ABSTRACT
Business intelligence software for educational institutions is specialized and organized. BI software is used in educational organizations to reduce the complexity of administrative management and increase academic performance. This paper is to make us understand how BI software is used in Schools and institutions to make them run fast and easier in administration work and reduce manual work. Education sector is very crucial as they provide knowledge to the young minds with positive attitude. The education system is becoming critical in the global market with more operations and millions of amounts are spent without any knowledge about the process analysis. Business intelligence software is the tool which makes the education system easy by handling many operations within one system giving more information to the users. It is explained by analyzing and developing new strategies. The theory of school of thoughts is linked to the BI software systems to make us understand the challenges and benefits in the education sector. The business intelligence software usage gives positive output to the institutions/organizations.

**Keywords:** Business Intelligence software, Business intelligence, Business intelligence for education, benefits of Business intelligence software.

INTRODUCTION
Business intelligence software is a Business intelligence tool which analyzes the data in a business organization to know its strengths and weaknesses. To make better decisions and to utilize the resources the BI software is used. It plays an important role in strategic planning process of an organization. Types of tools that make up business intelligence software application solution are include tools for spreadsheets, operational dashboards, data mining, reporting, search(query), analytics processing (OLAP), content viewer, enterprise resource planning(ERP) systems. BI software is used to integrate tools designed for special upstanding as retail, healthcare, and education. Number of ways of BI software utilization: 1. Cloud computing, 2. On-premise instalment, and 3. SAAS (ASP) application service provider. (Beal, 2010) First complete BI systems were designed by IBM and Siebel (currently owned by Oracle) in the period between 1970 to 1990. (Business intelligence software, n.d.)

Business intelligence is an important solution to the education sector as students will understand the courses availability and the schools will be providing all the required information about academics and extra-curricular activities on web by using BI software solutions. The software used in the education sector is different from the bank and doctor’s office. They differ according the requirements in the fields with
new functions. New industries use new functions according to their requirements. Marlab’s software Rajmohan Sreekumaran spoke to the press that BI is being popular in education sector to reduce the management complexity and reduce high costs. To make correct administrative decisions every sector is using BI software to analyze their organizations. Sreekumaran stated that few problems are solved by using this software system by change of processes as staff assignments etc. He said that by adding Business intelligence in the education sector gives more changes to the learning system but not all the organizations are using these solutions. If we use BI software in the educational organizations, the schools or institutions gain more benefits.

The system is good in the field of education in the Indian market. It may be, may not be beneficial in the global market. Without considering the field, becoming a Business Intelligence leader means working with BI software. A software is needed to explain their own data which makes sense to the different types of workers on their pay. Whether IT companies are dealing with educational organizations or utility providers. NECTO 14, BI360, Yellowfin are the software’s of Business Intelligence used by different organizations and institutions to make their academic performance better and to reduce the management stress. The BI software becomes essential in the education sector which makes schools successful in the Indian market says Rajmohan Sreekumaran. (Business intelligence use cases sprouting in education, 2014)

BI360 is a software used to increase the performance to keep low costs and increase the enrollment. Education managers are using Solver’s Microsoft based BI360 software to utilize an integrated cost-effective solution for: reporting, roll-ups, budgeting, forecasting, modeling, dashboards, scorecards based on key performance measures, data warehousing or data marts to mix financial data with student data. With this software educators, can execute –

- a combined budgeting, reporting, dashboard, and data warehouse solution for: student data (admissions), survey data, HR/payroll data, Financial data.
- To set goals, the head of the department and administrators are involved.
- Calculate funds required.
- Explain about improvements.
- Associate to develop strategy of focus which relates to budget.
- Assess and track progress of an organization.
- Develop administrative process by lessening the costs.
- High accountability and student satisfaction. (BI360 suite for education, 2017)

**METHOD**

In this Paper, Literatures on business intelligence software and data collected from secondary sources are used. The paper is explained by understanding what is Business intelligence software by review of literature on Business intelligence, educational institutions using BI software and outcomes of using BI software solutions in educational institutions. Linked to the school of thoughts to the Business intelligence: theme of uncertainty, information and game theory are the main topics
related to the importance of information and decision making. Then the collected information analyzes the paper. The paper is concluded by understanding the main topics of using BI software in educational institutions.

LITERATURE REVIEW

What is Business intelligence?
Business intelligence is an umbrella term launched by Howard Drenser of the Gartner group, in 1989. He launched it to upgrade business decision making by using computerized support and fact-based systems to outline a set of concepts and methods. (A. Nylund, 1999)
Ghoshal and Kim defined business intelligence as a management philosophy and tool which assists organizations to direct and filter business information for the reason to make successful decisions (Ghoshal & Kim, 1986)
BI goal is to record data, knowledge and answer to the business events which can be developed further with fast and easy decisions. (Guran, Mehanna, & Hussein, 2009)
It is regarded as analysing tool which helps the organizations/institutions to take better decisions about the sales, business conditions, consumer demands and product choices (Golfarelli, Rizzi, & Cella). BI is defined by the “Data Warehousing industries as a tool which changes data to information, information to knowledge and knowledge to plans which gives profits for a business action. Analyzing and giving information about a business with the help of important processes of a business lead to decisions and actions which gives good business performance as an output.

A raw and meaningless data is changed into useful information and knowledge (Williams & Williams, 2007). Golfarelli at al. argue that BI is data transfer tool which changes data to information and the latter one to knowledge (Golfarelli, Rizzi, & Cella). An individual can analyze the information, gather conclusions, or make impressions with the help of the process of collecting high-quality and useful information about the subject matter which is being researched (Jonathan, 2000).Stackowiak et al state that BI is the process where data is collected in large amounts, that data is analyzed and a high-level record of reports are given for that data which turns into good business actions by making the management to take fruitful decisions (Stackowiak, Rayman, & Greenwald, 2007).Zeng et al have defined BI as “the process of gathering, Analyzing, and dispersing information with an objective, the decrease of unpredictability to make strategic decisions (L. Zeng, Shi, Wang, & Wu, 2007).Ranjan refers BI as strategic alteration of data from all the data sources into new types to give information which is business-driven and results-oriented (J.Ranjan, 2008).

EXTRACTING BUSINESS INTELLIGENCE

Conclusions are retrieved from the term “data” which is described as a set of facts, calculations, and statistics. Knowledge is referred as an emotional outcome of recognition, hearing, and understanding. (Miller, 2000) Information is combination of both data and knowledge. Intelligence is knowledge gained from information gathering which is strained, analyzed, and amplified. (Taylor, 1986) (Dr Lilit, 2009). The issues with knowledge and intelligence are tough to document. To gain
intelligence and analyze information, it requires information but intelligence itself gives rise to new knowledge. The relation between them can be seen in the below diagram.

![Diagram showing the relationship between data, information, knowledge, and intelligence]

**Source from:** (Dr Lilit, 2009)

Business intelligence has different explanations in Literature according to different disciplines and cultures. Japanese approach about BI is that large amount of data is gathered and combined about competitors. Europeans approach is that they analyze BI. Example: Denmark and Sweden organizations and government institutions gather data about foreign country competitors of national economical goods (Dr Lilit, 2009). Due to globalization, companies are interested in gathering information about foreign competitors rather than local one’s. Secondly, as competition is more in the global market daily new technologies are emerging in the market making competitors to strive for growth and survive in the market for a long period (Dr Lilit, 2009). Gathering information for the development of the company’s plans is the important issue. (Bouthillier, 2003) explained three basic methods to measure the information value:

- The normative value approach: to understand people view on the pay about the information but not on the value in the process of decision making.
- The realistic value approach: to understand the information impact by examining the information effect on the results of decision making or on performance.
- The perceived value approach: To understand how information value is observed by users by knowing the benefits of information recognized by users. (Dr Lilit, 2009)

Information services and systems should understand the importance of getting information value. (Taylor, 1986) stated that the value-added services are the actions done by information service and systems that give both to send the information potentiality and to connect it to issues in important environments. To
Perfectly select the correct information services and systems one has to understand the below methods:

- **Ease of use:** Browsing, Formatting, Selecting, Sorting, etc. to overcome problems in use.
- **Noise reduction:** Remove unnecessary information and add useful information which has probability and accuracy.
- **Quality:** Ensure precision, comprehensiveness, reliable, and valid gathered information.
- **Adaptability:** Give assurance about the system response according to customer needs and issues. The system should change the gathered information.
- **Time and cost saving:** Implement processes that consume less time and are not expensive for customers. (Dr Lilit, 2009)

**BUSINESS INTELLIGENCE SOFTWARE SOLUTIONS**

Organizations traditionally retrieve information from different sources of different quality and utilize incompatible codes that require adaptation. Coordinating, Cleansing, and systematizing data in preparation for BI which is demanding and need Extract-transform load (ETL) tools to arrange the data properly. (Chaudhuri, Dayal, & Narasayya, 2011)

Most of the dashboard ideas within the BI software are “drag and Drop”. If advanced functions are needed- a syntax of combination of SQL and Microsoft-EXCEL like functions. When data is ready and model is designed, the customer should create dashboard applications using charts, Graphs, multidimensional data analysis and reports. (Garcia & Harmsen, 2012)

By assessing different Business intelligence software titles for use a regular demand was high barrier to entry. Popular BI software like ORACLE BI or IBM Cognos need outstanding server framework which was not budget-friendly regardless of low cost or cheap academic agreements. Example: Oracle BI stack needs different database, middleware, and application servers, with essential software’s like Java, operating system patches to run safely, which needs powerful planning investment and time to execute (Wixom, 2014)

**TRADITIONAL BI ENTERPRISE SOFTWARE**

These are distributed as enterprise software, means that software solutions are fixed and assisted on the base of its own IT team. The software is very costly and regularly needs hundreds of thousands and millions of dollars in upfront costs. The use of this software is also costly, in addition if employee pays, it needs more hardware for the software like hardware servers. Investment costs are higher than the maintenance and support costs. Traditional BI solutions are transported very costly. Saas BI solutions are transported very costly. Saas BI solutions rectify from the stress of costs, time requirement and have limits for traditional solutions. A single BI solution could apply and purchase together with the combination of more software components, like
software for gathering data, data integration, storage, reporting, and analysis. Below is the diagram of a typical traditional Business intelligence solution application (Figure 1).

(Marian & Lucian, 2016)

Figure 1: Traditional business intelligence application (The traditional Business Intelligence Approach, n.d.)

Companies praise the analytical value they receive from traditional BI solutions as they are interested in investing in time, software, hardware, and human resources. But the expensive prices discourage the small and medium organizations they can’t afford it (Marian & Lucian, 2016)

SAAS (SOFTWARE AS A SERVICE) OR ON-DEMAND BI
As traditional BI software is highly expensive, long delay in time and resource removal. Instead of buying or implementing a Saas software users can buy software as a service from a dealer. With support of a seller, the software can be used in a remote locality also by the help of the servers. Services are utilized via a secured internet connection. Salesforce.com, NetSuite and Rightnow are examples of successful Saas solutions. Saas is given in instalment basis to the users of small and medium organizations. Trial versions are demonstrated, it is less expensive and user-friendly. It gives less execution time for the organizations than traditional Enterprise BI solutions. Traditional BI solutions offer complex operations while Saas is useful for both types of users and it satisfies business user as robust reporting and data exploration are easy for the small and medium enterprises. (Marian & Lucian, 2016)

TRADITIONAL ENTERPRISE BI SOFTWARE VERSUS SOFTWARE AS A SERVICE BI
Traditional enterprise BI software is a enterprise software which are effective, need high investment costs, large usage of IT resources, hardware investments and 3rd party consulting to begin a new application. Maintenance is also expensive and
resource-based. Large companies buy these software solutions. Saas is the best solution for small and medium sized organizations with low cost and less time investment. Saas solutions are gaining new customers from the small and medium sized organizations. The latest innovation is the cloud BI which is useful for many organizations. It is suitable for many businesses because data is directly retrieved from the place where it is stored namely in the cloud. HTML5 and Java support helped cloud to be successful because it can be used via a browser. They can be inserted in a cloud application to enable most productive way of giving BI within an application- embedded BI. Extensive analysis and report tools can be accessed which allows companies to handle business processes. Cloud BI is user-friendly and easy to every person who is also not aware of its application methods. Advantage of cloud BI solution is, any employee can use it in an organization with minimum knowledge. To increase the efficiency business administrators can analyze everyday processes and help their co-employees in other sectors. Normal people can also use cloud BI application to organize standard processes to make good contribution to make successful organizations. Cloud BI solution takes days or weeks for implementation compared to traditional enterprise BI software solutions. (Marian & Lucian, 2016)

Five stages of BI: (Marian & Lucian, 2016)
Raw data and actionable for customers is same for both traditional enterprise BI solutions and Saas solution software. They differ in time, cost, complexity, and resources.
1. Data
2. The ETL (Extract, Transform and Load) Engine.
3. Data Warehousing
4. Analytic engine
5. Presentation layer

BUILDING BETTER EDUCATION SYSTEM USING BI SOFTWARE

As education is competitive in the global market. The schools and institutions are using Business Intelligence software to analyse the business and reduce the management complexity. As primary and secondary education is in demand now- as education is a business and it provides required knowledge, resources to develop young minds. Educational institutions try to get more profits with less investments. School performance is based on the investments on school fees collected, examination results, student class strength, size of the classes, average student attendance, extended programs (Music, dance, fine art, sports, etc.). The organizations should can attract new students and they should satisfy parents with their program offerings, fee charges. Government is putting tough regulations for schools and institutions. Proper time and sufficient administrative resources supply and tough competition can be satisfied and good reports can be given to stakeholders. The above all data can be put into a one system by reducing the stress-level to the human resources by using Business Intelligence software solutions. The BI software gives good academic performance to the institutions and makes the management understand the advantages and disadvantages of the process and makes them to improve the performance with high profits and low cost. In countries where private schools are more and favoured, there operational costs are more which make the
institutions risky to run. As there is high competition in the education sector, the schools should adapt to the BI software to improve the academic performance by reporting and analysing the information required for decision making. The university of Konstanz(Germany) and Macquaire University(Australia) used BI software to get crucial awareness from more operations like financial, student, human resources, research, and ranking data. Using Business intelligence software makes schools and institutions easy to take decisions, give reports on academics faster and easier. They meet their goals easily by analysing the data using the BI software. (James, 2014)

1. **Academic outcomes and Experience of students:** The institution should analyse the mode of selection student is preferring in the subject selection and their performance to remodel the schedule and subject preferences to improve the outcome of examinations and satisfaction of the students. The performance of the students should be noted always against the points where government and institutional norms. Individual student assessment is mandatory to understand their performance in each subject and make them improve by giving suggestions by organizing corrective methods. Analysing students by giving extra support for good results in the examinations. Check their behaviours by analysing attendance data, incident reports, and discipline records.

2. **Administrative effectiveness and efficiency:** Check the amount spent and manage it on contract services and extra-curricular activities. Observe the student enrolment numbers and class sizes overtime to locate resource planning and calculate government finance needs. To make the required finance incremental activities, the faculty should calculate the costs and funds to build budget insufficiency. Marketing activities should be analysed. Student addresses are located for marketing. Information is given easily which is required for the government reports and funding essentials, and industry regulations.

3. **Workforce management and moral:** observe the balance between the teaching and nonteaching staff and student-teacher ratios to locate student intake and appointing plans and processes. Observe the student administration process aid with schedules and timetables. Observe that teachers are not given more classes and more work load. To observe and understand teacher student performance analyze the historical data of student grades by year, subject, and teacher. (James, 2014)

A perfect executed Business Intelligence program can boost primary and secondary schools to improve their administration capability and skills, academic achievement and student/teacher practice and fulfilment. (James, 2014)

**DISCUSSION**

**Schools of Thought** gives the importance of gathering information and knowledge and good decision making choices to the institutions. In Game Theory, (Wilson, 1981). Influence and useless information focus on the importance of information collection and the prestige related to the organization and the ambitious benefits through it. He states that the encounter of blemished information can be very sentimental. On the fluke, that competitors see the minute opportunity
than an existing organization may praise "grasping response", then the officeholder's excellent action is to apply such conduct against its opponents overall, with the rejection of probably the last ones, in a large set of interviews. For the existing one, the efficient cost of predation is a beneficial reflection to execute or promote its fame, thereby discouraging indirect problems. The consequence that gathered information (whether true or false) collected is enormous and decision making depend on it.

Consequently, the thought of Business intelligence is fixed from the concepts from Game theory information from the thematic schools of thought. The regular access of a business intelligence analysis can be concluded as following essentials: the targets of the exploration are honoured and the execution pointers that will be used to rate different varieties are described, Mathematical models are then developed & analysis are performed to understand the impacts on the performance settled. (Vercellis, 2009). Accordingly, distinct & gathered information from all the sectors are important to enhance the process of decision-making and they are in conclusion with the concepts of Schools of thought that renew that abandoned information computes no value to the process.

**ANALYSIS AND FUTURE RESEARCH**

This paper offers some points for future software research. By understanding the state of BI software in educational institutions, it is very important to take into consideration the attitude of primary and secondary schools. Most BI software systems are withstanding powerful transformation on new development. Therefore, a brief study to get organizations opinions at various stages provides the information of adjustment and improvement of the current development picture. There persists a lack of academic bodyworks on how to evaluate organizations’ learning capability regarding skill improvement from a BI software learning activity. Future research may ask and apply the concepts and theories of Software systems being used in the schools/institutions to improve academic performance and to gain profits with low costs. This will also help educational institutions create a booming business analytics and thus comeback to the industrial demands to ensure the success of their schools. Future studies can focus on 1) comparing the schedule design and instructional design of BI software systems 2) workforce challenge, and the necessity for data scientists’ knowledge, and 3) measure BI software programs of different countries (e.g., Germany, Australia, and India). (Wang Y. R., 2014) Finally, gaining a high-quality BI software system is advancing schools’ problem solving, team work and allows the institutions to take better decisions with good academic performance and management capability. (Wilder & Ozgur, 2015) (Wang Y., 2015)

**CONCLUSION**

This paper developed a theoretical structure to identify the factors which are important in BI software performance. The bodywork collected fussy success factors and categorized them into management and technology. This bodywork had given both academicians and practitioners by developing new vision how to use BI software in educational organizations and what must be done to be successful in that sector. For more experiments, the academic institutions should add new features to
the software system they are using in the institutions. The research is conducted to understand the different things in the global market and how BIS is used in the institutions. Business intelligence solutions assist organizations to achieve actionable understandings from the given data to gain business goals. There are some ways for the operational groups to use the information within their zones shown in the form of tables, databases, and limited coverage in an operational solution, such as customer-devotion management solution. The business intelligence solutions support large organizations or institutions to analyse the different combinations of data and perform complex calculations easily by giving reports of data warehouses to the companies. For better decision making and data processing Business intelligence are very good for the organizations with different sources of data. The data can be put together in one system to analyse the administrative and academic performance. The business intelligence solutions using traditional enterprise, Saas solutions or cloud BI solutions are helpful for the organizations to exist in the competitive global market. They must work fast with good performance and good management skills. So, the business intelligence solutions help them to work faster and easier. (Marian & Lucian, 2016)

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