2. LITERATURE REVIEW

This chapter presents a review of business intelligence tool literature to understand the importance & benefits of the BI tool and to understand the relationship between business intelligence tool, quality of decision making and organizational growth. The first section describes the strategy used for searching the research paper, the second section describes the review of the article and the third section summarizes the reviewed research paper and highlights gap & uniqueness of the study.

2.1 Literature Review Strategy

Many research portals (EBSCO, IEEE, PROQUEST, GOOGLE SCHOLAR) were referred for studying the articles and research papers so as to gain a deep insight into the developments which have already taken place in the field. The research portal were searched for following key words and phrases: Business Intelligence Tool, Role of Business Intelligence Tool in decision-making, Impact of Business Intelligence tool on quality decision- making, Role of Business Intelligence Tool on organizational growth, Impact of Business Intelligence Tool on organizational growth, Trends in Business Intelligence Tool. The leading newspaper such as Economic Times was also referred for articles on business intelligence tool. This research strategy yielded eighty-six articles relevant to the study and is discussed in the next section.

2.2 Literature Review

Cody et al. (2002) have highlighted in the research paper that knowledge management and business intelligence technologies have provided good return on investment to the customers. The authors have highlighted that the two technologies will blend over a period of time to provide solution to the problems requiring both data and text analytics. The authors have discussed two tools eclassifier and sapient developed by IBM for text analytics and a framework for integrating text into the data warehouse and stated that text integrated with business data helps in improving the quality of decision.

Ortiz Jr. (2002) has highlighted new trends of BI tools in his article. The author has mentioned due to high-speed processing and networking technologies increasing amount of data are getting generating at faster rate, along with typical data generation
enterprise resource planning and human resource applications, due to internet-based applications. The author has highlighted that the financial services, communications, and manufacturing industries are the biggest users of business intelligence technology as depicted in figure 6 due to emergence of new trends such as real-time BI, web-based BI and making BI easier to use.

![Figure 6. Usage of BI tool in Industry sourced from Ortiz Jr. (2002)](image)

The author has highlighted that despite recent improvements, BI still faces several obstacles such as data security, cost and ability to handle large volume data for a widespread adoption.

Abukari and Jog (2003) have highlighted in their study that BI is robust & strategic initiative by management and the smart managers can generate increased value for investors by deploying BI tool in their organizations. The authors have described BI as a decision support system which uses a fact based approach to management decision-making and enables sustainable competitive advantage for the organisation. The authors have recommended six-step for successful BI tool implementation:

(i) link business strategies and goals with the solution,
(ii) identify all the essential data sources existing in organization for building the system,
(iii) create a subject-orientated multidimensional cube and extract, transform and load (ETL) the relevant information about the subject,
(iv) identify a reporting platform to view and analyze the data in multidimensional cubes,
(v) build standard reports, perform ad-hoc analysis and data mining to monitor the corporate performance,
(vi) implement enterprise-wide solution.

The authors have discussed use case of BI tool in finance, manufacturing and human resource function and have demonstrated that a systematic
& effective BI tool implementation enables transformation of data into insight to support managerial decision-making and action.

Negash (2004) in his research paper has discussed the concept of BI tool and has provided framework for using structured and semi-structured data to support informed action by decision-makers as depicted in figure 7. The author has discussed the architecture for structured and semi-structured BI tool. The author has also highlighted that market for BI is growing and vendors for structured data based BI tool are mature in comparison to semi-structured data based BI tool. The author highlighted that the use of semi-structured data in decision-making process is increasing. The author has also provided various areas to be covered for further research such as managing semi-structured information, real-time BI etc. The article is conceptual in nature and is useful for students, academicians for their study.

Figure 7. Business Intelligence decision framework sourced from Negash (2004)

Gupta (2004) have discussed the current state of Information Technology (IT) usage in select Indian organizations in their research paper. The research findings were based on questionnaire survey & interview of employees (business executives and information system team) of select IT-savvy organizations. The researchers have highlighted that the issues of IT usage in India were similar to those of worldwide organizations but some of them were specific to India such as credibility with business executives, difficulty in measuring return on investment, lack of business intelligence applications, strategic planning, IS organization alignment, using data as a resource and integrating technology which is resulting in slow adoption of information technology in India. The authors have recommended that business
intelligence application needs to be included in the portfolio of applications for business use and that a culture needs to be developed in the organization for information based decision-making. Since the study was performed on the companies in multiple industry sectors, the study could not provide details on how business intelligence applications were used in those sectors.

Hall (2004) has highlighted in her article that companies which have invested in CRM technologies and were not realizing full benefit from the same is likely due to missing critical piece of the solution which is business intelligence process that drives behavioural change. The author highlighted that due to increase in number of business decisions, complexity and customers demanding higher level of services results in multiple technical and business challenges for the enterprise. The author highlighted that BI tool plays a critical role in comprehensive CRM strategy of the organization and with the use of BI tool in the CRM, the enterprise can best manage customer relationships for maximum customer satisfaction, loyalty, retention and profitability.

According to Chen (2005), multi-national organizations had started investing heavily in BI tools for supporting the analysis process due to tougher business outlook and a systemic approach is required to ensure that the business intelligence process involves the right stages from data collection through to usage of the final input. The author has highlighted and importance of BI tools by citing various examples such as “Apple” who has used strategic business intelligence for becoming the fastest computer’s brand. The author has highlighted that right business team (who were impacted by the change) should be involved in the implementation of BI tool in order to have successful change management in the organization. The research paper has not addressed other challenges of implementation of BI tool such as data integration, skill level of implementation partner, unambiguous user requirement.

According to Graves (2005) BI tool plays a strategic role in achieving regulatory compliance in faster and easier manner in the legal (law firms), financial industry and government agencies. The author has highlighted that a BI tool can help companies overcome hurdles related to gathering, analysing, presenting and storing information. The insightful information helps management take effective decision by quickly visualizing the answers for business queries on corporate data. The author has discussed various features of BI tool but has not provided the full usage/functionality
details of BI tool in legal, financial and government agencies. The research paper has highlighted that still there are organizations that have not implemented the BI tool.

Ramko and Jarosch (2005) have highlighted the importance of BI tool and knowledge management for digital marketing in their article. The authors highlighted that BI tool allows pharma companies to gain insights into individual physicians such as their preferences, prescribing histories, practice characteristics and potential value as customers which will enable better services to the physicians through the right channel at the right time. The authors also highlighted that customer segmentation achieved through BI enables pharma companies to have a balanced salesforce structure to achieve maximum efficiency and productivity. The authors also highlighted that use of digital marketing for knowledge management also increases customer satisfaction & loyalty and the companies executing digital marketing campaigns driven by BI tool gains significant cost and competitive advantages.

Havenstein (2005) has highlighted in his article that new BI tool & capabilities such as operational analytics/ analytics embedded in the business process are enabling ease of daily decision-making process for front-line workers by providing access to operational data. The author highlighted that with the use of new BI tool in hospitals ambulance dispatcher section can help improve efficiency by allowing dispatcher to see where service level agreements are getting missed. The author also highlighted that BI dashboard can be developed for hospital emergency rooms to monitor metrics & performance on admission, discharge times and other treatment related threshold information.

Watson et al. (2006) have highlighted the importance of real time BI solution by citing the example of continental airlines which has received 1000 percent return on investment. The authors have highlighted that objective of real-time BI solution is to improve profitability by increasing revenue and decreasing cost. The authors have provided guidelines for successful implementation of real-time BI tools and key elements of the guideline are (i) change in organization process and technology architecture (ii) defining the real-time BI in the context of the business, (iii) automation of extraction, transformation and loading process, (iv) help user to understand the potential of real time BI, (vi) calculate the return on investment before
starting the journey. The authors have discussed that real-time BI enables decision making for the operations staff.

Sebor (2006) has highlighted the importance of BI tool for marketers in her article. The author has highlighted that almost all decision in organization are subject to scrutiny and CRM systems have collected lot of customer information which can be integrated with BI tool to improve future decision making. The author has highlighted that BI tool can integrate data from various sources such as direct marketing & email campaigns, paid click & search, key word & ad banner performance and has enabled marketing teams to predict customer behaviours & improved campaign effectiveness by providing insights on potential customers for marketing campaign. The author also highlighted that BI tool provide common platform for communication between marketers and sales team and helps marketers to provide valuable information to sales team quickly to support decision-making. The author also highlighted that customer information captured during interaction with call center team in the text form, on line request and web data are goldmine for marketer. The author has highlighted that organization needs to implement the BI tool properly and have to train its employees for effective use of the tool.

Lawton (2006) has highlighted in his article that traditional business intelligence tools has various shortcomings and vendors are taking steps to remove the same. The BI tool has various challenges such as lack of integration with best of-breed components from different vendors, lack of standards, lack of technical sophistication for most employees for effective usage of the technology have caused BI tool to be slow at gathering and analysing data, making the technology unsuitable for short-term and day-today decision-making. The author has highlighted that the BI vendors were already working to improve the product capabilities for addressing the challenges such as real-time analysis to provide information to business for immediate decision, availability of information to the masses so that productivity is improved, ease of integration with other packages (ERP, CRM) resulting in quicker deployment of analytics for decision-making, search features similar to google search and concurrent user licensing for attractive pricing. The author has mentioned despite improvement in technology, BI tool will still face significant obstacles to widespread
success due to high cost of implementation, challenge in calculating the return on the
investment, few companies not interested in newer version of BI tool and the user
ability to take decision based on the analysis. The author has not provided any
suggestion for addressing the challenges for widespread adoption of BI tool.

In his article, Panian (2006) has highlighted the importance of BI tool in human
resources (HR) department for meeting company goals & objectives. The author has
mentioned that BI tool based insights help in strategic decision-making for staffing,
planning and budgeting in the organization. The author has highlighted the seven
areas of HR management where BI tool can be used such as HR scorecard, recruiting
analytics, retention analytics, workforce analytics, succession planning analytics,
training programs design and tracking, and compensation analytics. The author
highlighted that BI tool enables HR manager to predict staffing requirements,
challenges & trends, the impact of challenges on payroll and their effect on
performance of the business. The BI tool enables HR managers to collaborate and
share information with managers and empowering them to make informed decisions
about employee performance and career progression.

In his article, Zangaglia (2006) has highlighted five areas requiring upfront
consideration during project planning for a successful delivery of the business
intelligence project. The areas include solution requirement, organizational and
political realities, project scope, source system complexities and information
technology capability & maturity. The author has highlighted various solutions for the
issues such as business requirement should be aligned to business objectives and
important measures of the organization, executive level commitment to address
political issues, phasing and prioritizing the functionality to address the project
scoping issues, the IT staff should be trained/hired in line with the project
complexities, standardizing of data formats for source system integration. The author
has provided deployment matrix based on the resources & constraints vs.
development approach (data warehouse approach, data mart approach and pre-
packaged solutions) and have discussed the solution for potential issues which may
be encountered during the implementation project.

In his article, Dagan (2007) has discussed the importance of dashboard and scorecard
and has provided guidance to build visual tools on top of effective key performance
indicators (KPIs) for strategic business goals in order to maximize the usage of BI tool. The research paper was focused around the definition of dashboard and scorecard and author has provided example of scorecard & dashboard from natural gas and electricity and has highlighted best practices for effective implementation, and provided guiding principle for selecting between a dashboard or scorecard application. The sample dashboard is depicted below:

![Sample Dashboard](image)

Figure 8. Example of dashboard sourced from Dagan (2007)

The research paper provided limited information on business performance management & monitoring which acts as a foundation for building dashboard and scorecard.

Garza (2007) has discussed the usage of BI tool for conducting better margin analytics by using hypothetical case in financial services sector in his study. The article has highlighted that BI tool can access existing reporting data marts to enable analytics and BI tool with on-line capability provided the ability to analyse data on a multi-dimensional basis allowing the organization to view the information and data for developing action plans. The hypothetical case depicted that the proper architected tools and technology, along with the ability to analyse information on a non-traditional multidimensional basis, helps make decisions easier through quantified supporting analysis. According to the author, BI tool was only valid if the fundamental data is complete and accurate. The full usage of BI tool in financial service sector was not provided in the research paper and the example was hypothetical only.
Watson and Wixom (2007) have highlighted in their research paper the benefits of BI tool, critical success factors for BI tool implementation and the new trends in the BI tool. The authors have highlighted that BI tool implementation provide spectrum of benefits such as reduction in cost, increased efficiency for data suppliers & users by saving time, better decisions due to better information resulting in improved business processes & meeting strategic business objectives. The authors have highlighted that senior management support is a critical success factor for BI tool implementation. The authors highlighted that real-time BI, pervasive BI and business performance management are the emerging trends by discussing use cases from gaming and airline industry. The authors have mentioned that BI framework depicted in figure 9 has primarily two activities (i) sourcing data in and (ii) data out and suggested that BI tool will change the practices and strategies with respect to management of the companies, fact & rational based decisions, and performance of the people on their jobs.

![Business intelligence framework](image)

Figure 9. Business intelligence framework sourced from Watson and Wixom (2007)

The authors have not mentioned how better decision enables the organizational growth and has not provided the best practices for new trends implementation.

Raden (2007) has highlighted in his article that although the BI tools are marketed as tools aids in decision-making, but they don’t help choosing issues that requires attention, setting goals and finding suitable courses of action. All of these activities involve working both in individual and collaboration manner in organization.BI tool provides information to user based on role and hierarchy and the hierarchical model of BI is insufficient in today’s business environment which requires constant communication with computer-savvy employees & partners. The author has highlighted that a new approach of BI is required that allow people in organizations to
able to perform the work that they've been told they should do - act independently and collaboratively, and leverage the wealth of technology available to assist them. The author has highlighted various qualities required in good and interactive analytics tool such as no coding, no scripting, no cryptic words or phrases to learn the technology, ability to modify existing models while maintaining the dependency between the original and modified model, ability to selectively expose elements of a model for understandability (to others) and administration of models by stakeholder and not by IT team to support the new approach.

Love (2007) has highlighted in his article that the organization should not rush into buying/selecting the business intelligence tool until the companies are sure of their need. The author has highlighted various key questions that should be addressed before organization starts BI implementation program such as (i) how BI tools will help in meeting the short term and the long term strategic goals? , (ii) what is the associated cost with the initiative and the risk of failure? , (iii) who is getting directly and indirectly benefitted and who will be the program sponsor?, (iv) does the organization generating the required information for the program and how this will be collected for analysis?. The author has highlighted various type of BI tools such as Dashboards, Reporting Software, OLAP tools, Data Mining tools, free and open source tools. The author has highlighted that companies should invest the time and money in a product/system that meets the business requirement. The author highlighted that the quality of BI output helps in providing crucial difference with competition and the effective BI tool improves the quality of management decision-making.

Curko and Pejic (2007) has highlighted in their article that BI tool has become a crucial technology in banking industry for achieving strategic goals and gaining competitive advantage for the future growth. BI techniques can be used to balance & rationalize business operations, improving performance and reducing operational costs at banks. The authors have highlighted that larger data volumes of banks can be analysed by using BI analytics for risk management, additional products selling to the customers, reducing churn rate, customer segmentation, client lifetime value in the banking industry for strategic decision-making. The authors have mentioned that BI technology helps bankers in enhancing relations with customer, improving efficiency
of marketing & campaigning activities, increased risk management, quickly responding to market changes and improving efficiency & quality of business processes. The rise of new trend of business process intelligence opens novel improvement areas in banking processes & operations.

Jourdan et al. (2008) have performed secondary research on business intelligence journals published in ten leading information systems journals during 1997 to 2006 and have classified 167 articles based on research strategy and BI category. The authors classified 56% of the research as formal theory/ literature review followed by 13% based on primary data and 12% based on secondary data and concluded that majority of the research work follows exploratory methodology. The authors have classified BI article based on five categories such as benefits, decisions, implementation, strategies and artificial intelligence and found that 35% articles on strategies related to using BI tool in the current business environment and 16% articles correspond to improving the decision-making. The authors highlighted that all BI categories have used the formal theory/ literature review research strategy and artificial intelligence used field-secondary and computer simulations strategy. The lab experiments approach was followed for technology-focused category of decisions and sample survey approach was followed for implementation, benefits and strategies categories. The authors also highlighted that there is increasing trend on BI articles/activity over the period of analysis. The authors highlighted that limited work done in decision area is due to challenges in quantifying the benefits of BI system based improved decision making and further work is required in the field of decision and benefits.

Wixom et al. (2008) have highlighted in their article about the various challenges posed by mature BI tool and data warehouse solution by citing the case study of continental airlines and provided suggestions to overcome the obstacles. The authors also highlighted that organizations must invest in hardware to ensure scalable and good performance solution, cross train employees to reduce the impact of employee turnover, a data recovery/back-up site is required for business continuity, leverage predictive analytics to avoid larger volume of data processing, educate the user about the data latency as per the time zone and revise the real-time data availability plan as per the global usage. The authors also highlighted good practices of building BI tool
such a uniform development standard, building data driven organization culture which provides competitive advantage to the organization and enabling users to develop their analytics helps in ease of deployment for BI tool for enterprise wide usage.

Felix (2009) has highlighted the increasing use of interactive business intelligence (BI) tools among business and organizations in her article. The author highlighted that interactive BI tool can help organizations extend their meagre resources and create new ways for efficiency and profitability. The author highlighted that interactive BI tool can cover activities such as capturing mass data, sustaining corporate goals and directing workflow and cited example of Google Flu trend which provides the information to Center for Disease Control (US) two weeks faster than traditional working and enable agencies to take preventive actions during the initial stages of flu outbreaks. The author highlighted that interactive BI tool can help organizations achieve business-critical goals such as saving lives, meeting sustainability requirements, improvement in positive sales outcome, investment returns & customer satisfaction. The author highlighted that BI dashboard should be integrated into business workflow for enabling employees to take action.

Ştefănescu et al. (2009) have highlighted that the BI tool help modern manager in decision-making by quickly gathering, storing, accessing and analysing the business information and the modern manager should make use of BI tool. The article also highlighted that BI tool can be used in various levels of decision-making (strategic, tactical & operational) across enterprise and provided examples of usage of BI tool in various functions of organizations. The authors highlighted that BI tool provide appropriate information to executive management for quick and efficient decisions and help organization to increase income or reduce costs. The research paper has not quantified the income gains or the reduction of the cost due to implementation of BI tool. The research paper has not addressed the importance of training and change management need for modern managers for efficient & effective use of the BI tool.

Foody (2009) has discussed new approach (user-centered BI) for system design and development in his study. In the new approach, author suggested that the BI industry need to turn its approach inside out and start with the user rather than being bounded and driven by what the technology can do. He has highlighted in his study that the
decision makers utilizing user centric BI tool will be quickly responding to the changes (internal and external) in comparison to traditional BI tool which requires high degree of effort from analyst & developer before the results can be achieved. The research paper has not highlighted the challenges in implementing the user-centered BI approach and has not provided roadmap for moving from traditional approach to the new approach.

Ştefan (2009) has highlighted that BI tool plays essential role in increasing the decision quality. The author has highlighted the concept of BI and the architecture starting from OLTP (transactional system) as a source of data, ETL process for extracting and loading data in data warehouse along with advance techniques of data mining for analysis. The author has highlighted various business areas (marketing, finance, supply chain etc.) where quality of decision-making was improved after implementation of BI solution by Microsoft SQL Server 2008. The article has not addressed to what extent the quality of decision–making was improved after implementing BI tool and the impact on business performance.

Bara et al. (2009) have highlighted various aspects of the BI systems (BIS) development such as: architecture, lifecycle, modeling techniques and evaluation criteria for the system performance in the research paper. The authors have highlighted that BIS reports are used for strategic decision and ERP reports are used for operational decision. The authors have highlighted that BI systems has the capability to gather, integrate internal & external data, analyse and provide presentable information (key performance indicators) to the executive management to support strategic planning, forecasting and tracking of business performance. The authors have highlighted that BI systems enable managers to view data holistically and provides new insights affecting business process and improves the information quality for strategic decision.

Mitchell (2009) has highlighted in the article that the economic situation has forced companies to focus on how existing BI tool can further help in their environment instead of buying the new BI tool. The author has provided various strategies to get more out of existing BI tool. The strategies focused around tool, training & business team. The author highlighted that companies should minimize the number of BI tool and should eliminate the redundant tools and analytics and should move toward
centralized business intelligence rather than department based business intelligence. The author also highlighted that the existing data should be presented to users in more insightful manner, the users should be trained to understand both the data and the BI tool and more & more sources of data should be integrated to derive additional value from the BI tool. The author also highlighted that business should take driver seat in determining what metrics to be analysed and should build new information models for new markets as the same strategy cannot be applied to all the markets.

Serbanescu (2009) has highlighted the importance of BI tool in the competitive market of travel agencies in Romanian business environment. The author has highlighted that increased productivity, efficiency, quick response and the services offered are important elements in attracting the customer in the market. The author has discussed OLAP, Data mining, reporting and query technology of BI tool that can be used to determine tourist related queries such as past trend of destinations & boarding houses and the upcoming trends of tourist destination & boarding houses and can help in serving the customer in better manner. The author has highlighted the BI tool can easily integrate data from various sources of travel agencies such as front-office, booking system and internet application and helps in generating analytics on tourist destinations, clients and service suppliers which helps in reducing time in decision-making, reducing role of IT department in generating reports, reduces time in collecting periodic data and analysis. The author also highlighted that BI solutions can be implemented on National Association of Rural, Ecological and Cultural Tourism system of Romania to evaluate touristic potential of the rural area and to make the best decisions for its development.

In the article Bucher et al. (2009) have discussed the concept and importance of process-centric business intelligence, its benefits in supporting operational decision making by citing the example of financial services company engaged in providing mortgage services through the integrated supply of analytic information in the mortgage approval process. The authors have highlighted various benefits of process-centric business intelligence such as acceleration of business process execution, improvement in process performance and increase in customer profitability through accurate decision. The authors have provided service-oriented architecture for implementation of process centric BI tool which comprises of front-end BI services
for users for query, reporting and analytics services and backend bi services for connection, transformation and integration etc. The authors have provided implementation roadmap starting with service composition and business process management add-ons deployment in the existing ERP landscape followed by BI tool integration into the business process for enabling of analytical information based decision-making.

Viaene et al. (2009) have highlighted that policing is knowledge intensive activity and the police department at Amsterdamstelland (Netherland) has implemented operational BI tool for efficient and effective policing. The evidence/information based analyses provide direction and guidance for police actions at all levels in the organization. The authors have highlighted that police decision makers prime responsibility is capacity management, reduce crime and improve public safety and in order to achieve this they need actionable information. The authors have highlighted that police department has implemented two BI dashboards a) early warning system to compare against actual and forecasted crimes b) data detective which is a weekly report of actionable crimes available to all users. The authors have highlighted dashboards provides police department with actionable information in their hands resulting in better and improved public safety and reducing crime. The authors have highlighted that operational BI at police department have led to better management and supports police decision-making with quality information.

Gessner and Scott (2009) highlighted the use of BI tool to improve sales and optimize cost of the inside-sales team (team who do no travel for sales). The authors have highlighted that there is increased focus on building inside-sales team in order to reduce high costs of transportation and unknown travel challenges of an outside sales team. The authors have highlighted that BI tool can be used to identify prospects/buyers based on frequency and order quantity pattern and the inside-sales team to make a call/contact with prospects/buyer and helps in closing the sales .On other hand there is need to optimize the cost of inside-sales team and this can be evaluated based on comparing the sale conversion ratio for each employee and sharing best practices across the team and measuring number of customers moving into position of making calls themselves for buying from the position of being getting called.
Smietana (2010) has highlighted the importance of pervasive BI tool in helping manufacturing and service providers to manage their supply chain operations efficiently and in profitable manner. The author discussed how pervasive BI tool is helping in plan, source, make, deliver and return stages of SCOR (Supply chain operations reference) framework of supply chain process by citing example of wine & spirit distributor and healthcare provider. The author highlighted that supply chain managers have to look for reduction in cost and have to protect the margin and pervasive BI tool helps in decreasing inventory, improving customer satisfaction rating and cost reduction in supply chain process. During planning stage, the BI tool can help in demand forecasting based on the historical data, In sourcing stage the BI tool help in evaluating vendor performance and helps in reducing inventory cost. In make stage, BI tool helps manufacturer to re-deploy excess capacity and underutilized assets, reduce waste and decrease operating costs. In delivery stage, geographical based BI tool helps in identifying transportation bottlenecks and alternate delivery routes for efficient delivery and in return stage, BI tool can help in root cause analysis of return goods and customer feedback analysis.

Ahmad and Shiratuddin (2010) have highlighted in their study that BI tool is the key source for acquiring knowledge for sustaining in competitive telecommunication industry in Malaysia. The researchers had undertaken a qualitative field study of BI implementation of four telecommunication services providers. The researchers have used convenience non-random method for selecting the sample for the data collection. The study was conducted on key personnel taking decisions in their organizations via interviews. The study highlighted that following major factors: quality of information, quality of users, quality of systems and governance of BI tool affect successful implementation and this coupled with organization strategy, culture and use of BI tools leads to generating insight for sustainable competitive advantage. The article has not addressed the various business functions where the business intelligence tool was used in telecommunication industry and has not quantified the sustainable competitive edge.

Chen (2010) has discussed about next generation (web 2.0) business intelligence framework in his article for capturing opinions/views/data about company, industry, product, and customer available over the internet/web portals and analysing &
preparing insights for decision-making and competitive advantage. The BI/ web analytics designed on the views/opinions helps in providing recommendation in the areas of designing web site, optimized product positioning at web site, transaction analysis of customer by analysing the traffic, blogs, and feelings of customers, employees and investors content posted on the website. The author has discussed the dashboard of sentiment analysis of Wal-Mart employees and has not provided the best practices of implementing the market intelligence framework. The sample sentiment dashboard is depicted in figure 10.

![Sentiment Dashboard](image)

Figure 10. Sentiment Dashboard sourced from Chen (2010)

Ortiz Jr. (2010) has highlighted in his article that next generation pervasive BI (PBI) tool will provide real-time and predictive analytics to the organizations. The author has provided architecture of TIBCO Spotfire Enterprise Analytics PBI platform in the article. The author has highlighted PBI system faces various challenges such as increases in data volumes, delayed arrival of source data, delayed adoption by users in utilizing PBI, delay in finalizing key performance indicators for real time tracking for operational decisions. The author recommended that in order to fully utilize the PBI tool the organizations must change operational procedures and culture. The author has highlighted that cost of PBI implementations has reduced over the years due to lowering in cost for processing and storage of data and PBI implementation will grow as increasing number of staff will perform their jobs based on operational information. The author has highlighted that adoption of the PBI technology will further increase with web-based cloud technologies which will enable the provision of PBI as a service in future.
Hribar (2010) has described and analysed six different maturity models for the assessment of the maturity of BI tool in his research paper. The key highlights of each model are (i) The business information maturity model is based on increasing importance of BI tool, a well-documented model and freely available for analysis. (ii) TDWI’s business intelligence maturity model is based on the technical criteria (data, architecture etc.), well-documented and provides a web based tool is available for self-assessment. (iii) Gartner’s maturity model for business intelligence and performance management is used for people, processes, metrics & technology assessment, and limited documentation is available freely for analysis on the model and any additional documentation is available by making payment to Gartner. (iv) The business intelligence maturity hierarchy model focused on four stages (data, information, knowledge and wisdom) in knowledge management and limited documentation is available for analysis. (v) The infrastructure optimization maturity model helps in assessment of company infrastructure and enables transition from reactive to proactive infrastructure service delivery organization and the model is incomplete in the area of BI tool. (vi) AMR Research's business intelligence/ performance management maturity model focused on people, processes & technology and the documentation of the model is not available in public domain for analysis. The author highlighted that by using maturity models with in short time the company can discover the gaps in the BI tool and can take necessary actions. The author highlighted that maturity model for BI tool helps organizations in building a roadmap for future based on the assessment report and the organization objectives.

Popovic et al. (2010) have provided conceptual framework & model to measure business value of BI system in their research paper. The model helps in providing business case for investments into BI tool and model was designed on extensive review of literature, in-depth interviews and case study. The authors highlighted that BI system leads to information quality (IQ) which in turns leads to use of information in business process for decision making and which enhances business performance. As the BI system maturity improves the value from information quality also increase. The authors highlighted that assessing BI helps in two ways (i) proves that it’s worth investing in the technology, (ii) helps in managing the BI process and ensure that user needs are satisfied. The author highlighted that true business value of BI system is improved business processes & organizational growth as a result of improved IQ.
In his article, Serbanescu (2010) has provided the concept, architecture and benefits of the BI tool in today's competitive environment. The author has highlighted that objective of BI tool is to facilitate the rapid availability of new knowledge about the business for better decisions. The author has highlighted that a typical BI tool architecture contains extracting data from source and transforming & loading the data into data warehouse in a multi-dimensional cube for storing the summarized information as per the business need and process the same into meaningful insights using front-end reporting tools such OLAP, static and live reporting, balanced scorecards, budgeting and forecasting, data mining, exceptions and notifications etc. The author highlighted that businesses need BI tool to take advantage of opportunities and avoid risk in real-time situation and by combining BI tool with operational data enables companies to increase sales, improve profits by optimizing cost activities and increase customer loyalty.

Brahma and Sarma (2010) have highlighted the new concept of cloud based BI tool for decision-making in their article. The authors have highlighted various challenges such as security, scalability, technology integration & performance in implementing cloud based BI. The authors have provided various scenarios where cloud based business intelligence can be implemented in companies having a) applications with well-defined points of integration, and healthy internal enterprise architecture, b) application not requiring lot of data & can work with lower level of security, c) cloud applications (Salesforce.com) where data already resides in the cloud, d) application requiring one-time import of data from the sources for analysis. The authors highlighted that cloud BI tool will not work in scenarios such as downstream data integration, real time integration with EAI, real time analytics (churn management, supply chain costs analytics), business activity monitoring and fraud detection, HR analytics, applications involving intensive calculations, huge aggregations & massive storage and applications with single sign-on. The authors highlighted that average cost for implementing a cloud BI environment for a given scenario may be more than that of the same being implemented using conventional BI technology stack over a longer period of duration and organization should take the decision carefully.
Sowinski and Bengard (2011) have discussed the role of BI tool in claims organizations in their study and have highlighted the benefits achieved in terms of savings generated and other efficiencies achieved with respect to claims and litigation management program. The authors have mentioned that through BI tool claims firm can identify business best practices such as identifying the top performers and formulating strategy to replicate the similar model for other cases/claims resulting in increased revenue generation. The authors have also mentioned that BI tool can be used to track results against history in order to determine the effectiveness of new processes and strategies. The authors have mentioned that cloud based BI tool can be leveraged to accelerate the use of BI and have also discussed the possibility of utilizing BI tool automatically anywhere, anytime to access useful information for business decisions along with what if scenario analysis, making BI as intelligence on demand tool. The authors have not addressed the challenges/best practices of implementing the on-demand BI tool for claims /legal organization.

Rohloff (2011) has highlighted in her article that hospitals can gain various advantages from using BI system which include improving quality of patient care, improving staff and patient satisfaction and increasing operational productivity. The author highlighted that BI tool helps in information analysis for decision-making by providing ability to users to correlate macro and micro data and has suggested use of benchmarks and targets to improve the current business performance for hospitals. The author has provided four steps starting from primary data sourcing, eliminating bad data input and data silos, to data ownership for ensuring valid data entry into BI which the hospitals must ensure for effective strategic decision. A sample dashboard depicting the surgery status is depicted in figure 11.

Figure 11. Sample surgery dashboard sourced from Rohloff (2011)
The article has not addressed the compliance and regulatory aspect for hospitals using BI tool and has not addressed way forward mechanism to implement benchmarking in healthcare sector.

Longbottom (2011) has highlighted in his article that BI tool can report essential, timely data but companies should select the right system from open source, cloud, licence software based on their needs and should not just look into the initial cost aspects e.g. open source software is free of license but has implementation and support costs, cloud based software has on-going subscription costs and commercial off-the-shelf software has up-front licence costs along with on-going maintenance charges. The author has provided the guideline for selecting various categories of system based on the business need and importance e.g. if companies need single supplier based solution then they should look for market leaders/incumbent (IBM, Oracle, SAP), if companies need BI Solution which work across more heterogeneous system and require domain based analytics they should explore SAS & Tibco Spotfire and open source BI software should be explored where companies have internal skills to build and support the system in-house. The author has also highlighted that organizations should implement BI tool that enable the user to change the visualization method to one that suits them best.

Şerbănescu (2011) has discussed the BI Qilkview solution in his research paper and has highlighted the various benefits of using BI tool in sales and profitability analysis such as aid in decision-making, helps in cutting costs and identifying new business opportunities. The author has provided various examples of sales reports/dashboards/performance indicators and has also provided high level methodology for rolling and implementing BI tool. The research paper has not covered the use of BI tool in other functions/department (Human Resource, Finance, Procurement) of organization and the improvement in decision-making after implementing the BI tool. The sample dashboard of top 10 clients by sales is depicted in figure 12.
Tyagi and Shrivastava (2011) have highlighted in their research paper various issues and challenges in integrating BI tool with ERP system and have provided recommendations to mitigate the same. Few of the challenges faced during integration of BI with ERP were as follows: i) complete data not available in ERP, data integration with non-ERP systems is required to provide a complete view of the information, ii) higher customization of ERP resulting in higher integration effort in BI, iii) performance issues during productive system, iv) master data inconsistency resulting in incorrect results. The authors have provided various recommendations to address the issues such as i) interface testing to be properly conducted for volume/performance testing, ii) data type should be same between ERP and BI to avoid issues in production environment, iii) master data should be maintained in ERP. The study has not provided details of ERP and BI tool in scope for the purpose of the research. The authors have followed conceptual structure for the research design and have collected data from secondary research and the data analysis was qualitative in nature and was not specific to domain/industry and has not recommended any software for handling integration issues.

Smith and Charen (2011) have highlighted in their study that businesses are increasingly utilizing geospatial business intelligence (GBI) for better business decisions. The authors have mentioned that mobile phone is the key driver of the emerging trend since the location of the consumers can be tracked using global positioning system which in turn provide new and valuable business interactions which can be combined with GBI tool to provide business insights about customer and to gain competitive advantages. The researchers have highlighted the importance of GBI by providing use cases in retail stores and the insurance sector where the
combination of geospatial data and business intelligence data is providing better insight to the business. In addition to this, few companies have started using psychographic data for geo-spatial analysis helping organizations to forecast the likelihood that specific groups of people buy product/service within geographies.

Wixom et al. (2011) have highlighted in their article that organizations should not jump into investing into newer technologies (cloud, social) of BI tool since the enterprise BI capability cannot be developed overnight. The authors have cited the example of Norfolk Southern Railway’s in US which has built their BI capability over a period of time and have achieved significant operational and strategic benefits by leveraging BI tool. Norfolk has started BI journey by building reporting needs of department and emerged into enterprise data analytic organizations by using BI to support corporate strategy. The authors highlighted that Norfolk developed various BI analytics to meet strategic goals such as providing superb customer service, managing fuel use, managing asset turns, and improving workforce productivity. The authors have highlighted best practices for building strong foundation for BI capability such as establishing strong governance, developing business-IT hybrid team (employees who understand both analytics and business), building stable & graphical applications requiring minimal support, building analytics providing meaningful information and establishing robust data quality & metadata standards.

Slovak and Rabuzin (2012) have tried to identify and analyse the main reasons for not using BI tool in textile industry in Croatia in their article. The authors have followed questionnaire survey method for the purpose of study and have prepared separate questionnaire for managers and IT specialist and survey was carried out using online tool. The authors have highlighted in the study that low profitability of the textile industry, lack of clear vision and strategy of the company and inflexibility of the company for organizational changes were the top three reasons for not implementing BI tool based on managers survey and according to IT specialist insufficient computer literacy of managers and the fact that managers didn’t realize the importance of BI tool as a strategic enterprise resource were the key reasons for not implementing the tool. The authors highlighted that based on the analysed results and lack of information, the company in study was a suitable candidate for implementing BI tool, although managers and IT specialists thought that the time to implement such
a system was not right and IT specialists were without any experience. The study has limitation as this was carried out only in one company and cannot be representation of the complete industry.

In her article, Kumar (2012) has highlighted that indian telecommunication industry has cut-throat competition and market & technology are forcing major changes and organizations are turning towards BI tool and data warehousing for automation/support during decision-making process. The author has highlighted that telecommunications industry has varied adoption of BI tool such as few companies have advanced business intelligence initiatives, few companies are anticipating higher cost and longer implementation cycles and are not planning to implement the organization and few has implemented non-scalable solution which is bound to fail in the near future. The author has highlighted various analytics that can be developed over BI tool such as customer profitability analytics, forecasting of network equipment purchase based on the traffic, customer retention & satisfaction analysis by analysing service request from customers and designing value added services based on the current costs. The author has also proposed a data management feedback model to correct the incorrect data in the source system and has highlighted that BI tool provide advanced analytics and powerful data mining tool which helps in real time decisions (strategic, tactical and operational) of the telecom companies.

Calhoun and Srinivasan (2012) have highlighted in their article that dashboards are becoming prevalent visual BI tool since well-designed & accurate dashboards quickly communicate important business indicators and trends and provide actionable information for decision-making. The authors have provided the best practices of designing the dashboard during the project lifecycle process. The authors have highlighted that the accuracy of the data, timeliness of its updates, and performance of user interactions are important aspect of the visual design and should be considered in close consultation with business user during dashboard development. The authors also suggested business user early engagement in dashboard design helps in successful implementation.

The author (2012) highlighted that the San Diego Unified School District in California implemented BI solution to survive in tough financial climate. The author
highlighted that school district implemented procurement and student attendance analytics which resulted in increased revenue as depicted in figure 13 and improved district’s procurement efficiency. The BI tool also enabled the district’s budget analysts and other administrators spend less time in gathering and compiling data and more time analysing information and formulating action plans.

In the article, Rudin (2012) has highlighted that BI tools has helped commercial, educational, and government organizations by providing insight into their operations and have improved their overall effectiveness. The author has highlighted that new on-demand BI model will have far reaching effects on wider population of companies. The author has provided in detail the concept, practices and challenges of on-demand tool. The author has highlighted that on-demand solution is easy to buy and install as no hardware cost involved and easy to configure due to pre-built solution. The author has highlighted that companies should try the on-demand solution before implementing the same to avoid future integration issues. The author has highlighted key challenges in on-demand BI solution such as concerns on data security, network bandwidth for transferring data, data loss and viability of the vendor.

Stoller (2012) has highlighted that the BI tool is one of the top seven areas of information technology (IT) that are having most impact on certified management accountants (CMA) and offers tips to help them avoid getting behind in the trends. The author also highlighted that new trends are emerging in BI tools such as in-memory analytics and solutions specifies to industry verticals (healthcare & constructions) for helping in complex analysis of information. The author has advised that external trainer to be brought in for training for using BI tool for the management accountants. The article has not addressed the best practices of training on BI tool and has not addressed the minimum duration of training requirement for management account and the content of the training.

Khan and Quadri (2012) have presented a structured approach for BI system development in the article. The authors have provided various approaches of building BI system such as traditional (data aggregation, business analytics and data visualization) and adaptive approaches (self-learning systems for recommending the best actions from past decision in similar scenario). The authors have decomposed the
concept of BI into following areas: (i) acquisition of data, (ii) storage of data and (iii) access & analysis of data for easy understanding for practitioners, academicians and researchers. The authors have highlighted that BI application help organisation to analyse changes in market trends & share, behaviour of customer & preferences and market conditions and help analysts and managers to respond quickly to changing business environment. The information quality and timeliness is need of survival in today's environment for an organization and the need for BI tool will increase with the changing business environment. The article has not addressed how BI tool has helped in decision-making in organizations.

Popescu (2012) has highlighted various benefits the organization will gain by adopting the BI solutions. The paper highlights that BI tool can enable organizations to view single version of truth/data, perform the historical data analysis, align operations to strategic objective and organizations should adopt for BI solutions. The author has highlighted the traditional information support systems were application oriented while new BI tool focused on enterprise based single decision support solution. The article highlights that organization gets a better view of business environment based on the opportunities and insights provided by the BI tool enables best decisions in the organization. The paper has not quantified the efficiency and effectiveness gains achieved arising out of implementation of BI tool.

Nyblom et al. (2012) in their study have proposed a simple model for evaluating the performance of BI software systems in companies based on efficiency, user friendliness, overall satisfaction, price and adaptability. The authors highlighted that the importance of BI software is to collect process and store data of various kinds in efficient & effective manner in today's competitive environment. The study built on a deep interview with eight swedish small and medium enterprises (SME’s) of different industries. The study highlighted that most of the companies were using BI system for managing end customers and to get consolidated information in a quick and easy way. The study highlighted that the companies were also concerned about the systems compatibilities. The study was not focused on the decision-making process but was focused on the other aspects of tools such as efficiency, user friendliness, overall satisfaction, price and adaptability.
Amato (2012) has highlighted in his study that retail industry collects more data than other industry segments and is prospect for big data analytics. The author highlighted that by adopting mobile business intelligence application, retailers can harness the robust data and by empowering front line managers (store managers) to take decision will enable retailers to provide best service to the consumer. The mobiles apps can be configured to receive exception inventory analytics, alerting store managers on fast or slow moving goods, enabling retailers to fine-tune displayed goods in real-time in stores resulting in higher sales. The author has provided example of The Gilt Groupe, New York which is leveraging mobile analytics for on-going insights generation to uncover new opportunities. The author has not highlighted the challenges and best practices of implementing mobile technology on big data. The author has not provided the roadmap of implementing mobile technology on big data and business intelligence.

Stocker (2012) in his study has highlighted the importance of BI dashboards in higher education institutions. The author highlighted that dashboard provide better visibility to management team for improvement in satisfaction of student, excellence in teaching and better management of financial. The author has highlighted that BI tool can be used to develop various dashboards namely management board reporting (aiding in informed decision-making for the board) , admissions (course applications and enrolments by domestic and overseas students) , faculty, school and course performance (monitor programme and course intake) , experience of student dashboard (monitor engagement, withdrawal rates and student satisfaction) , performance of student dashboard (exam performance, attendance and engagement) which allow senior managers to gain instant, real-time insight into the performance and enables to respond to the tactical and strategic problems. The author has also provided a case study of Harper Adams University College wherein College has implemented intuitive dashboards and is more flexible and agile in the running of the University College and has been consistently named as University College of the Year since 2008 and was rated as a top 50 university by “The Sunday Times University Guide in September 2011”. The author has also highlighted that decision-making can be further improved by implementing financial dashboards for driving better results. The author has not provided the roadmap for implementation of BI dashboards and
the challenges the educational institution will face while implementing the BI dashboards.

Amato (2012) has highlighted in his article that many retailers are re-evaluating their business intelligence strategies in order to make more effective business decisions. The author highlighted that according to Aberdeen Group, Boston, 45% of retailers need to improve the speed of access to relevant business data, and 28% are still struggling to get beyond data integration and move data accessibility into the hands of line users/managers. The author highlighted that retailers need to focus more on real-time and predictive analysis to get insight into current key performance indicators. The author has not addressed the challenges faced by retailer in the data integration.

Amara et al. (2012) have developed and tested a model, SSAV (Solberg Søilen, Amara, Vriens) model, for BI software evaluation in their study. The authors have highlighted that competitive intelligence (CI) helps senior leaders to take informed decisions about marketing, research & development and investment opportunities for long-term business goals and the CI cycle consists of four phases planning, data collection, analysis and dissemination of information. The authors have used empirical search and have evaluated 11 BI software products and have collected the secondary data through vendors' presentations & whitepapers and primary data through observations and experiments on the trial software. The authors have provided new classification of BI software vendors such as fully complete, complete, semi complete, incomplete and insubstantial depending on the extent to which their product complied with the functions of the competitive intelligence (CI) cycle. The authors highlighted that SSAV model together with non-technological factors (human, users and vendor) and the new categorization can be used for selecting the BI software for implementation in the organization. The study was theoretical in nature and real use case was not described and model was build using limited software products only.

Custis (2012) has highlighted the importance of BI systems and data mining technology in the hospitality industry in the research paper. The author has carried out extensive literature review and has highlighted various scenarios where BI & data mining technology can be used such as improving customer relationship by providing personalized service, improving effectiveness of loyalty program and managing
human capital more efficiently. The author has highlighted that data mining and BI tools are useful at managerial and operational level in industry in order to understand their guests and for identifying trends. The author also highlighted that online feedback/opinion are available in the form of text and mining of the same could be of big value to the industry. The author highlighted that the agile development strategy must be followed for BI tool in order to have maximum return on investment from initiatives. The author suggested to have environmental scanning strategy to limit the data need for proactive search to reduce stress on company resources and suggested for having industry specific data acquisition & use strategy. The author recommended that BI system should be included in the overall business strategy of hospitality industry.

Chan et al.(2012) have discussed the key technical factors having impact on the successful deployment of a SOA-based architecture for BI tool in the research paper. The authors have classified technical factors in two areas consisting of operational area (deployability, interoperability, commonality, single open API, openness, usability, agility, manageability & security) and performance area (response time, throughput, availability, reliability, scalability). The authors have proposed a layered conceptual model for delivering BI capabilities in the research paper. The model has following six layers: presentation layer, communication layer, analytic layer, processed repository layer, layer for data integration & layer for data sources in the architecture. The authors have highlighted that SOA-based architecture enables easy access to data for business user which leads to improved decision-making.

Rovcanin et al. (2012) have explained concept of BI tool such as data warehouse, data mining and OLAP technologies, and their basic characteristics in their research paper. The authors have highlighted various benefits that can be achieved by using BI tool in business such as increasing revenue, increasing profit, improving customer satisfaction, cost savings and increased market share. The authors have highlighted that knowledge management is one of the basic prerequisites for creating sustainable competitive advantage of organizations and BI tool can help in building knowledge about customers and partners in an effective & efficient manner.
Gollapudi et al. (2012) have highlighted the architectural aspects of BI tool such as reliability, interoperability, scalability, agility, usability, manageability, utilizing existing infrastructure & security solutions that an organization must focus for successful BI tool implementation in the article. The authors have highlighted that the companies without having BI tool faces challenges such as non-availability of aggregated data for analysis and decision-making, not able to respond rapidly to market changes, lack of real time reporting & performance due to data lag synch between transactional and datawarehouse system and have discussed role of cognos BI tool for addressing the challenges. The authors have highlighted various benefit provided by cognos BI tool such as 1) BI analysis provide complete view of outcomes, opportunities, challenges and trends, 2) Helps in reduced reliance of business on IT team, 3) BI tool becomes platform for advanced, predictive or what-if analysis, 4) Enables collective intelligence, 5) Has ability to support new trends of mobile integration and helps in staying competitive in current market dynamics.

Weider et al. (2012) have highlighted in their study that the decision-making quality of manager is impacted by the data quality of BI information and for quality data in the BI system a data quality management program is an important pre-requisite and organization should initiate the same for better managerial decision-making. The authors also highlighted that better management of BI system leads to increase in user satisfaction and the available scope (analytics) of BI tool has strong relationship with the usage of BI tool in the organization. The sample size of the study was small and user satisfaction & managerial decision quality parameters were measured based on user experience. The study was not able to determine relationship between managerial decision quality and the organizational performance due to time lag between managerial decisions and outcomes, existence of other performance drivers and due to limitations in the managerial decision quality measurement.

Airinei et al. (2012) have discussed the next generation semantic BI tool for decision-making based on unstructured data analyses, processing and synthesizing of data in the reference of transformation from social(version 2) to semantic(version 3) and have highlighted that SAP Business Object and Microsoft SQL services have semantic analytics capabilities. The authors have proposed the architecture of semantic web based BI tool and highlighted difference between traditional BI and Semantic BI i.e. Semantic BI has to access data from various sources including structured and un-
structured data, data storage take place in triplestore in comparison to data warehouse, and formal concept analysis replaces the data mining tools for data analysis, knowledge and information management in semantic BI.

In the article, Stoodley (2012) has highlighted that BI tool should be pushed into all business units and a competitive advantages can be achieved by having business analysts and decision-makers collaborating to uncover hidden value with data analysis by citing example of two cities Charlotte and Pittsburgh in USA which pushed BI tool into hands of decision makers & business analysts which led to streamlining of public services, impressive cost-cutting, and improved communication between citizens and their smarter local governments. In the Pittsburgh city the application of analytics for approval process for permits to upgrade a residential property resulted in recovery of taxes and faster approval process. The use of analytics has helped better interdepartmental communication & better understanding and involvement of city residents by publishing of reports for residents. Similarly, in Charlotte city decision maker saved $50,000 annually by discovering the insight that fuel additive has no impact on mileage of trucks and also optimized paths for the fleet for sanitation department to take on its morning runs and reducing overtime payments.

Bartram (2013) in his study has highlighted 8 ways of using BI tools for getting optimized results - (i) develop an analytical culture in the organization, (ii) deliver information wherever it's needed, (iii) make use of unstructured data to get better insights, (iv) implement predictive analytics rather than analysing too much of historical data, (v) view information pictorially in the form of dashboards for quicker decision-making, (vi) keep information up to date to address current/future business problems, (vii) extract intelligence from social sites to give full picture of the competition, (viii) ensure that managers use the information for decision-making. The article is conceptual in nature and does not provide details on how above practices can be implemented for efficient use of BI tool.

Pourmojib et al. (2013) have introduced the concept of business intelligence in the research appear and have defined BI functions and consumers into three levels 1) strategic level for sr. management 2) tactical level for middle manager 3) operational level for front-line managers based on the decision making. The authors
have highlighted best practices of architecture such as usability, use of common API for integration and extensibility, security etc. for the implementation of BI tool and enabling decision-making to improve company performance and enhancing its competitive advantage in the marketplace. The research paper was conceptual in nature and has not provided any real time scenarios of the BI tool.

Prasad and N (2013) have highlighted in their article that big data (next generation business intelligence) is a buzz word among technology service providers and Indian industry is not able to realize the benefits of the same. The telecom, banks, consumer goods makers and retailers are all flooded with data generated by their customers but industry is unable to capture information in organized manner for analysis. The authors have provided example of “Reliance Telecomm” which receives 20 million calls per month from customer and is looking for ways to read the pattern or insight from the calls. The authors highlighted that in Indian context most of the decisions based on gut-feeling and intuitions. The authors have highlighted that as per Ernst &Young report, big data analytics is still in exploratory stage and will remain muted for atleast next two years. The authors highlighted that due to lack of technology expertise and the limited skill availability the organizations will not be able to take up the big data analytics journey.

Goptu and Peerzada (2013) have highlighted in the article that various international firms in the retail, healthcare, pharma, banking and financial sector are leveraging niche Indian service providers (iCreate Software, Unmetric, Net Positive Business Analytics, Meshlabs and Abiba system) for BI & data analytics. The authors have also highlighted that analytics is essential for competitive advantage and provided few examples of the niche analytics such as text analytics for the end customer feedback for a real estate organization, predictive analytics for telecommunication companies to predict the customer behaviour.

Bhatia (2013) has highlighted in her article that the business data volumes have increased tremendously in last decade which has increased the complexity in processing and analysis. The author has highlighted that traditional BI tool approach is not meeting the current needs of high volume/big data processing. The author has highlighted that big data analytics enables organization to take advantage of totality of their information (internal & external) in real time and enables fast decision-making.
for serving the customer & society in unique and innovative way. The author has highlighted some of the use cases of big data analytics like better understanding customer needs, making process more efficient, and further reducing costs. The author has also highlighted that there is need to educate the organizations on the available big data opportunity to ensure they are not missing the competitive advantage.

Jai (2013) has highlighted in his article that private firms like Tata Power and Reliance are using weather forecasting data of skymet (weather analysis and forecast agency) and are accurately forecasting the power consumption demand which enables power firms to help them make accurate decisions regarding the sale and purchase of power. The author has also highlighted that BSES uses a load forecasting system developed by SAS analytics to helps its distribution companies to predict the load factor more accurately. The BI analytics has helped the organization to keep the power purchase cost to low and in result passing the higher benefits to the consumer.

The author (2013) has highlighted in the article that big data is making lot of buzz but there is lack of clarity among the organizations who want to use the technology as well as the students who aspire to gain expertise in the domain. The author has highlighted that data business expert, data scientists and data engineers are the essential roles required in the big data domain based on interaction with various technology leaders. The author has defined the roles as: data business experts are the resources who understand the business and the underlying data, data scientist analyses & use the data and data engineers writes the algorithm. The author has highlighted that industry is not having middle/senior level resources in the big data domain, most of the experts at entry level. The author has recommended that the students should be doing training program from top institution. The article is focused on the student and has not given any recommendation for the industry dilemma on use of big data technology.

The author (2013) has highlighted in the article that business analytics is becoming a strategic imperative for corporate india. The author highlights that there is shift in senior management culture and sr. executives are keen on leveraging business analytics to analyse past problems and predict future trends. The author also highlighted that encouraging a culture of data-driven decision-making and leveraging forward-looking analytics will help organization to grow in competitive environment.
The author has highlighted various challenges such as isolated systems, data quality, data integration issues and commitment from executive leadership faced during implementation of BI tool in India. The author has not provided solution for addressing the challenges for the BI tool implementation in Indian context.

Khan (2013) in his research paper in the banking sector has studied the usage of BI tool in 25 selected banks of Rajasthan. The author has highlighted that private & foreign banks are well ahead in high utilization of BI tool in comparison to government sector banks. In the research it was found that Banks which have implemented the complete BI solutions in their banks are having edge over the other which does not have the complete solution. The study highlighted that 65% of banks including public and private banks are using standard reporting tool and have high usage where as 35% banks are using at moderate level. Ad-hoc reporting tool is used 45% at “Moderate”, where as 35% are using at “Low”. The research also highlighted that usage of BI tool is underutilized and the banks have significant opportunities to increase the use of BI technology to support critical decision-making and operations. The regulatory compliance analytics is perceived as the highest benefit achieved by the banks.

Graff and Cameron (2013) have highlighted in their research that due to regulatory changes, cost constraints, and the need for maintaining a competitive advantage in health care sector, the sector is having high focus on using BI tool. The authors have highlighted that the vast majority of healthcare providers (83 percent) are planning for enterprise business intelligence strategy rather than departmental strategy which will allow them to cater to the organization needs in better manner. The authors have highlighted that industry is looking for real-time and predictive analytics to see future efficiency and return on investment and is waiting for a leader/vendor to emerge who will deliver the mature, robust, enterprise-centric BI tool for meeting healthcare provider’s needs. The functions of new BI solutions are depicted in figure 13.
In his article, Bunata (2013) has highlighted that healthcare industry in US is looking for opportunities for cost savings and increasing revenue due to reforms & cost pressure and BI tool provides timely, informed, accurate, and intuitive data which can help in managing supply costs by accurate tracking of purchasing costs and helps in determining the root causes of cost increases. The author highlighted that with the use of BI tool industry can control the cost of product creep arising due to physician preferences during treatment and gradual price increase over time by supplier which would have gone un-noticed in normal processing by procurement department. The author highlighted that hospitals can use BI tool to educate their physicians about pricing, gain their perspective on why specific products are needed or work better than others, and engage them during the negotiation process with manufacturers. The author highlighted that BI tool can provide price benchmarking allowing purchase department to negotiate price at market rate with supplier.

Barakat et al. (2013) have highlighted that knowledge remains the ultimate goal for employees, top management and decision makers in the organization and has discussed the role of BI tool in knowledge sharing in the article. The authors highlighted that knowledge sharing is playing a major role in today’s organizations to achieve competitive advantage and there is a growing need for the use of BI tool in capturing and sharing knowledge in organizations. The accumulation of information over time in BI tool becomes explicit and implicit knowledge stored in the organization. The authors have used questionnaire survey for study and concluded that BI tool such as online analytical processing, data mining, and data warehousing have significant influence on knowledge sharing among employees. The study was
restricted to employees of a single organization and does not reflect any industrial trend/pattern.

In the article, author (2013) has highlighted the use of new BI tool for trucking industry manufacturers, dealers and aftermarket providers for identifying prospects. The author has highlighted that with the use of BI tool companies can determine market share and provide their sales forces with information on purchasing behaviour, buying cycles and trucks in operation and integrate this intelligence into their CRM system for sales planning. The BI analytics also provided details about financing activity for trucks & bodies and safety compliance score for the vehicle.

Karami et al. (2013) have highlighted impact of BI tool on improving hospital performance in their research paper. The authors have highlighted that intellectual capital of hospitals can be used with BI tool in achieving their strategic goal. The authors have highlighted that BI tool can be used to monitor employees' productivity, improve the patient care quality, reduce costs and improve patient satisfaction in hospital sector. The authors highlighted that various analytics can be implemented in the area of disease management, population health management, epidemiological surveillance, bioterrorism readiness and response, radiology, workflow management, cost management, collections, claims adjudication, customer relationship management and marketing in hospitals. The authors highlighted that key to successful BI tool implementation is to have right architecture, complete required information, clearly defined business objectives and organizational culture supporting analysts, designers, and users who have the required skills for identifying, modeling, and sharing knowledge during project lifecycle.

Olszak (2013) have discussed the concept of BI tool and emergence of “BI based organization” which leverages BI tool for carrying out changes in business and BI tool is considered as prerequisite for organizational success in the article. The author has highlighted that the driver for making model of BI based organization are making more decisions effectively, enhancing business processes and performance. The author has also discussed various maturity models for assessing the current state of BI tool and have classified the 20 organization based on Gartner’s Maturity Model for Business Intelligence and Performance Management. The author has highlighted that
the management support, corporate culture, clearly defined goals & objectives and use of right technologies are the key management factors for achieving business benefits with BI tool. The author has highlighted that the clearly defined KPI’s, knowledge sharing, training and education on BI are the important project specific factor for effective implementation.

Dawson and Van (2013) have discussed critical success factors (CSFs) for a successful BI tool implementation in the context of South African financial services sector in the research. The researchers followed Delphi-technique approach and survey approach with key project stakeholders for studying three BI projects of leading finance services organization. The study identified that management support and commitment, management vision, involvement of users and quality of data are the most important CSFs for the business units. The quality of data, return on investment and influence of information technology on business strategy were the key CSFs from BI perspective. The authors have also proposed a model for executing a BI project successfully based on executing data warehousing project success model of Wixom-Watson. The study was based on a single company; hence the inference cannot be generalized for the industry.

2.3 Summary of Literature Review

The above studies and discussions can be summarized as follows:

- Studies focusing on defining BI tool concept, architecture, and highlighting importance of using the tool. (Panian, 2006; Sebor, 2006).
- Studies focusing on defining new concepts of BI tool such as concepts of pervasive, real-time, operational, user-centered, semantic, SOA based BI and democratic business intelligence and providing benefits of the new concepts. (Foody, 2009; Chan et al., 2012)
- Studies focusing on evaluation of BI tools, assessing maturity of BI tools. (Hribar, 2010; Amara et al., 2012).
- Studies focusing on new trends of BI tools such as Big, cloud, social & unstructured data analytics. (Amato, 2012; Bhatia, 2013)
The majority (87%) of the research work is contributed in international market and 13% of the research is contributed from the Indian market in the reviewed research work as depicted below:

Figure 14. Contribution to body of knowledge

There is an increase in research activity in the BI tool area and 73% of the research papers were published in the last 5 years as depicted below:

Figure 15. Research publication linear trend line
- Limited use cases of BI tool in each industry sector as depicted below and no use case of BI tool in IT sector.

![BI Tool Usage in Industry Sector](image1)

Figure 16. BI tool usage in industry

- Majority of the use cases of BI tool in the area of sales & marketing and financial analytic as depicted below:

![BI Tools Usage in Business Functions](image2)

Figure 17.BI tool usage in business function

From the above review, it can be concluded that there is no study carried out in IT industry, hence this study is unique.

The few of the studies have highlighted various challenges in implementing the BI technology but has not suggested solution for the same. The few of the studies in legal, telecommunication and finance sector have not provided in detail how BI tool is
used in the business function and how to improve the adoption of the technology. The studies have also not addressed to what extent the quality of decision-making is improved after implementing business intelligence tool and the impact on business performance. The review of the literature confirms the existence of the gap.

From the literature review and discussion, it is evident that no studies have been undertaken on the subject and hence the study is undertaken to determine the impact of BI tools on quality of decision-making and organizational growth in select information technology organizations at pune.