

Strategy, Action Plan and Approaches for Business Intelligence in Banking and Mining

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Abstract: This case study will analyse the critical success factors and key matters related to the deployment of BI deployment in different organisations. Different organisations have different approaches to making BI available for different business users, divisions and departments. Data visualisation is also one of the important factors which will provide user better reflection of data rather than make them confuse about organisation data with too much information in the reports and dashboards. Data quality and diverse standards which make BI famous in the different organisation also analyse during the investigation of both organisation used in this case study. The case study analysis also shows how BI maturity, governance and framework are one of the key factors involved in the successful deployment of the BI in different organisations.

Key words: BI, dashboards, reflection, data visualisation, analysis

INTRODUCTION

Background: Business Intelligence (BI) is becoming the part of strategy and vision in most of the organisations. Information and knowledge are essential assets to any organisations, where BI is utilising both to provide business values and strategic advantages to companies in competitive environments. BI is significant for the organization and its managers to view business performance and make right decisions on right time (Price, 2006). BI is established a set of technologies and processes which used to explore, analyse structured and unstructured data to find different trends and pattern of organisational traditional and operational data (Hammami and Alkhaldi, 2012).

The BI makes the information available at the lowest level so organisation takes the benefits out for their operational data sources by integrating, analysing and presenting it online in a timely fashion in the form of a dashboard, reports and alerts. Before BI things were different and there were no processes involved which can lead to continuous improvement cycle. Things were done manually, costly and time-consuming fashion even though there were still latencies and discrepancies found in data. Processes were not agile and did one change can be a massive task. Business manager and users didn't have trust in the data when making decisions. Organisations were lacking the flexibility of selecting data dynamically through different time frames for operational and historical data point in time. BI implementation changes significantly by taking a requirement from users rather than building the solution on assumptions. For the

successful deployment of BI depends on the technical skills and awareness of the business users of the organisations and how much time current spend on finding, accessing and analysing the operational source data. Implementation of BI also involved the business user roles and department they belong to regarding data availability and governance. Successful implementation of BI provides the completeness and accuracy of data at any point in time. It also provides the summary and detailed level of information by drilling and navigating to different reports from manager and business users perspective. Business Intelligence successful deployment depends on the BI framework, system architecture (Hardware and Software), data standards, data quality, BI strategy, visions and BI project lifecycle. With the technological advancements in ICT, BI is also adopting those changes with the trend of Big Data and Predictive Analytics as part of successful BI strategies and implementation.

Research motivation: The BI approach enables organisations to make decisions at the right time to achieve a competitive advantage. Acknowledgement of CSFs is essential for organisations successfully implement BI (Naderinejad *et al.*, 2014). The CSFs include communication, collaboration, innovation, adaptability and leadership. A lack of information and communication can result in costly failures where 60% of companies lose value after 5 years, 30% have no increase in value and only 10% increase in value (Rud, 2009). Success or failure is not necessarily associated with BI implementation but instead is determined by

organisational and environmental factors (Olbrich *et al.*, 2012). The revenue generated from BI platforms reached US\$10.5 billion worldwide in 2010 and 80% of BI projects fail (Jafar and Teymournejada, 2012). A BI system is not simply a combination of software and hardware; it requires suitable infrastructure and resources for the longer term. Organisations generate enormous amount of data from external and internal sources but need to present meaningful information to their business users. This information must be clean and based on relevant data because data quality issues alone cost United States businesses over US\$600 billion a year (Isik *et al.*, 2013).

MATERIALS AND METHODS

This research is an explanatory case study that is used for theory building and to verify and validates the discoveries as part of field data findings around BI methodology, contributions of division and CSFs. The main aim is to conduct semi-structured interviews with people with diverse expertise within the organisation to investigate the research questions in details. To examine and explore these questions, the exploratory case study is conducted for two organisations from diverse industries (Banking and Mining). The grouping of two different industries will provide a better understanding of real-world and theoretical issues related to BI. By examining and working for both organisations, the primary objective is the deployment of BI across all business units and most of the business users.

Research objective: The goal of this research is to explore and identify the followings:

- Establishing BI methodology within mining and banking organisation
- The participation of different business units
- The main key factors for the BI implementation

Research questions: To discover, BI implementation phases and factors involved in diverse organisations and divisions involvement about successful deployment of BI. (Appendix A).

- How are various organisations establishing their BI methodology to fulfil the requirements of their business?
- What are the contributions of divisions and participation from IT in BI?
- What are the critical factors involved in successful implementation of BI?

Litratue review: BI brings the creation and innovation how to present the data in organisations to make the

business value out of it. World famous companies are using BI to evaluate their benefits of activities. Western Digital annual sales are about \$3billion, using BI to manage inventory, customer relationship and supply chains to reduce company cost about 50%. On the other hand Continental Airlines which was about to bank corrupt back in the 1990s, invested in BI about \$30 million to improve BI business process and customer service, within six years turnover went high up to \$500 million with ROI of >1,000%. CompUSA one of the leading sellers of computer equipment and software earned ROI more than \$6 million after using BI to analyse its sales trends (Wrembel, 2012). BI offers organisation to evaluate business information to maintain, expand and improve management resolutions across business accomplishments (Elbashir *et al.*, 2008). BI is the primary significance for most of the organisation because of quickly increasing of diverse data, volume and velocity (Isik *et al.*, 2013).

The BI leaders need to work on the enhancement of existing enterprise data warehouse architecture, information framework and big data technologies to align their agility with organisation visions and strategy. It will also help the organisation to represent the trends to deliver information through clouds on by using social media data and operational data on to smartphone and tablets devices to align and move the new technologies trends. In past, most of the analysis and reports were using existing logical data warehouse without looking to market segmentation of customers and predictive analysis by the current data. How different organisations such as Wal-Mart, Harrah's, Marriot and Capital One are running their business on the abilities to analyse and get data through BI and predictive analytics (Viaene, 2008). Investment in BI and analytics will be substantial for the organisations to handle volume, velocity, variety and validity of data challenges. Organisation's involvement with new technologies to bring data for BI and predictive analytics will provide them with the advantage on their competitors. Advancement of technologies will provide companies to share their information on mobile and clouds to survive in the challenging market towards collaborative decision making where companies are moving and adopting BI. Gartner's yearly survey reflects that BI is a top priority and investment in BI is still continuous and it is not going to stop in coming years. Innovations are coming to BI technologies even BI is becoming prime examples are enterprise metadata management, semantic information services and natural languages questions answering in BIM's Watson technology. In past two years, the Mobile BI is becoming more popular technologies with compatibility with iPads and Androids smartphone and tablets. Investment in BI

as SaaS is also increasing because of the business hosts applications such as CRM and Web analytics. Different vendors like SAP, QlikTech, Tibco and Panorama are adding social software capabilities to their BI platforms to collaborate with social media. Most of the applications are providing the semantic layer of a single repository to enforce information governance in their Organisations. By adding enterprise metadata management capabilities will make organisations capable of managing their metadata and save more than \$1 million on data related issues. Logical Data Warehouse (LDW) will be evolving by the end of 2015 and most of the organisations will be moving towards that for their predictive analytics as compared to Traditional Data Warehouse (TDW) which will be used for operational reporting only (Azma and Mostafapour, 2012).

BI was giving the current picture without giving any information about the future where an organisation can concentrate and invest on the concern areas as part of their investment in the competitive market. It will help the organisation to cope with growing volumes of data and bring transparency to their customers, partners and suppliers.

Collecting and managing data: For the Business Intelligence (BI) case study, I have used different data collection techniques to acquire the required information. My personal work experience and as the employee for both organisations (Banking and Mining) in this case, I have not face any significant challenges to access the required information with organisation's permission. On the other hand, if someone from outside is analysing and conducting as a case study, it was difficult to get access to required information of the organisation's BI documents. Most of the information I have acquired comes from the existing BI documentation for both organisations which includes gap analysis, emails, agenda, presentation, BI strategy documentation, lesson learned documents, project meeting and minutes. I have also conducted an informal meeting with the familiar technical people involve in the implementation to ask the different question to confirmed my questionnaires which will be easy to understand for the technical and business users at the same time as well. The informal meetings with professional people will give you the more insight of the real world scenario rather than get the single picture. There are limitations and constraints involve with questionnaires and surveys. Business users and technical people may forget to answer the specific question about some important issues during that period. Questionnaires and investigation can end up with some open ended question which generates the significantly amount of data

and participant will not answer the survey question and even turn-up for the interviews can lead to unpredictable analysis. I have also used audio tapes and take some notes during interview session by the permission of interviewee.

After collecting the data, second phase is to manage the collecting data so it will be easy to find the relevant documents and evidence uses for the case. The managing step required to divide data into separate collection depending on their source of information (Yin, 2003). Database design to categorise data into information and set of protocols for questioners and surveys needs to be considered. I have classified data into the different section like if it's coming from organisations documents and computer files with the data acquired from the article, reports and books. All gathered information was recorded and documented for future use and if something is modify or change that is also reflects in the material for better understanding and management of the collected data. Managing and categorization will help to maintain the chain of evidence which required compiling the conclusion by research questions and propositions. I have used questionnaires and survey option to divide different people with diverse business and technical skills to get different information for my case analysis. These two possibilities are not that time consuming and pricey to compare with other methods and easy to manage and maintain the right data. Some challenges are using this approach with the number of people response and completeness if the questionnaire and surveys.

Strength, weaknesses and unit of analysis: BI is becoming the top priority for most of the organisations to have a strategic advantage in the competitive market. Every organisation is implementing or either thinking of to deploy BI in their department and divisions. BI spending is increased from 13.4 % level to 10.5 billion in 2010 and 49% of the companies are seeing applying BI solution (Ong *et al.*, 2011). BI is on the top agenda for most of the organisations because of that CIOs spend more than \$1 million on BI projects in 2008 and 24 % of the projects are identified as successful projects (Anjariny and Zeki, 2011). BI market is getting larger with the growth rate of 23 % which shows the turnover around US\$3.3 billion only in Asia Pacific region (Yeoh and Koronios, 2010). Two organisations selected but from diverse industries like banking and mining. As I was involved as BI developer in the implementation of BI in both organisations, so it required personal experience, ideas and implementation from the IT industries experts from the different background using giant IT companies like Oracle, SAS and Microsoft. By having a comparison of various

industries will give more in-depth knowledge about BI strategic importance and implementation (Appendix B).

The case study concentrated on large organisations from various industries although similar concept can be applied to small firms when implementing BI. It requires further analysis to determine if the outcome remains the same. There are partial numbers of studies but not enough related to improving the performance of existing BI infrastructure. There are also less number of studies and work presented where companies can avoid the massive budget coast to BI projects when organisations short in budget.

Ethical issues: If private enterprise collect all information about an individual can cause ethical concerns but on the other hand for the organisations itself, the privacy ethics is not a concern (Demilia *et al.*, 2014). Data collections about facts and figures about individuals and organisations, where it should not be released as part of a case study which can cause information breach later. Ethical issues which involve Data Warehousing and Business Intelligence are very complex. Organisations should define company policies for developers about customer data and account number information. Organisations data become significant and critical when its contract with regulatory observance managing personal information and financial reporting data. The most important things to consider for the business users and developers when disclosing personal information and organisation information unintentionally which can lead to identity theft of customer, employees and any strategic information belongs to the organisations itself. In recent years several major companies confirm that several million personal information has been stolen which includes social security number, date of births, license numbers, credit card numbers, addresses and family member information. That is a very important matter for companies that business depends on customer trust if they lose that confidence they will lose the whole business. Organisations should prepare themselves for the worse and define some practical steps to handle these situations accordingly.

- Awareness about ethical issues those are significant for the organisations business which will allow understanding boundaries, guidelines, objective and directions
- Collection of information and identification what is relevant to the organisation by maintaining, securing and providing appropriate access to the external and internal business users

- Define some guidelines and rules what is and what is not ethical for the organisation
- Be aware what's happening in the current world and around you, then try to make and adjust policies according to that
- Develop a culture in organisation to discuss and recommend some feedback on companies ethics
- Make it transparent where information is available for certain level of people
- Make it confidential so only individuals with appropriate privileges can access that information
- Take recommendation from legal experts to make a proper approach towards legal issues

RESULTS AND DISCUSSION

Issue identification and analysis: One of the significant findings is that organisation are making the robust move towards BI implementation by integrating with governance and IT infrastructure. The case study also indicates that organisation are concentrating more on BI reporting, KPI and performance matrix but less support for predictive analytics. BI dashboard and reports mostly used by managers, experience business users but less number of operational business users are utilising it. The case study also reflects that most the reports accessed at month end (EOM) and some of the reports on the daily basis depending on the department involvement in business operations. Both organisations were using ETL tool to transform, load and improve the quality of data but there is less concentration and work done towards initial data discoveries and data conditions issues reside in the source system. The data storage in centralise data warehouse is also becoming the primary concern because data is growing on daily basis and nightly process are taking the considerable longer amount of time to complete compared to previous years. One of the other findings where both organisations still using old legacy reporting tools and still there is no move towards to merge and transform all existing old reports into the new BI tool and remove all the additional reports which are not required. By analysing both organisations, one of the findings was that they were not following any BI implementation maturity model which will help the organisation to improve, compare, efficient, measurement and management of the BI environment. Another finding was the lack of information about BI in organisations Appendix C which can overcome by involving all business units, departments and divisions must be involved in persistent communication and information distribution among business users for awareness and educating them about BI. The top management and

standard system owner support and funding required for successful implementation for any BI projects. The case study analysis finds that both organisations struggling to find and allocate persistent budget for BI projects, especially in the time of global financial crisis and when organisations profits are going down the line. Both organisations developed usage tracking system for BI reports and dashboard to see whether business users are using the BI solution or not and also present in front of steering committee the trend line of business users for using the system effectively. It was also analysed that banking organisation was giving training and awareness workshops to the corporate user on the other hand mining organisation were lacking those grounds; that's why most business users were unaware of any BI program is running in the organisation. Another significant finding was any top functional or business manager were allocated to the project office which will overlook the business goals, strategies and any political disputes to resolve within the business and project team. The case study found that both organisations were lacking internal BI experts, developers and analytics to train and handover from BI contractors to the permanent employees of the organisations. By analysing both organisations, different stakeholders identified which can influence the successful project completion. The main stakeholders identified includes, organisation project and portfolio management team, business analyst, business user, application power user of the source system, enterprise information architect, program manager and executive sponsor and the departmental manager leading the project. One of the other findings was that both organisation problems could be reflected with TOP implementation framework including technology, organisation and people. In technology feature, all the BI business goals can be set to align with organisation strategy and vision which are lacking in both organisations regarding proper BI maturity model. Organisational feature reflects all the BI infrastructure, governance and support mechanism to support the BI project and solution which is also lacking in term of standardisation and to support BI solution. In people feature where business users, power users needs to be involved through training and top management engagement through discussion and presentation for quick wins also seemed to be lacked in both organisations at the higher level.

Solutions: The first resolution is BI strategy, to address most of the issues highlighted and identified, the organisation needs to build and implement BI Strategy. It will allow an organisation to align their strategy with their goals and vision by creating preeminent use of the



Fig. 1: BI aligning with BI Strategy

information through tactical and operational decision making. A consultant from Deloitte explained that BI strategy would help organisations to bring the forces together which constrain business operations like people, process and technology in a collaborative environment to deliver successful BI implementation. Efficient BI strategy will ensure that business strategy, investment and enterprise objectives and BI are aligned with each other to address most common issues face by BI implementation.

According to Fig. 1, it explained that BI strategy should include processes, technology, governance, a framework to deliver business value for organisations according to their visions and goals. The different steps to implement successful BI strategy:

- Produce business case
- Buy in document from senior executives what to be delivered
- Set up criteria for successes
- Agree to preeminent practices and standards
- Generate the gap analysis resenting the current and future state
- Develop Governance mechanism
- Iterative implementation with parallel implementation
- Proven framework and methodologies
- BI framework which includes People, Processes and Technologies
- Constraints and assumptions must be documented
- Better decision for better business performance in business context
- KPI
- BI architecture
- Data quality
- Data integration
- Data architecture

The second resolution is Business Intelligence Competency Centre (BICC), It will help organisations to

engaged IT and business divisions by involving different stakeholders and from various levels of organisations to ensure the implementation of BI application. BICC can be defined as dedicated Business and IT expertise accountable for establishing, organising, owning the BI strategy and agenda (Safeer and Zafar, 2011). BICCs is responsible for distributing high rate implementation of complete BI lifecycle by the consolidation of skill, information and knowledge (Boyer *et al.*, 2010). BICC also help to generate and distribute the established practices and implement BI standards by improving the cost of services, training, support, hardware and software licensing. BICC is comprised of different components including BI Centre of Practice, BI Department, BI Community, BI Centre of Excellence, BI Centre of Knowledge, BI Community of Practice, BI Technology Services and Data Mining and Information Delivery. BICC will help the implementation of BI solutions by:

- Increase efficiency and quality of BI across every level of business through standards and reusability
- Different business case for diverse projects
- BI deployments with higher value and less cost
- Business user adoption to ensure its success
- Close gaps between business and IT deliveries
- Enable enhanced technology management and business agility
- IT combines business, IT and analytics
- Governance mechanism to measure BI success
- Align success of matrix by working with business sponsors

Action plan: Action plan to develop and deliver with BI strategy and on the later stage when BI strategy will be mature organisation can add BICC as part of its BI strategy. BI strategy will help organisations to find out all departments and division those are doing transformational projects, operational reports and massive usage of excel sheets. This will also provide organisations to develop a rapid implementation development for BI applications which will offer quick wins to get the top management interest towards BI. BI strategy will help to find out the main stack holders and business users and try to engage them in making the successful implementation of BI. Many organisations are still struggling to implement BI strategic initiatives and 67% Organisations are still complaining about a lack of time, budget and resources applied to it (Boyer *et al.*, 2010). BI strategy will help to understand; it will provide you with the medium to get there. BI strategy will assist organisations to develop the framework to understand (how, why and what) the needs and consideration about its strategy.

- Produce business case to understand the current situation and define scope done
- Buy in document from senior executives what to be delivered, so it will be easy to determine target and milestones to achieve at the end of each phase of the project
- Set up criteria for successes and how to measure and define success in term of organisations mission, goals and strategy
- Define and implement different practices and standards around data and development so it will be easy to combine different development phases to support the solution.
- Generate the gap analysis to find the differences on various aspects to present the clear picture to the top management what we were at and where we are going now.
- Develop Governance mechanism to define the different level of access to different people. It will also help to identify the data owners for accountability and traceability.
- It will help organisation define Agile and Iterative approach to handling the changes in the middle of and end of development through a proper change request mechanism
- Proven framework and methodologies to approach BI and ETL development to manage data loss, backup and rollbacks for different transactions at different level
- BI framework which includes People, Processes and Technologies
- Constraints and assumptions must be documented
- KPI will help to provide the insights on serious matter to measure progress and it will contribute to measure performance against defined targets
- BI Architecture which defines data sources, perform integration (ETL), Data Marts and Presentation Layer for analytics and reporting
- Data Quality, it will highlight the data issues at the level of origin or by performing data quality audit through different tools to achieve data quality and owned trust by the business users
- Data integration to gather all the various data sources at one platform through ODS and EW layer to define data marts and transform various data into exact shape
- Data architecture to provide business-specific attributes names rather than technical and physical name acquired from the data sources

Hypothesis for the research questions

- H₁: Making BI available for every one across different divisions and departments

After analysing both industries regarding BI initiative towards BI implementation start from a single business unit and then its roll over to other business units. This approach is adopted in both banking and mining organisations in terms to improve the awareness towards BI strategy. Different BI tools provide different abilities and not all of them share the same characteristics (Isik *et al.*, 2013). One of the findings of the case study about the organisation to provide data and report access to different users depends on the requirements comes from data governance team. In the Mining company there was no plan and thinking involved in providing the restriction to the BI reports and analysis to the business users but on the other hand, banking sector implemented major restriction around reports and data level security. The organisational cross-functional team must be created to make the BI strategy on the right track from the start. It's important to define and plan the architecture well in advance for BI implementation which will deliver confidence to the executive managers and business users:

- H₂: BI dashboard and reports with drilling capabilities and detailed level analysis with BI

Both organisations produce reports with the requirements provided by different business units but lack regarding presenting reports with detailed analysis rather than just the reports itself. Organisation's executives and lead business subject areas experts use dashboards to understand the company's performance in an efficient way. In both organisations, mostly reports are developed according to an End of the Month (EOM) and daily snapshot approach, where data is taken from different data sources. One of the findings was in both organisations that most of the subject area experts view BI is just another reporting tool. In both organisations business users and executives provides training so they can better understand and utilise the operational reports. In both banking and mining organisations reports were carefully developed by developers and better visualisation techniques were used by business analysts and subject area experts to publish BI dashboard and reports on companies' BI Portal. One of the main factors of successful BI solution is to provide predictive analysis which both organisations used in this case study were missing. Predictive analysis about customer, products and customer behaviour will provide executives to make best and effective decisions on right time.

- H₃: BI success comes with superior data quality in organisations

For the successful implementation of BI, Organisation's division and business users have confidence about data comprehensive and accurateness. Integration of different systems is the major challenge for the organisations (Isik *et al.*, 2013). It is assessed that most of the BI project flops due to data quality issues which cost US\$600 billion dollars to US businesses a year. One of the findings in this case study that combining different sources systems and provide precise information in the timely fashion is one of the main priorities of the organisation. The effective BI solution in NASA implemented through data integration of diverse data (Maluf *et al.*, 2006). This is one of the core challenges organisations are facing which requires data analysis and data discoveries to find the holes in underlying data and make them accurate. Organisations are using BI deployment to classify the data quality issues in their different sources systems (Morabito *et al.*, 2012).

- H₄: Agile and flexible environment and architecture for successful deployment of BI

One of the main findings of Banking and Mining organisations that both are using entirely different approaches to creating data marts and denormalise start schema for the BI reports. The mining organisation approached towards loading data into the target tables in two phases. First phase staging schema load all the information from the source system, where all the transformation was already performed on the source system through database Views. In second phase Enterprise Warehouse (EW) load data and creating dimensions and facts from staging schema tables. The data is used for staging schema to create dimensions and facts, but the main problem with this approach was that it was not agile for Disaster Recovery (DR) processes if mappings stopped or error out in the middle of the night. On the other hand banking, organisation approach towards data loading was quite agile and flexible if something is broken in the middle of data loads. In banking organisation data ware house was divided into four phase which involves landing, staging, ELT and EW schemas. In landing schema, all data is loaded from the sources and then in staging the current and previous data from landing tables was used to perform in DR processes if something is broken. The final phase was almost the same like mining EW schema, where different data marts were created for a different set of BI reports. Organisation business environments varying so quickly and BI will provide proficiencies to absorb those changes into the existing business environment on time efficiently and effectively (Isik *et al.*, 2013). Integration and infrastructure

are the most important thing to make the BI foundation right at the start. BI provides the tractability to the organisation to point differences and gap in the business processes and guide organisations to select the core technology which is supported by the BI operations (Azma and Mostafapour, 2012). In this case study, findings were that banking and mining organisations both are doing the same to achieve the gaps, discrepancies and data quality issues with the help of BI tools and their infrastructure technologies.

- H₃: Effective Decision Support System (DSS) with the successful deployment of BI

Organisations can make well-organized choices under the umbrella of BI, where decisions can be made more efficiently on the live and accurate data. In the past decisions support system was autonomous and has the fragile relationship with other systems in the organisation which is overcome by the BI implementations (Ghazanfari *et al.*, 2011). By merging different analysis of data with the assistance of BI will provide the organisations to develop proficient decision support system with comparative, premeditated and logical decisions (Li *et al.*, 2008). BI will provide dynamic organisations learning through innovation of new internal and external processes (Zeng *et al.*, 2012). For the implementation of decision-making model organisations should move towards BI (Moghimi and Zheng, 2009). In the case study of banking and mining, both organisations are massively using BI to support their operational and business reports. It is also found that there is less focus to move towards proper decision support system which will provide business users to enhance internal knowledge, business process and procedures (Appendix D).

- H₃: Governance, Maturity and Operational framework for successful BI foundation

Analysing banking and mining organisations as part of this case study, one of the finding was that both companies lack the governance and operational framework. The result of that both companies was finding the key complications to implement governance and operational support after the deployment of dashboard and analysis. The successful deployment of BI in organisations needs to have proper governance and operational support (Williams and Williams, 2007). Governance will support the entire BI program which will

oversee all programs phases, responsibilities for BI requirements and data stewards for underlying data for different department and divisions. Organisation's governance framework is dynamic for supporting BI applications and its usage in large organisations (Hammami and Alkhaldi, 2012). Operational support for the BI architecture which will resolve production issues related to the BI and separated from operation systems support. Organisational maturity is also one of the key factors to consider when considering different BI solutions (Ong *et al.*, 2011). One of the findings in the case study is that banking and mining organisations were not following any maturity models to improve and enhance the efficiency of BI. There are different maturities models exist in the market; most famous ones are Gartner and TWDI which will allow the companies to align their framework, goals, visions and tactics according to their strategic goals. The detailed analysis of banking and mining organisations also provide the insight where there were a different set of awareness levels and standards were adopted at different levels of the organisations. Business Intelligence Competency Center (BICC) is the essential factor to provide BI awareness and standardisation to all stakeholders at all levels of organisations (Safeer and Zafar, 2011). BICC helps the organisations to accomplish and implement BI strategy which aligns with organisations business goals. The detailed analysis of both banking and mining organisations reflect there is no project management office, or any business unit looks after the implementation of the BI even after its implementation to measure the performance and milestones achievements.

CONCLUSION

The BI will help organisations to move away from spreadsheet BI solutions towards more interactive resolutions where executive have more controlled and better view of the organisational performance and decision making. The exploratory case study disclosed different challenges involved in the implementation of BI solutions which includes data quality, data governance, infrastructure for BI components, commitment from the common system owners, the interactivity of the BI reports and BI maturity models. It also focuses the areas where companies need to recruit and trained internal staff, BI experts and developer for ongoing support and development after the BI systems deployment. BI implementation is not only concentrate on technical perspective but also planning which involves different BI

maturity models, Business Intelligence Competency Center (BICC) and one of the organisation manager appointed in project office to improve and support efficiency and competence of their BI system deployment. BI preparation also includes the legacy systems and other old BI reporting tools used within the organisation to replace with the new BI efficient tool implementation. For the successful implementation of BI solution is the involvement and sponsorship from the top management which will help organisations to align their goals, visions and strategies for strategic advantages. Cross-functional division and business user involvement will contribute to capturing the precise requirements at the start of the successful deployment of BI solution. The successful implementation of BI comes with how the business measures the success? Which can be measured against the organisation's defined goals and business case for each phase of the project? BI implementation and adoption is growing and it is still evolving in the global market. Organisation should take measure to implement BI strategy which will have the competency to adopt changes and intended to be agile. BI execution starts with the high-level overview which will have guidelines, set of rules, what we are preparing to construct, how we will plan to build and how user requirements can be met with the success of BI deployment. BI strategy must involve traditional system owners and key stakeholders to identify the business drivers and needs to win the confidence of the main organisation sponsors. Developed and maintain the user's usage of BI reports and dashboard to determine the adoption of BI. Established BI framework metrics which will help organisations to align strategic goals with operational activities, identify and target specific problems and issues with BI context, evaluate the current situation, establish existing skills and technologies to support the successful execution of BI system. The primary objective of the BI is remaining within time and budget constraints and delivering the right information to the right people at right time.

APPENDICES

Appendix A

Interview Questionnaire 22: Questions:

- How BI data collection strategies handled
- How data marts and enterprise warehouse layer relates to BI functionality to support data
- How BI success is defined in the organisation compared to other projects
- How Agile the BI environment is, its adopting the changes
- How technological architecture and data standards defined
- What sort of data is used for BI
- Who is responsible for data collections
- What strategies are employed
- What sort of data qualities analysis implemented
- User access and permission are set for row level and data level security
- How Data Governance will be achieved and look after
- BI is making any contribution to risk management and decision support
- What business function and operations support by BI implementation
- How many ETL and BI tools are used and distributed
- How common system owners are committed and supported for BI
- How business users are involved in the BI implementation and which stage
- How training and workshops arrange to support new BI toll implementation
- How Project office is driving and helping for BI solution
- How BI strategy and Maturity is aligning with BI goals
- How data visualisation is handling for the reports and dashboard
- What approach of analysis and data model performed
- What are the challenges and troubles faced during implementation of BI
- What quick wins plans and any potential functional areas address
- How usage tracking is monitored or implemented to reflect business user are using the solution
- Which area of BI is more concentrating factor, views about cost and time

Positions and Title for Questionnaire: Business Manager, Common System Owner, Principal Consultant, Senior BI Developers, Teams Lead, Technical Architect, Project Manager, System Manager, Infrastructure and Support Manager

Appendix B

Survey: Business Intelligence Making the Difference in Organisation:

Instruction: This survey is to reflect how Business Intelligence (BI) is helping your organisation? Please specify your favorite response by placing a tick in the required box of your choice, the survey will complete in approximately 10 min.

Positions and title for survey: IT Staff, Experienced Business Users, Executive Users, Business Analyst, Functional Manager, Power Users.

Statement	Strongly agree	Agree	Strong disagree	Disagree	Not sure	None
Confidence on the data shown in reports						
Time efficient information analysis						
Access to the required information available						
Reports and Dashboard availability						
Operational and Financial Reports respond timely						
Required training and guides are useful						
Provide the required information for all levels of the department						
Single point of right data						
Changed information at the source reflect rapidly to the front end						
Helping decision making						
Provide enough information required						
User friendly and data visualization						
Data security issues for confidential information						
Business requirements keep changing						

Appendix C

Consent form:

Title: business intelligence critical success factors and its importance in the organisation purpose: The main purpose of the questionnaires to acquire the information about different factors involved in business intelligence deployment and implementation in organisation. It will provide better understanding from business users perspective and what are their thoughts about the BI solution provided and to present diverse approaches from the industry experts. There are no funding allocated to produce result for this case study and complaints and suggestions can be provided to the case investigator.

Participants: By signing the consent form participants will be asked to complete the questionnaire which will not take >30 min. Many of the questions are open ended questions and user can be answered what they think is the best suitable answers; the data will be store and presented accordingly without changing it. As participant your opinions are valuable for this case study analysis.

Risks: There are no risks engage by participating and providing input for the case study analysis.

What will happen the information provide by you: Data and results will be used by the organisation by itself to improve the different processes involved in the industry and to present the data for the case study. The participant name and response will not be shown and keep it anonymous to provide privacy and confidentiality. The data will be provide unique coding style to keep the obscurity and any data will not be available to those are not involved in the project directly and secure by encryption to keep the confidentiality.

Consent: I confirm that I have read and understand the information provided and explained to me. I intentionally presume there are no risks involved and understand that I can pull out my consent and suspend participation at any time without penalty and with no reasons. I have indicated my willingness of my own free will and taking part in this case study:

Participant Signature: _____
 Date: _____
 Case Study Investigator: Hafeez Niazi
 Date: 15th of October 2013
 Thank you for your participation!
 Hafeez Niazi
 niahu001@mymail.unisa.edu.au

Appendix D

Evidence Collected Externally

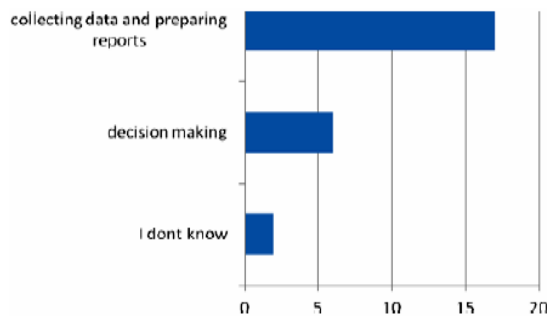


Fig. 1: Activity Spend more time on (Skvorc and Rabuzin 2012)



Fig. 2: Is company ready to impliment BI (Skvorc and Rabuzin 2012)



Fig. 3: The reason BI is not implimented in the company (Skvorc and Rabuzin 2012)

Construct level measurement statistics and correlation of constructs.										
Construct	Composite reliability	AVEP	Risk Mgmt	Flexibility	Data quality	Integration	User access quality	Decision types	Information characteristics	BI success
Risk management	0.87	0.69	0.831							
Flexibility	0.94	0.81	0.586	0.900						
Data quality	0.85	0.49	0.410	0.546	0.700					
Integration	0.87	0.63	0.594	0.533	0.520	0.794				
User access quality	0.87	0.69	0.619	0.583	0.629	0.558	0.831			
decision type	0.47	0.45	0.066	0.262	0.200	0.085	0.110	0.671		
Information characteristics	0.83	0.70	0.176	0.051	0.101	0.111	0.196	0.041	0.837	
BI success	0.93	0.59	0.441	0.464	0.356	0.560	0.550	0.103	0.142	0.768

Fig. 4: Level of Measurement and Correlations (Ibýk et al., 2013)

Demographic	No. of respondents	Percentage of respondents
Primary job function		
Overall management of BI	13	20.6
Developing BI architecture and infrastructure	20	31.7
Evaluating and purchasing of new BI Technologies	1	1.6
Systems maintenance and operations	4	6.3
BI competency center employee	1	1.6
Business analyst	7	11.1
Business user	1	1.6
Others	16	24.2
BI orientation		
Technical	44	69.8
Business	99	30.2

Fig. 5: Job Fuctions, Classification and Oriqtqion (Ramakrishnan et al., 2012)

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