5. RESULTS, CONCLUSIONS AND RECOMMENDATIONS

This chapter contains results, conclusions, recommendations, limitations and scope for further research of the study. The chapter is organized into three main sections. The first section contains results of survey response and hypotheses testing. The second section contains conclusions & recommendations. The third section contains limitation and scope for further research.

5.1 Results of Survey Response

Several interesting findings came to light as a result of analysis of survey response and the findings of the study are discussed below:

1. 70.59% of respondents organization has integrated use of BI tool.
2. 52.94% of respondents are in the category of BI consumers and 31.37% of respondents are in the category of BI users with respect to usage of BI tool in the organization
3. SAP Business Objects and Oracle BI tool have been implemented equally 15.3% followed by SAP BI/BW (14.1%) in IT organization. The home grown analytics are also used 21.2% along with other BI tool in the organizations.
4. Most of the respondents agree that following objectives are achieved after BI tool implementation in IT organization:
   - Standardized reporting & analytics objective is achieved. (Mean = 4.22, Std. Deviation = 0.856).
   - Timely report availability objective is achieved. (Mean = 4.37, Std. Deviation = 0.528)
   - Improving quality of decision-making objective is achieved. (Mean = 4.08, Std. Deviation = 0.89)
   - Improved efficiency objective is achieved. (Mean = 4.12, Std. Deviation = 0.952)
   - Organizational growth objective is achieved. (Mean = 3.8, Std. Deviation = 0.722)
   - Optimized internal process objective is achieved. (Mean = 3.96, Std. Deviation = 0.72)
• Platform enabling data driven decision-making culture for future organizational strategies objective is achieved. (Mean = 3.96, Std. Deviation = 0.799)
• Competitive advantage objective is achieved. (Mean = 3.61, Std. Deviation = 0.723)

5. The findings of challenges faced during BI tool implementation in IT organization are:
   a) Most of the respondents agree to the following implementation challenges:
      • Changing business requirement. (Mean = 3.56, Std. Deviation = 0.693)
      • Data integration. (Mean = 3.58, Std. Deviation = 0.852)
   b) Most of the respondents neither agree nor disagree agree to the following implementation challenges:
      • Application not meeting the business requirement. (Mean = 3.13, Std. Deviation = 0.894)
      • Poor skill of consultant. (Mean = 2.96, Std. Deviation = 0.852)
      • Delayed Implementation. (Mean = 3.18, Std. Deviation = 0.834)
      • Higher cost of deployment than the approved budget. (Mean = 3.18, Std. Deviation = 0.834)
   c) Most of the respondents disagree to the following implementation challenges:
      • Limited availability of business team for review and verification. (37.8% respondents disagree, 33.3% respondents neither agree nor disagree and 26.7% respondents agree)
      • Poor data quality. (44.4% respondents disagree and 20.0% neither agree nor disagree)

6. Most of the respondents agree to using following best practices of BI tool during implementation:
   • Business analytics are designed keeping future needs in mind. (Mean = 3.89, Std. Deviation = 0.866)
   • Design and technical templates are available to capture the design and technical aspects. (Mean = 3.70, Std. Deviation = 0.832)
   • Data standards such as naming standards, data modeling standards, reporting and other data architecture standards are available. (Mean = 3.64, Std. Deviation = 0.919)
• Policies & procedure exists to govern the creation, standardization and dissemination of data. (Mean = 3.87, Std. Deviation = 0.850)
• Data steward/ owners identified for managing the data. (Mean = 3.87, Std. Deviation = 0.769)
• Data/Information quality is addressed as part of the project. (Mean = 3.94, Std. Deviation = 0.895)
• Training and operational procedures are addressed as part of the project plan. (Mean = 3.89, Std. Deviation = 0.866)

7. 20.8% of respondents has confirmed HR system integration into BI tools, 20.3% of respondents has confirmed ERP system integration into BI tools, 14.6% respondents has confirmed CRM system integration into BI tools, 14.1% respondents has confirmed Travel & expense system integration into BI tools, 13.5% respondents has confirmed Project quality assurance system integration into BI tools, 9.9% respondents has confirmed training system integration into BI tools, 6.8% respondents has confirmed other systems integration into BI tools.

8. 39.22% respondents organization has less than 500 BI users and 17.65% of respondents organization has 500-1500 BI users.

9. 40.2% respondents access BI information via internet/intranet portal, 23.9% respondents access BI information via email, 20.7% respondents access BI information by logging into BI tool and 15.2% respondents access BI information via mobile device.

10. The findings of areas of usage of BI analytics in the organization are:

   a) Most of the respondents agree to high usage of following analytics:
   • Sales/revenue analytics. (Mean = 4.08, Std. Deviation = 0.829)
   • Utilization analytics. (Mean = 4.02, Std. Deviation = 1.104)
   • Profitability analytics. (Mean = 3.88, Std. Deviation = 0.949)
   • Bench analytics. (Mean = 3.51, Std. Deviation = 1.157)
   • Quality analytics. (33.3% respondents agree high usage and 23.5% strongly agree)

   b) Most of the respondents agree that following analytics are not deployed/used:
   • Sales & general administrative expense analytics. (Mean = 3.33, Std. Deviation = 0.977)
   • Training analytics. (40.8% respondents agree)
• Hiring analytics. (37.5% respondents agree)
• Attrition analytics. (35.4% respondents agree)

11. The findings of reasons for low usage of BI analytics in the organizations are:
   a) Most of the respondents disagree to following reasons for low usage of BI analytics:
      • Poor data quality, integrity and consistency. (33.3% respondents disagree and 11.1% strongly disagree).
      • No access to the right data. (35.3% respondents disagree and 17.6% strongly disagree)
      • Many employees do not know how to use business analytics to make decisions. (50% respondents disagree and 12.5% strongly disagree)
      • Missing key requirements in the analytics (50% respondents disagree and 12.5% strongly disagree)
      • Slow query/report response. (50% respondents disagree and 18.8% strongly disagree)
      • Not easy to use. (Mean = 2.00, Std. Deviation = 0.632)
      • Not easy to interpret the information. (56.3% respondents disagree and 12.5% strongly disagree)
      • Lack of appropriate analytical staff. (56.3% respondents disagree and 12.5% strongly disagree).
   b) Most of the respondents neither agree nor disagree that less critical data is reason for low usage of BI analytics. (Mean = 3.42, Std. Deviation = 1.121)

12. The findings of importance of BI analytics in the organization are:
   a) Most of the respondents agree that following analytics are important in the organization:
      • Sales/revenue analytics. (Mean = 4.42, Std. Deviation = 0.647)
      • Utilization analytics. (Mean = 4.33, Std. Deviation = 0.595)
      • Profitability analytics is important. (Mean = 4.15, Std. Deviation = 0.759)
      • Bench analytics. (Mean = 3.59, Std. Deviation = 0.884)
      • Sales & general administrative expense analytics. (Mean = 3.59, Std. Deviation = 0.923)
      • Quality analytics. (Mean = 3.90, Std. Deviation = 0.778)
b) Most of the respondents agree that following analytics are somewhat important in the organization:

- Training analytics. (Mean = 3.19, Std. Deviation = 0.699)
- Hiring analytics. (Mean = 3.38, Std. Deviation = 0.716)
- Attrition analytics. (Mean = 3.38, Std. Deviation = 0.0806)

13. The findings of features of BI tool used in various analytics are:

- Standardized Reporting feature is used 29.1%, Ad-hoc Analysis feature is used 13.6%, Scorecard/Dashboard feature is used 29.1%, KPI feature is used 16.4% and Predictive analytics feature is used 11.8% in sales/revenue analytics.
- Standardized Reporting feature is used 29.7%, Ad-hoc Analysis feature is used 11%, Scorecard/Dashboard feature is used 20.9%, KPI feature is used 26.4% and Predictive analytics feature is used 12.1% in utilization analytics.
- Standardized Reporting feature is used 30.9%, Ad-hoc Analysis feature is used 8.6%, Scorecard/Dashboard feature is used 29.6%, KPI feature is used 21.0% and Predictive analytics feature is used 9.9% in profitability analytics.
- Standardized Reporting feature is used 44%, Ad-hoc Analysis features is used 12%, Scorecard/Dashboard feature is used 32%, KPI feature is used 6% and Predictive analytics feature is used 6% in bench analytics.
- Standardized Reporting feature is used 49.1%, Ad-hoc Analysis features is used 18.9%, Scorecard/Dashboard feature is used 17%, KPI feature is used 11.3% and Predictive analytics feature is used 3.8% in sales & general administrative expense analytics.
- Standardized Reporting feature is used 31.5%, Ad-hoc Analysis features is used 11%, Scorecard/Dashboard feature is used 21.9%, KPI feature is used 28.8% and Predictive analytics feature is used 6.8% in quality analytics.
- Standardized Reporting feature is used 38.1%, Ad-hoc Analysis features is used 26.2%, Scorecard/Dashboard feature is used 16.7%, KPI feature is used 14.3% and Predictive analytics feature is used 4.8% in training analytics.
- Standardized Reporting feature is used 34.1%, Ad-hoc Analysis features is used 20.5%, Scorecard/Dashboard feature is used 20.5%, KPI feature is used 13.6% and Predictive analytics feature is used 11.4% in hiring analytics.
- Standardized Reporting feature is used 33.3%, Ad-hoc Analysis features is used 20%, Scorecard/Dashboard feature is used 20%, KPI feature is used 8.9% and Predictive analytics feature is used 17.8% in attrition analytics.

14. Most of the respondents agree to usage of BI tool in following decision making categories:
- Operational decision-making. (Mean = 4.45, Std. Deviation = 0.541)
- Tactical decision-making. (Mean = 4.09, Std. Deviation = 0.905)
- Strategic decision-making. (Mean = 4.06, Std. Deviation = 0.978)

15. 23.53% respondents identify 0-20% problems based on BI information, 23.53% respondents identify 21-40% problems based on BI information, 25.49% respondents identify 41-60% problems based on BI information, 23.53% respondents identify 61-80% problems based on BI information and 3.92% respondents identify 81-100% problems based on BI information.

16. 7.84% respondents are taking 0-20% decision based on BI analytics, 25.49% respondents are taking 21-40% decision based on BI analytics, 25.49% respondents are taking 41-60% decision based on BI analytics, 29.41% of respondents are taking 61-80% decision based on BI analytics and 11.76% respondents are taking 81-100% decision based on BI analytics.

17. 17.65% respondents are taking 0-20% quality decision based on BI analytics, 15.69% respondents are taking 21-40% quality decision based on BI analytics, 23.53% respondents are taking 41-60% quality decision based on BI analytics, 31.37% respondents are taking 61-80% quality decision based on BI analytics and 11.76% respondents are taking 81-100% decision based on BI analytics.

18. Most of the respondents agree to following attributes of information provided by BI tool in the organization are:
- Adequate information. (Mean = 3.97, Std. Deviation = 0.659)
- Reliable information. (Mean = 4.06, Std. Deviation = 0.645)
- Accurate information. (Mean = 3.94, Std. Deviation = 0.614)
- Complete information. (Mean = 3.75, Std. Deviation = 0.771)
- On-demand information. (Mean = 4.02, Std. Deviation = 0.812)
- Easy to access. (Mean = 4.12, Std. Deviation = 0.791)
- Easy to interpret. (Mean = 4.02, Std. Deviation = 0.787)
• Information helps in building insight for the process. (Mean = 4.20, Std. Deviation = 0.566)

19. The findings of quality of decision attributes before BI tool implementation in the organization are:

a) Most of the respondents neither agree nor disagree to the following:
   • On-time decisions were taken before BI tool implementation. (Mean = 2.86, Std. Deviation = 0.917)
   • Faster decisions were taken before BI tool implementation. (Mean = 2.71, Std. Deviation = 0.855)
   • Appropriate decisions were taken before BI tool implementation. (Mean = 3.08, Std. Deviation = 0.891)
   • Effective decisions were taken before BI tool implementation. (Mean = 3.06, Std. Deviation = 0.925)
   • Right amount of effort was utilized before BI tool implementation. (37.3% respondents neither agree nor disagree and 27.5% respondents disagree).
   • Informed decisions were taken before BI tool implementation. (Mean = 2.94, Std. Deviation = 0.925)

b) Most of the respondents disagree that inputs for multiple problems were provided at the same time before BI tool implementation. (31.4% respondents neither agree nor disagree, 29.4% respondents disagree and 11.8% respondents strongly disagree).

20. Most of the respondents agree to the following quality of decision attributes after BI tool implementation in the organization:

   • On-time decisions are taken after BI tool implementation. (Mean = 4.12, Std. Deviation = 0.653)
   • Faster decisions are taken after BI tool implementation. (Mean = 4.20, Std. Deviation = 0.633)
   • Appropriate decisions are taken after BI tool implementation. (Mean = 4.16, Std. Deviation = 0.579)
   • Effective decisions are taken after BI tool implementation. (Mean = 4.08, Std. Deviation = 0.659)
   • Right amount of effort is utilized after BI tool implementation. (Mean = 4.02, Std. Deviation = 0.787)
Informed decisions are taken after BI tool implementation. (Mean = 4.20, Std. Deviation = 0.775)

Inputs for multiple problems are provided at the same time after BI tool implementation. (Mean = 4.00, Std. Deviation = 0.849)

21. The findings of improvement in business benefits before BI tool implementation in the organization are:
   a) Most of the respondents neither agree nor disagree to the following:
      • Revenue was increased before BI tool implementation. (Mean = 3.16, Std. Deviation = 0.738)
      • Customer satisfaction was improved before BI tool implementation. (Mean = 3.06, Std. Deviation = 0.890)
      • Cost was reduced before BI tool implementation. (Mean = 2.67, Std.Deviation = 0.792)
      • New opportunities were identified before BI tool implementation. (Mean = 2.94, Std. Deviation = 0.867)
   b) Most of the respondents disagree that efficiency was increased before BI tool implementation. (29.4% respondents neither agree nor disagree, 35.3% respondents disagree and 5.9% strongly disagree)

22. The findings of improvement in business benefits after BI tool implementation in the organization are:
   a) Most of the respondents agree to the following:
      • Customer satisfaction is improved after BI tool implementation. (Mean = 3.98, Std. Deviation = 0.915)
      • Efficiency is increased after BI tool implementation. (Mean = 4.33, Std. Deviation = 0.653)
      • Cost is reduced after BI tool implementation. (Mean = 3.94, Std. Deviation = 0.785)
      • New opportunities are identified after BI tool implementation. (Mean = 3.50, Std. Deviation = 1.147)
   b) Most of the respondents neither agree nor disagree that revenue is increased after BI tool implementation. (Mean = 3.44, Std. Deviation = 0.907)

23. Most of the respondents agree that BI analytics usage have increased in decision-making in last 12 months. (Mean = 3.88, Std. Dev. = 0.816)
24. 45.10% of respondents have received BI training and most of the respondents agree to the following benefits of BI training:

- BI training enables understanding on analytics available in business intelligence tool for decision-making support. (87% respondents agree and 13% respondents strongly agree)
- BI training enables developing adhoc queries/reports to address the information need of the management for decision-making. (82.6% respondents agree & 13% respondents strongly agree)
- BI training enables increased usage of BI analytics. (82.6% respondents agree and 8.7% respondents strongly agree)

25. The findings of development of leadership traits in manager due to BI tool based quality decision-making are:
   a) Most of the respondents agree to the development of following traits in personality:
      - Dynamic. (Mean = 3.71, Std. Deviation = 0.842)
      - Confident. (Mean = 4.12, Std. Deviation = 0.711)
      - Motivated. (Mean = 3.68, Std. Deviation = 0.844)
      - Sense of service. (Mean = 4.04, Std. Deviation = 0.699)
   b) Most of the respondents neither agree nor disagree the development of charismatic and influential leader trait. (Mean = 3.48, Std. Deviation = 0.953)
   c) Most of the respondents disagree that BI tool based quality decision-making has no impact on leadership traits development in personality. (37.5% respondents disagree and 25% respondents strongly disagree).

26. 39.2% respondents agree that plan exists for BI strategy/roadmap in the organization.

27. The findings of plan for using new BI technology in the organization

- 35.29% of respondents organization has plans to use Big data analytics.
- 45.10% of respondents organization has plans to use the Mobile analytics.
- 31.37% of respondents organization has plans to use the Cloud analytics.
- 21.57% of respondents organization has plans to use the Social analytics.
- 17.65% of respondents organization has plans to use the Unstructured analytics.
5.2 Results of Hypotheses Testing

The results of the statistical test performed on hypotheses of the study are summarized below:

1. Business intelligence tool information has significant influence on quality of decision-making (B=0.781, P=0.000). Quality of decision-making has significant influence on organizational growth (B=0.737, P=0.004) and business intelligence tool information has no influence on organizational growth (B=0.126, P=0.503). Quality of decision-making is mediator between Business intelligence tool information and organizational growth.

2. The hypothesis finding of difference in the quality of decision making before and after BI tool implementation:
   a) There is significant difference in the mean values of on-time decision before BI tool implementation (Mean=2.86) and after BI tool implementation (Mean=4.12). [ t (50) = -8.492, P = .000]
   b) There is significant difference in the mean values of faster decision before BI tool implementation (Mean=2.71) and after BI tool implementation (Mean=4.20). [ t (50) = -12.089, P = .000]
   c) There is significant difference in the mean values of appropriate decision before BI tool implementation (Mean=3.08) and after BI tool implementation (Mean=4.16). [ t (50) = -8.645, P = .000]
   d) There is significant difference in the mean values of effective decision before BI tool implementation (Mean=3.06) and after BI tool implementation (Mean=4.08). [ t (50) = -7.074, P = .000]
   e) There is significant difference in the mean values of right amount of effort for making decision before BI tool implementation (Mean=2.78) and after BI tool implementation (Mean=4.02). [ t (50) = -7.848, P = .000]
   f) There is significant difference in the mean values of making informed decision before BI tool implementation (Mean=2.94) and after BI tool implementation (Mean=4.20). [ t (50) = -8.068, P = .000]
   g) There is significant difference in the mean values of providing inputs for multiple problems at the same time before BI tool implementation (Mean=2.78) and after BI tool implementation (Mean=4.00). [ t (50) = -6.837, P = .000]
3. The hypothesis findings of improvement in the organization growth (business performance) before and after BI tool implementation are:
   a) There is significant difference in the mean values of increase in revenue before BI tool implementation (Mean=3.16) and after BI tool implementation (Mean=3.44). [t (49) = -2.137, P = .038]
   b) There is significant difference in the mean values of improved customer satisfaction before BI tool implementation (Mean=3.06) and after BI tool implementation (Mean=3.98). [t (49) = -6.334, P = .000]
   c) There is significant difference in the mean values of increased efficiency before BI tool implementation (Mean=2.90) and after BI tool implementation (Mean=4.33). [t (50) = -9.142, P = .000]
   d) There is significant difference in the mean values of reduction in cost before BI tool implementation (Mean=2.67) and after BI tool implementation (Mean=3.94). [t (50) = -8.912, P = .000]
   e) There is significant difference in the mean values of identifying new business opportunities before BI tool implementation (Mean=2.94) and after BI tool implementation (Mean=3.50). [t (49) = -3.694, P = .001]

4. The hypotheses findings of impact of BI tool based quality decision-making on decision categories are:
   a) BI tool based quality decision-making has no influence on operational decision. [F (2, 44) = 0.560, P = 0.575]
   b) BI tool based quality decision-making has significant influence on tactical decision. [F (2, 44) = 7.720, P = 0.001]
   c) BI tool based quality decision-making has significant influence on strategic decision [F (2, 44) = 13.569, P = 0.000]

5. There is significant difference in preference of IT firms for BI tool usage with reference to decision-making categories in the organization. [χ²(2) = 8.220, P =0.016]

6. The hypothesis findings of relationship between BI tool based quality decision-making and development of leadership traits in manager are:
   a) There is significant relationship between BI tool based quality decision-making and development of dynamic trait in manager. [χ²(4) = 15.837, P =0.003]
b) There is significant relationship between BI tool based quality decision-making and development of confident trait in manager. \[ \chi^2(4) = 14.983, P = 0.005 \]

c) There is significant relationship between BI tool based quality decision-making and development of sense of service trait in manager. \[ \chi^2(4) = 25.957, P = 0.000 \]

d) There is significant relationship between BI tool based quality decision-making and development of charismatic & influential leader trait in manager. \[ \chi^2(4) = 13.231, P = 0.010 \]

e) There is significant relationship between BI tool based quality decision-making and development of motivated trait in manager. \[ \chi^2(4) = 12.202, P = 0.016 \]

7. There is significant difference in the extent of leadership traits development in managers due to BI tool based quality decision-making. \[ \chi^2(4) = 42.504, P = 0.000 \]

8. The hypotheses findings of relationship between BI analytics importance and BI analytics usage are:
   a) There is significant relationship between sales/revenue analytics importance and sales/revenue usage. \[ \rho = 0.538, P = 0.000 \]
   b) There is significant relationship between utilization analytics importance and utilization analytics usage. \[ \rho = 0.647, P = 0.000 \]
   c) There is significant relationship between profitability analytics importance and profitability analytics usage. \[ r = 0.490, P = 0.001 \]
   d) There is significant relationship between bench analytics importance and bench analytics usage. \[ r = 0.533, P = 0.000 \]
   e) There is significant relationship between sales & general administrative expense analytics importance and sales & general administrative expense analytics usage. \[ r = 0.730, P = 0.000 \]
   f) There is significant relationship between quality analytics importance and quality analytics usage. \[ r = 0.765, P = 0.000 \]
   g) There is significant relationship between training analytics importance and training analytics usage. \[ r = 0.608, P = 0.000 \]
h) There is significant relationship between hiring analytics importance and hiring analytics usage. \[ r = 0.329, P =0.029 \]

i) There is significant relationship between attrition analytics importance and attrition analytics usage. \[ r = 0.429, P =0.004 \]

9. There is significant difference in the preference for areas of usage for BI analytics. \[ \chi^2(8) = 96.788, P =0.000 \]

10. There is significant difference in the BI analytics importance in IT organization for quality decision-making. \[ \chi^2(8) = 103.873, P =0.000 \]
5.3 Conclusions

The following conclusions can be drawn from this study:

1. BI tools are used in integrated manner in all business functions in the IT organization.

2. The most commonly used BI tool in the IT organization are
   - SAP Business Objects
   - Oracle BI
   - SAP BI/BW
   - Home-grown analytics

3. The impact of BI tool on quality of decision-making and organizational growth is summarized as below:

   The survey result confirms that information provided by BI tool has following traits:
   
a) Adequate Information(BITI1)
b) Reliable Information(BITI2)
c) Accurate Information(BITI3)
d) Complete Information(BITI4)
e) Information is provided on-demand(BITI5)
f) Easy to access the information(BITI6)
g) Easy to interpret the information(BITI7)
h) Information helps in building insight for the process (BITI8)

   The survey result confirms that quality of following decision attributes are improved in business function after BI tool implementation compared to before BI tool implementation:
   
a) On-time decision(QDM1)
b) Faster Decision(QDM2)
c) Appropriate decision(QDM3)
d) Effective decision(QDM4)
e) Right amount of effort for making decision (QDM5)
f) Making Informed decision (QDM6)
g) Providing inputs for multiple problems at the same time (QDM7)

SEM and CFA confirm the following structural relationship between BI tool information, quality decision-making and organizational growth.

The paired sample t test also confirm that quality of above decision attributes are improved after BI tool implementation compared to before BI tool implementation situation. Hence there is positive improvement in the quality of decision-making after BI tool implementation compared to before situation.

The survey result confirms that following business benefits are improved after implementation of BI tool in comparison to before implementation:

a) Improved customer satisfaction (ORG2)
b) Increased Efficiency (ORG3)
c) Reduction in cost (IT & Non-IT cost) (ORG4)
d) Identifying new business opportunities (ORG5)

The paired sample t test also confirms that above business benefits are improved after BI tool implementation. Hence there is there is positive improvement in the organizational growth (business performance) after BI tool implementation.
compared to before situation. It can be concluded that BI tool has positive impact on quality of decision-making and organizational growth.

4. The conclusion of impact of BI tool on managers is summarized below:

The survey result confirms that BI tools are used in following decision-making categories in the organization:

- Operational decision-making
- Tactical decision-making
- Strategic decision-making

The Friedman ($\chi^2$) test results further confirm that BI tool has top usage at operational decision-making category in the IT firms. MANOVA test result confirm that BI tool based decision-making is resulting in good quality tactical decisions and good quality strategic decisions. It is a known fact that successful strategic decision leads to organizational growth. Hence it can be concluded that quality strategic decision based on BI tool has impact on organizational growth.

The survey result confirms that BI tool based quality decision-making enable development of following leadership traits in managers:

- Dynamic
- Confident
- Motivated

The Chi-Square test of contingency further confirm that BI tool based superior quality decision lead to development of dynamic, confident, sense of service, motivated and charismatic & influential leader traits in managers and BI tool based good quality decision lead to development of confident and sense of service traits in managers. The Friedman ($\chi^2$) test results also confirm that confident and sense of service qualities are the top 2 traits developed in managers due to BI tool based quality decision-making. It’s a known fact that a confident and motivated employee has higher output and efficiency and hence result in improved business performance.
5. The conclusion of usage and importance of BI analytics in IT organization is summarized below:

The IT organization has high usage of following analytics

- Sales/Revenue Analytics
- Utilization Analytics
- Profitability Analytics
- Bench Analytics
- Quality (Project Delivery) Analytics

The survey result confirm that the above five analytics and sales & general administrative expense analytics are also important to the IT organization.

The Friedman ($\chi^2$) test result confirm that utilization analytics, sales/revenue analytics and profitability analytics are top 3 analytics used in the organization and are also top 3 analytics important to the IT organization.

Spearman and Pearson correlation result further confirm that BI analytics usage has positive correlation with importance of analytics. The strength of relationship between usage and importance of various analytics is described below:

a) There is a strong positive relationship between usage and importance of following BI analytics:

- Utilization analytics usage $\leftrightarrow$ Utilization analytics importance
- Sales & General Administrative Exp. analytics usage $\leftrightarrow$ Sales & General Administrative Expense analytics importance
- Quality analytics usage $\leftrightarrow$ Quality analytics importance
- Training analytics usage $\leftrightarrow$ Training analytics importance

b) There is a moderate positive relationship between usage and importance of following BI analytics:

- Sales/Revenue analytics usage $\leftrightarrow$ Sales/Revenue analytics
- Profitability analytics usage $\leftrightarrow$ Profitability analytics importance
- Bench analytics usage $\leftrightarrow$ Bench analytics importance
- Attrition Analytics usage $\leftrightarrow$ Attrition analytics importance
c) There is a weak positive relationship between usage and importance of following BI analytics

- Hiring analytics usage \(\leftrightarrow\) Hiring analytics importance

The survey result also confirms that business analytics usage has increased in decision-making in last 12 months in the IT organization. Hence it can be concluded that managers will be taking more and more informed and quality decision based on business analytics which will further improve the performance of the organization.

6. The conclusion of objective, challenges and best practices of BI tool implementation are summarized below:

The IT organization has achieved following objectives after BI tool implementation

- Standardized Reporting & Analytics
- Timely Report availability
- Improving quality of decision-making
- Improved Efficiency
- Organizational Growth
- Optimized internal process
- Platform enabling data driven decision-making culture for future organizational strategies
- Competitive advantage

The survey result confirms that changing business requirement and data integration are the two key challenges faced during BI tool implementation in the organization. The survey result confirms that the best practices followed during the implementation of BI tool are:

- Business analytics are designed keeping future needs in mind
- Availability of design and Technical Templates to capture the design and technical aspects
• Availability of data standards such as naming standards, data modeling standards, reporting and other data architecture standards
• Policies & procedure to govern the creation, standardization and dissemination of data.
• Identification of data steward/ owners for managing the data
• Data/Information quality is addressed as part of the project
• Training and operational procedures are addressed as part of the project plan

7. The conclusion of source system, features and medium of access of BI tool information are summarized below:
The most commonly source systems integrated with BI tool for the purpose of reporting and analytics in the organization are
• Human Resource System
• ERP system
• CRM System
• Travel & Expense System
The most commonly used features of BI analytics in the organization are
a) Standardized reporting & scorecard/dashboard are the most commonly used feature in sales/revenue analytics, profitability analytics and bench analytics.
b) Standardized reporting & KPI are the most commonly used feature in utilization analytics and quality analytics.
c) Standardized reporting & ad-hoc analysis are the most commonly used feature in training analytics.
d) Standardized reporting is the most commonly used feature in sales & general administrative expense analytics.
The survey result confirms that most commonly medium of accessing BI tool information/data in the organization are access via internet/intranet portal and access by email.

8. Most of the respondents have received the training on BI tool and the training helps manager in following ways in the organization
• Enables understanding on analytics available in BI tool for decision-making support in the business function
• Enables developing adhoc queries/reports to address the information need of the management for decision-making.
• Enables increased usage of BI analytics.

9. Most of the IT organization has BI strategy/roadmap plan. Following are few of the areas of focus for IT organizations:
   a) Few of the organizations are having plans to implement new/replace existing BI tool
   b) Dashboard for mobile platform
   c) Hiring process analytics
   d) Bench prediction analytics

The following are the unmet need of the IT organization
• Single dashboard for utilization, revenue & profitability is required
• Sales forecast vs actual comparison analytics
• Delivery escalation prediction analytics
• Integration with social platform

10. IT organization has plans to use following new technologies of BI tools:
• Big Data Analytics
• Mobile Analytics
• Cloud Analytics

The IT organizations has plan to implement new technology in the area of sales, finance and marketing analytics and few organizations are facing following challenges for implementing new technology:
   a. Limited availability of skill to support new technology
   b. New tools are launched by vendors every now & then and identifying the right tool to deploy is a challenge.
   c. Resource retention
   d. Change management
5.4 Recommendations to IT Organizations

Organizations should consider surveying of BI users to measure user satisfaction and to meet new business requirements on periodic basis. Based on the study following are the recommendations for IT organizations:

1. Few of the organizations have multiple BI tools and custom analytics; organization can optimize their landscape to a single BI tool and can reduce license and operational cost.

2. The changing business requirement and the data integration were the two key challenges for BI implementation. The two challenges can be addressed in following manner

   a. Performing a prototype of analytics before starting the implementation project
   b. Involving the data source system team early to check the feasibility of data integration before starting the project.
   c. Involving business/user team early during design phase of the project for sign-off of the business requirement

3. The organization should deploy following BI analytics to meet the unmet business needs

   a. Single dashboard for utilization, revenue & profitability analytics
   b. Sales Forecast vs actual comparison analytics
   c. Delivery escalation predictive analytics
   d. Integration with social platform

4. Most of the respondents have not received the BI analytics training. Organizations can build e-training for employee self-learning which will result in increased usage of the analytics and will ensure maximum return on investment in BI tool.

5. The organizations have low usage of predictive and KPI features of BI tool in comparison to standardized reporting and scorecard/dashboard. The organizations should focus on increasing usage of predictive and KPI (Key Performance Indicator) feature of analytics in order to stay competitive in the uncertain environment.

6. Hiring, attrition and training analytics are considered as somewhat important in the IT organization in resource (human capital) intensive industry. The
organizations should focus on increasing usage of the HR analytics which will enable them to train, retain and hire best talent.

7. High number of respondents were not aware about the implementation plan for new technology. The organizations can publish their BI roadmap to managers so that the change management is easier during the implementation phase.

8. The result of the study clearly indicates BI tool has positive impact on quality of decision-making and organizational growth. The IT organizations not having BI tool should consider implementing the same in order to stay competitive in the global business environment.

5.5 Research Limitations

The scope of the study was to determine the impact of BI tool on quality of decision-making and organizational growth in IT organization. The survey response was collected from employees (manager and above) working in IT organization at Pune. The majority of the respondents were manager and not CIO, CEO which is a limitation in this study.

Obtaining data from larger population was the limitation. Only limited numbers of respondents were having access to the business analytics information. Few respondents were not willing to participate due to sensitive nature of the subject. Due to information security and control in IT organization, only few of the limited managers were able to respond after taking necessary approvals.

5.6 Scope for further research

The current study has found relationship between BI tool, quality of decision-making & organizational growth and BI tool has positive impact on quality of decision-making and organizational growth. Further research can be extended to quantify the impact on business performance.

The study has not included the maturity of BI tool and its impact on quality of decision-making and organizational growth, further studies can be conducted on maturity of BI tool and impact on quality of decision-making and business performance.
The current study found relationship between importance and usage of analytics, further studies can be conducted on data presentation (charts, pictures, etc.) methods and impact on usage of the BI tool.

The study found limited usage of predictive and KPI analytics, further studies can be conducted to explore impact of predictive and KPI analytics on business performance.

The study suggest that organization have plans to use the new technology of Big data, social, mobile and cloud analytics in the organization, further study can be conducting on impact of new technologies on innovation and business performance.