's personal data, etc [15] [14].

4.3 Business challenges

The European Network and Information Security Agency, a cross-border organization formed by the European Union to address IT security for all member states, has summarized the unique security issues raised by cloud computing:
• Loss of Governance - Data processed outside the enterprise brings with it an inherent level of risk, because the organization may not have direct control of the infrastructure, trust in the provider and its own ability to provide proper security is paramount [16].

• Compliance Risk - Customers are responsible for the security and integrity of their own data. The cloud provider impacts the organization’s ability to comply with regulations, privacy expectations and industry principles, since data and systems may exist outside the organization’s direct control.

• Isolation Failure - Data in the cloud is in a shared environment alongside data from other customers. Multi-tenancy and resource sharing are defining characteristics of the cloud. It is exclusively possible for competing companies to be using the same cloud services, in effect running their workloads side by side. Keeping memory, storage and network access separate is essential [16].

• Data Protection - In the cloud, the organization doesn’t know where his data hosted. The ubiquitous nature of data in the cloud raises unparalleled identity and access management threats, since the organization relinquishes direct manage over data, it relies on the provider to keep that data protected and, when it is deleted, ensure that it is permanently destroyed.

• Management Interface and Role-Based Access - Cloud applications are accessed and managed through the Internet, and involve bottomless and extensive control. The risk connected with a security break is therefore increased and proper access authorization must be carefully considered [16].

V. CLOUD BUSINESS INTELLIGENCE

The ability to pay for analytics capabilities as a monthly or annual service, instead of purchasing, integrating and maintaining software on your own is called Cloud Business Intelligence. It is generally more cost effective and rapidly implemented than traditional solutions. Cloud BI is the most simple, cost-effective way for an organization to get all the components needed for data access and integration, analytics, reporting and dashboards— all available in hosted environment with "pay-as-you-go" economics. Cloud delivery enables rapid deployment – most businesses can build an initial BI environment in days or weeks compared to months with traditional Business Intelligence solutions.

Organizations now realize that high investments and Total Cost of Ownership of conventional on-premise BI makes these solutions impractical and unattractive. The allure of Software-as-a-Service or Cloud BI has never been stronger [17].

Business Intelligence solutions in the Cloud represents the unification of two key trends, the evolution of cloud computing as a cost effective, fast and well-prepared platform and the use of Business Intelligence technology to gain insight and improve the quality and speed of business decisions. To create the most of Cloud BI, businesses have to look for a complete solution that offers a extent of features that are easy to use, immediate to deploy and scalable as data and user requirements grow. To discover the best clarification, each business should consider their own unique needs with respect to multi-source data ability, data detection, analytics and reporting, scalability, computerization and flexibility. Once these requirements are determined, the best equivalent can be found among available Cloud BI vendors.

Cloud BI solutions hosted by service providers and accessed by users over the Internet, proposal all of the capabilities of traditional BI solutions while substantially improving the economic bottom line. Cloud solutions provide powerful and flexible business imminent, but are faster, easier, and less pricy than custom "behind the firewall" clarification. The business benefits of Cloud BI are persuasive and actual [17]. The Basic Architecture - the basic architecture needed to run business intelligence solution in the cloud is depicted in Figure 2 [18].

The lower layers are formed by hardware and software systems. These are the minimum elements that have to be offered by the cloud computing provider. Hardware refers to processing, storage, and networks, while software refers to the operating systems and drivers required to handle the hardware.

The Data integration box refers to the equipment needed to perform the extract transform load (ETL) and data cleansing processes. The database box considers to the relational or multidimensional database systems that manage the information. It is important to message that there are original devices called "data warehouse appliances", which merge hardware, software and databases elements in just one box. However, they should be considered as an integrated part of the architecture [18].

Data warehousing tools are the set of applications that allow the creation and maintenance of the data warehouse. BI instruments are the set of front-end applications that permit the final users to access and analyze the data.
Finally, since all the architecture is departure to be accessed through the Internet, there is no need for thick clients or preinstalled applications, because all the substance and configuration can be reached through conventional internet browsers.

Figure 2. Business intelligence on the Cloud: Architecture [17].

5.1 A Framework for delineating Cloud Business Intelligence

The diverse constructs introduced above lead to a framework that can help with identifying, combining, and eventually evaluating possible BI services. The cloud business intelligence framework is visualized in Figure 3. The starting points for the BI service grid are the software components in the BI infrastructure, e.g. based on the three-layer architecture introduced below. The components can also be adapted to individual needs or be further broken down if necessary. The second feature business specificity builds up on the concept of the “service stack” and distinguishes between infrastructural services, like database hardware provision or BI tool hosting, and services nearer to business, example indicator definition or the development of a report [19].

The core criterion for differentiating along this dimension is the allocation of responsibilities between the provider and the user of BI services. The additional responsibility for the business content is shifted to the provider, the more he/she needs comprehension of specific business semantics and user context. The business intelligence service grid proposes the distinction of four layers:

- **Hardware**– The provision and running of the relevant computing, storage, and network equipment necessary to operate one or more business intelligence components. In the web based context of Cloud Computing, handing out this layer corresponds to an infrastructure as a Service approach. Here, virtualization brings flexibility regarding both the physical location and assigned resources like CPU power or storage – highly relevant arguments when considering the volatility of resource consumption in BI. Hardware abstraction is especially interesting for facilitating scalability and portability and it might give middle sized enterprises access to hardware power that was otherwise be out of reach for them (e.g. because they cannot afford “DWH appliances” (McKnight 2005)). High-end requirements on the DWH side (latencies, data volume) are often at odds with an Internet based rider model. It can therefore be doubted that virtualization relieves of the cumbersome installation, alteration, and operation tasks for truly demanding ODS/DWH installations.

- **Software tools**– This relates to the Business Intelligence software, from ETL tools to data visualization packages. For Cloud Computing, services on this level incur a SaaS approach. The resolution of the portfolio of managed components needs to be adjusted to individual needs. The software units in discussion can range from complete applications down to atomic functional blocks that are delivered as web services. A facilitator for applying Cloud concepts on tool level is the fact that most state-of-the art BI software products now come with rich web interfaces that match or even surpass the former separate clients. However, with respect to the distribution feature of Cloud Computing, it needs to be acknowledged that many BI tools on the data and analysis layers still lack multi-tenancy capabilities, let only mechanisms for handling multiple instances or for load balancing. This doesn’t inhibit a Cloud approach (as it can be circumvented with hardware virtualization) but it surely makes its application more difficult [19].

- **Templates**– It is as understood as preconfigured applications and prearranged contents that can be modified to individual needs. Several larger business intelligence suites deliver ready-to-use templates and include features to make own ones. Templates have become a powerful tool in BI to reduce development cycle time, foster reuse, and impose rules regarding application development on the user side. However, they are still tightly bound to the BI software tool products. An uncoupling of the layers is therefore currently not of much relevance for Cloud BI.
• Content—This pertains to the actual business semantics. A provider who operates on this layer takes over responsibilities for the definition, assembly, structuring, transformation, and/or presentation of data. Cloud computing is here understood to be a means for outsourcing hardware and software.

The third dimension that can be addressed refers to the "application life cycle". It can be differentiated whether a service is devoted to the development of components or on their operation. This dimension becomes relevant in Cloud Computing when components allow or even foster a web based development, e.g. by making use of PaaS and technologies like mashups [19].

5.1.1 Structure of the framework

Spanning all possible Cloud BI variations is an "umbrella of general provider and contract related issues". As in all outsourcing agreements, it wants to be thoroughly tested whether the provider is trustworthy. Besides, the contractual agreement has to pinpoint the Cloud promises of high availability, data security, elasticity, scalability, and consistency in form of distinct service level agreements. This is of essential importance for BI solutions where the content in discussion is highly sensible and which are – unlike the currently existing Cloud computing examples (office software etc.) – truly demanding concerning performance, customizing, and administration requirements. As has been discussed, the provider can either be an established partner or an anonymous and possibly interchangeable entity from the market, example a larger IT service provider [20].

The next building block in the framework is the actual "composition of the service". As discussed above, this can be achieved by specifying the applied granularity on the tool layer (solution, component, or web-service) and by defining the subsumed BI services with the help of the dimensions component, business specificity, and life-cycle phase [20].

While the type of service is implicitly part of the service composition, the second defining Cloud aspect is the distribution. In BI, this essentially has two sides to it: The physical distribution and the architectural distribution. Eventually, the intended benefits have to be reflected upon. This can pass on to classical cost based outsourcing rationales or to harnessing the qualitative traits of the Cloud approach (introducing flexibility, scalability, performance, or additional functionality). As well, there might be informational benefits (through add-on data integration services from the provider) or even transformational effects (by adding new capabilities).

5.2 The Benefits of Cloud Computing for Business Intelligence

According to a current Gartner study, the most important drivers for investing in business intelligence are related to providing faster response to user’s need for data, decreasing cost and enhancing the user’s method for data sharing and identity service [18]. Cloud computing makes sense to business intelligence solution only if it offers benefits to customers. In this section those benefits are described below:

• Lower costs: Under a cloud computing concept, companies do not need to invest large amount of money to acquire hardware, software, license and knowledge to put this business intelligence infrastructure up and running. They would only have to agreement a cloud computing provider and pay for the resources they require. It is unnecessary to pay for the time in which no user access the application and computing resources remain inactive.

• Multiple redundant sites: One of the main concerns of business intelligence professional is to keep solution available the longest schedule possible. One way to achieve this is to have multiple sites that suggest redundancy. Since most of cloud computing providers have sites geographically dispersed this characteristics is achieve.

Figure3. Cloud Business Intelligence Framework [19].
• **Scalable provisioning of resources:** Business intelligence solutions do not have the same load effort during the day. This process that at certain points in time, some servers could be idle while others may be reaching their peaks on processing, memory usage or I/O operations. With cloud computing resources can be automatically and rapidly scale in and scale out. For example, during the ETL process at night, the solution could use processing power from applications servers and in the daylight, analytical processes could use memory that is not in use by ETL processes [18].

• **On-demand performance improvements:** One of the most recurrent problems that are seen on business intelligence applications is when the customer needs to expand their data warehousing because it requires high investment in new hardware, storage, license and human effort to perform the migration to the new environment. Under a cloud theory, this problem would be addressed almost instantaneously and transparently for users by taking advantage of existing hardware and software resources.

• **Usage billing:** By using cloud computing, corporation pay for a service as they go or pay on a monthly or yearly basis. With this policy, this expenses move from Capital Expenditure (CapEx) to Operational Expenditure (OpEx). CFO’s will grate appreciate this characteristic.

• **Fast development:** Instead of spending long time preparing and installing required hardware and software, the platform can be up and running in just minutes, ready to configure applications and start populating the data warehouse.

• **Easy maintenance:** Most of the maintenance needed for hardware and software, like firmware updates and promote, are done by the cloud computing provider. Also, since these applications are accessed through internet browsers, maintenance on client computers is reduced dramatically [21].

VI. CONCLUSION

Cloud is a big part of future Business Intelligence and offers several advantages in terms of cost benefits, flexibility of implementation, availability and speed of implementation. There are many benefits from using the cloud computing for business intelligence. It influences the way business intelligence software projects are managed which it provide a virtually unlimited pool of computing power, storage space and memory for the business intelligence infrastructure. Business Intelligence in the cloud has been developed in order to enhance the efficiency and productivity of business intelligence and increase the performance of Business Intelligence software.

BI on the Cloud offers huge possibilities for removing barriers to decision making by integrating high volume and mission critical business processes. Therefore, a Cloud BI solution may be a feasible answer to the challenges of the economic crisis. By such a solution, the economic organization - small, middle-sized or large – may use market opportunities that under normal conditions would not be accessible. There are many benefits from using the cloud computing for business intelligence. It influences the way business intelligence software projects are managed which it provide a virtually unlimited pool of computing power, storage space and memory for the business intelligence infrastructure. Business Intelligence in the cloud has been developed in order to enhance the efficiency and productivity of business intelligence and increase the performance of Business Intelligence software.

REFERENCES

[16] Ewa Ziemba and celina M. olszak, Approach to Building and Implementing Business Intelligence Systems. University of Economics, Katowice, Poland
[17] Secure your cloud applications...inside and out IBM Application Security Services for Cloud, (IBM).
[18] Images_docs_cloud_BI pdf.