

Business Intelligence in Hospitals: Current Users' Perspective and Anticipated Future Trends

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Abstract

Introduction: A hospital cannot work in isolation; it has to adjust to the changing needs of the patients and the environment. Business Intelligence is a technology to manage raw data and convert it into meaningful information which can support better decision making and add enormous value to the business. *Aim:* The study was aimed at understanding the current user perspective regarding BI in hospital and to predict the future trends in the field of Business Intelligence in hospitals. *Material and Methods:* The study is a mixed method study. The research design was descriptive which intended to understand the current user perspective about BI (Business Intelligence) application in hospitals. The study of anticipated future trends has been done through quantitative methods. 50 respondents from the top management of hospitals participated in the study. A structured questionnaire was used to collect data on future trends. *Results:* BI system did help administrators in analysing the information integrated from various sources, thus helping and supporting the decision making. The administrators also showed confidence in the system and championed the fact that it would improve the quality of management decisions by providing on the fly accurate and meaningful information. As far as the future trends are concerned the data showed a definitive positive

growth in this domain and dramatic growth is expected in the demand for mobile BI. (write about statistic analysis) *Conclusion:* In absence of a system which can integrate, analyze and derive meaningful insights from the data, the hospitals will continue to be rich in data but poor in information. They can improve their performance by looking at their own data. Hospitals now need to move from descriptive analytics to predictive and prescriptive analysis which is a step ahead tells us about what we should do.

Keywords: Business Intelligence; Data; Hospital.

Introduction

"The world is one big data problem." – Andrew McAfee

Data in hospitals is growing at an increasing rate. A hospital cannot work in isolation; it has to adjust to the changing needs of the patients and the changing environment. According to a study conducted by Oracle, healthcare providers on an average lose 15% of additional revenue per hospital simply because they fail to fully leverage the information they collect. Only a few hospitals in India are using the data they have collected as a basis for action and timely decision making.

Business Intelligence is a technology to manage raw data and convert it into meaningful information which can support better decision making and add enormous value to the business. By processing and analyzing collected data through BI tools, managers can find opportunities to implement corrective action to prevent income loss and to improve operational efficiency and clinical outcomes. Gartner predicts that the BI revenue will reach US\$245 million in 2017, a 24.4 percent increase over 2016 revenue of US\$206 million.

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Despite the growing significance of the use of BI as a decision support system in Hospitals, it still is an unexplored area when it comes to academic researches; there is a need to study the application and maturity of business intelligence in hospitals, the factors that influence its adoption and implementation and to find out the future trends.

BI can be a game changing tool for reporting, benchmarking and data analysis for making fact based decisions. So understanding of business intelligence would help hospitals conduct their business in a better way.

Materials & Methods

The study is a mixed method study. The research design was descriptive which intended to understand users' perspective on BI in hospitals. All the respondents were CEOs of the hospitals. Semi structured interview guide was used to collect data.

The study of anticipated future trends has been done through quantitative methods. 50 respondents from the top management of hospitals who were the potential future users of Business Intelligence participated in the study. Purposive sampling was employed for collecting data. A structured questionnaire was used to predict the trends that are anticipated in next 5 years. (Write in detail about quantitative and qualitative methods)

Understanding Potential User's Perspective on BI

Data was collected from five CEOs of leading corporate hospitals of Delhi and Mumbai. An interview guide was prepared and the interviews were recording or written down verbatim after taking prior permission from the interviewee. The interview results were divided into themes which are described below:

Defining Business Intelligence

There was no uniform understanding on the subject among the CEOs of all the hospitals. Everybody defined BI according to their own understanding of the subject. Some of the definitions provided were as follows-

- "Business intelligence is a technology-driven process for analysing data and further presenting in a meaningful manner to empower decision makers to make more informed decisions."
- "Business Intelligence is the current business situation in terms of revenues and

performance. It gives a projection for future planning."

- "Business Intelligence is information that insights about my operations, that helps me take strategic decisions in time and appropriately to be able to drive my commercials and other operations activities in the hospitals."
- " Business Intelligence is to know what are the businesses which are similar to mine, what are they doing right now, what are their future plans, what are their strategies, where are their financials going, what are the steps they are taking so that would give an insight into what similar companies are doing, what is the industry in general doing, knowledge about that and global perspective"

Current Scenario

"Hospitals are not able to manage data. Most of the hospitals do not have a hospital information system (HIS), if they have mostly it is not working at par, also to what extent all modules are integrated and put to use is a matter of concern. Hospitals are not able to get physicians or staff to populate EMR or enter data in HIS, not able to go to the next level of intelligence. Level of maturity is far too low considering use of data."

Reasons for investing in Business Intelligence

- "To enable decision makers with the right information to help run their operations efficiently and in a streamlined manner."
- "We wanted to understand the performance of each and every segment. Also, we wanted to identify the leakages if any and the opportunity missed."

Value of Information

- One of the respondents said, "What gets measured gets done. We tried and tested it by measuring our dischargemetrics- it has significantly improved our discharge turnaround time."
- The other respondent shared his concern about the litigations faced because of the lack of information and said "By investing later into litigations and the amount of energy resources will be too much rather than investing in a company which gives me a real time data or data which I can use and prevent such a thing"

Prerequisites for Implementation

The responses obtained were-

- "Support from management"
- "Good leadership"
- "Effective data management"
- "Clear objectives and strategy"
- "Well defined processes"
- "Performance measurement metrics"
- "Training and education on BI"

Barriers to Implementation:

The respondents experienced the following barriers when asked about implementation.

- "perception first of all that this thing is not required."
- "Standardizing and structuring the data still is a challenging task."
- "Finding the right tool which is flexible for a growing organisation like ours."
- "A majority of data entry is doctor dependent."
- "Capturing data at the point of generation. If there is no data entered into the system then no business intelligence system can work."
- "Problems with use adoption."
- "Credibility of the data. Ensuring the data is accurate."
- "Scale and diverse nature of the organisation."
- "Information overload i.e. how to filter the right data."
- "Integrating data is a complex task."
- "Poor quality data"
- "Users unwillingness to change from spreadsheets."
- "Slow implementation."
- "Lack of sponsors."
- "Lack of skilled talent"
- "Budget constraints"
- "Challenge to conventional wisdom, BI

is many times contrary to common sense, which counters the long-held assumptions and challenges executive's perception about their expertise."

- "Why should I put my money into something that is intangible."
- "Awareness is not there, second thing is something that has not yet kicked in full time in India."
- "We do not have enough input points, so what gets fed in is what is given out."

Value to Hospital

When asked about the value that BI can add to a hospital, the responses obtained were-

- "Yes, if we improve data capture. The data extraction now is very cumbersome and unorganised."
- "BI provides better analytic tool which can process information quickly and in the manner in which is preferred."
- "BI facilitates alignment of an organisation around a consistent set of KPI's and metrics."

Advantages

When asked about the advantages of a BI system the respondents said,

- "A lot of time can be saved as processes are automated."
- "Easier and quicker access to information."
- "Correct and quick decisions based in trustworthy and relevant data."
- "We are able to get the opportunity cost saved by using the BI system which we share with the respective department."
- "Promotes transparency and operational excellence."
- "Transition from data rich to information rich."
- "Common source of truth."
- "Alignment to organisational goals."

Disadvantages

When asked about the disadvantages of a BI system the respondents said

- “Cost is the major disadvantage”
- “Time consuming implementation”
- When asked about the disadvantages of BI he said, “According to me the only disadvantage with the system is that the hidden things surface up for e.g. poor performance of any division. But this is actually a blessing in disguise.”

Who should go for Business Intelligence

“Hospitals which are about 200 beds could go for a BI solution, presuming that they are also relatively matured in terms of data management structure and it is not necessary that all hospitals have to acquire a BI solution within their hospital to be able to manage data. Buying a solution and hosting at a hospital pops up the cost. They may also go for AaaS (Analytics As A Service), let the solution lie with the existing IT organisation, which can just provide analytics on cloud, for which they pay subscription fee, much lower than hosting own solution. Cost goes down by 1/4th with AaaS model, so even 50 bedded hospitals can go for it.”

Why Business Intelligence has not gained popularity in India

“Lack of domain expertise to develop that kind of a solution; need to know what do you want to measure across clinical efficiency, clinical pathways, outliers in terms of cost and clinical inefficiencies. Also need is not there today because pressure is not so much, if patients do not mind paying why do hospitals need BI, only when they will get a hit that they will be paid only so much fixed amount of money for a specific procedure by the insurance company, then they will look for any wastages and revenue leakages.

HIS VS. BI

“HIS captures day to day data, the activities. For example Mr. X ordered for a cup of coffee, that is the data collected on a day to day basis, BI tool measures trends over a period of time, now suppose Mr. X calls for a coffee everyday and only has half a cup, actionable intelligence will give the insight that he should start ordering only half a cup, to avoid the wastage happening. Thus data is getting translated into efficiency. HIS is the collection system, it is collecting and storing the data, BI picks that data cells and transforms it into insights in a way that you can slice it & dice it in whichever way you want to see it, to be able to take decisions.. It can to an extent generate MIS reports that can provide reports on Turnaround time (TAT), Average length of stay (ALOS), discharge time etc but other trends and wastages analysis HIS is not capable of doing.”

Return on Investment

“Ironically, huge cost is associated with BI but it also provides opportunity for cost reduction if implemented rightly by ensuring effective use of resources. We get returns on investment in the form of savings by avoiding wastages of consumables or man hours. There are direct savings associated with improved clinical outcomes, hospital's brand value improves, patient confidence goes up. More bed days get released as Length Of Stay becomes less which increases revenues.”

Future trends in hospital business intelligence

Data was collected by administering questionnaires among top management of Hospital.

Table 1: Responses for anticipated future trend in Hospital Business Intelligence

Future Trend	Dramatic Increase	Slight Increase	No Change
Demand for Business Intelligence in Hospitals	52%	43%	5%
Recruitment of Business Intelligence talent in Hospitals	33%	48%	19%
Demand for Mobile based Business Intelligence	67%	28%	5%
Outsourcing of Business Intelligence	0%	52%	48%
Integration of Business Intelligence with Social Media	43%	48%	10%
Demand for Cloud Based Business Intelligence Applications	5%	43%	52%
Demand for Advanced Visualisation tools	48%	48%	5%
Demand for Continuing Business Intelligence Education	57%	39%	4%
Demand for unified information management platform for structured and unstructured data	52%	38%	10%
Emphases on Data and Business Intelligence Governance	32%	49%	19%
Integration of BI with Hospital's Operations and Information Infrastructure	67%	27%	6%

Results

After the analysis of the collected data, we can say that BI system did help administrators in analysing the information integrated from various sources, thus helping and supporting the decision making. The administrators also showed confidence in the system and championed the fact that it would improve the quality of management decisions by providing on the fly accurate and meaningful information. The study has described some important implications of BI implementation in hospitals and emphasized on the importance of understanding the requirements of system development from hospital perspective. There was a consensus among all the respondents

As far as the future trends in BI are concerned the data shows a definitive positive growth in this domain. Out of 50 respondents, 95% said that the demand of Business Intelligence in hospitals is going to increase in the next 5 years. 81% respondents believe that they will need to hire BI experts. 19% respondents still believe that that can do without it and they do not see any change in this area. 95% see a rise in mobile based Business Intelligence applications, thus keeping in mind the whole idea of BI, which promises to deliver the right information at the right time at the right place in the right format. 52% feel that there will be a slight increase in Outsourcing of Business Intelligence while 48% feel that there will be no change at all. The reason for this could be the concern about data security; hospitals may not be very keen to share their patient or financial data with a third party. 90% said that Business Intelligence will be integrated with social media, realizing the importance this new platform for interacting and engaging with the customers. 52% believe that the demand for cloud based Business Intelligence applications is not going to increase in the next 10 years, same reason of data security can be attributed to this belief. 95% hold the view that demand of Advanced Visualization tools will be on a rise in the coming years, so the information delivery will be more visually intuitive, that would help in easy understanding and interpretation of information. 96% believe that there will be a growing demand for BI Education in hospitals, as majority of the people are not aware of this technology, and those who know also will need to keep themselves updated with new knowledge on the subject, as it is a rapidly changing field. 90% said that the demand for unified information platform for structured and unstructured data is going to increase. 89% thought that there will be greater emphasis on Data Governance and BI Governance in the next 5

years. 94% said that there will be an increase in the integration of BI with hospital's operations and information infrastructure.

Discussion

Hospitals today are dealing with large pools of data. In absence of a system which can integrate, analyse and derive meaningful insights from the data, the hospitals will continue to be rich in data but poor in information. Most of the hospitals look at what the competitor is doing, they should look inside first, and there is so much the hospital data can tell them. They can improve their clinical outcomes by looking at their own data. Hospitals now need to move from descriptive analytics to predictive and prescriptive analysis. Descriptive analysis tells us about what happened, predictive analysis tells us about what might happen and prescriptive analysis which is a step ahead tells us about what we should do.

The focus of the study was to understand the user perspective about BI in hospitals. Hospitals are becoming aware of this opportunity and realizing the importance of using data for strategic decisions. The Qualitative interview responses indicated that most of the champions are aware of the technology, the barriers to implementation and benefits. As far as the future trends are concerned the data showed a definitive positive growth in this domain and dramatic growth is expected in the demand for mobile BI. The whole idea behind business intelligence is to provide on the go information in real time to facilitate quick proactive business decisions which can be realised through mobile BI. So we will be seeing much growth in mobile BI in near future.

Conclusion

In absence of a system which can integrate, analyze and derive meaningful insights from the data, the hospitals will continue to be rich in data but poor in information. They can improve their performance by looking at their own data. Hospitals now need to move from descriptive analytics to predictive and prescriptive analysis which is a step ahead tells us about what we should do.

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