Impact of BI Tools on Business Decisions and Development of Leadership Traits in Managers

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Abstract - **The Information Technology managers have to take operational, tactical and strategic decision in complex, global economic, technology and regulatory environment. The management needs data for efficient and quality decisions. With the help of business intelligence (BI) tool the managers can take quality operational, tactical and strategic decision. The focus of the study was to determine the impact of business intelligence tool on decision levels and how these decisions help in developing leadership traits in managers of IT Organizations at Pune. The quantitative research methodology is followed and the questionnaire survey is designed to capture the impact of BI tool based quality decision-making on operational, tactical and strategic decision and development of leadership traits in managers. The study used statistical test such as MANOVA to determine relationship between BI tool based quality decision-making & decision categories and Chi-Square test of contingency to determine relationship between BI tool based quality decision-making & development of leadership traits in managers. The study result confirms that there is positive impact of BI tool based quality decision-making on tactical & strategic decisions and development of leadership traits in managers. The study also proposes newer areas of research.**

Key Words— Business intelligence tools; Business Decision; Leadership traits development in managers; Quality of Decision-making; Business analytics; Competitive intelligence

1. INTRODUCTION

The decision-making in management is an essential skill required at all level and the quality of decision impacts the performance of the organization. The top management has to take strategic and complex decisions which affect the long-term direction of the business based on the organization's vision, goals and values, the middle management have to take tactical and less complex decision to meet the strategic objective and finally the front-line management is responsible for operational and routine decision as depicted in figure 1.
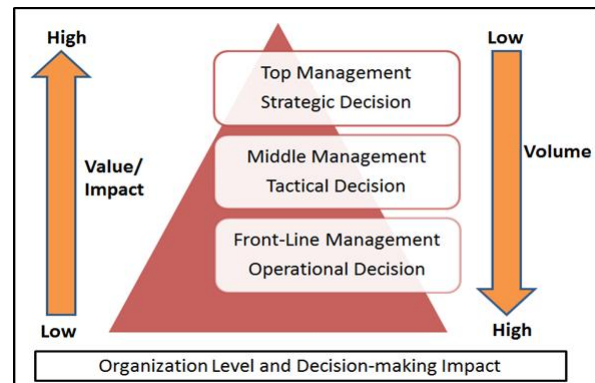

Figure 1. Organizational level and impact of decision adapted from (BBC, n.d.; Taylor, 2009) [1] [2]

Operational decisions are high in volume but have relatively low economic impact/value on the organization, tactical decision has middle volume and middle economic impact on the business and strategic decisions are of high economic value and low volume in nature (Taylor, 2009). [2]

The information technology managers have to take operational, tactical and strategic decision in complex, global economic, technology and regulatory environment and require data for efficient and quality decision. According to According to Rodrigues and Hickson (1995) a decision-making process in which information and means of implementation were readily available most likely result to a successful decision [3]. Good and quality decision in organization leads to sustainable organization growth and organizations should be better equipped with tools and processes for meeting the short and long term goals. With the help of business intelligence (BI) tool the managers can take quality operational, tactical and strategic decision leading to sustainable business growth.

The successful decision based on BI tool boosts the confidence and morale of the managers. It is a known fact that motivated and confident managers have high efficiency and productivity in the organization. The BI tool based quality decision helps in building leadership traits (confident & motivated) which enables building of efficient organization in competitive environment.

1.1 Problem Statement

- Whether BI tool based quality decision making impact decision categories (operational, tactical and strategic) in the organization?

- Whether leadership traits are developed in managers due to BI tool based quality decision-making?

1.2 Research Objectives, Research Questions & Research Hypotheses

1.1 Research Objectives

- To study relationship between BI tool based quality decision-making and decision categories (operational, tactical and strategic).
- To study impact of BI tool based quality decision-making on decision categories (operational, tactical and strategic).
- To study relationship between BI tool based quality decision-making and development of leadership traits in managers.
- To study impact of BI tool based quality decision-making on development of leadership traits in managers.

1.3 Research Questions

RQ1: Does BI tool based quality decision-making influence decision categories in the organization?

RQ2: Whether IT firms attach importance to the usage for BI tool with reference to decision-making categories in the organization?

RQ3: What relationship, if any, exists between between BI tool based quality decision-making and development of leadership traits in managers?

RQ4: What is the extent of leadership traits development in managers due to BI tool based quality decision-making?

1.4 Research Hypotheses

$H1_1$: BI tool based quality decision-making does influence decision categories in the organization.

$H2_1$: There is significant difference in the preference of IT firms for BI tool usage with reference to decision-making categories in the organization.

$H3_1$: There is significant relationship between BI tool based quality decision-making and development of leadership traits in managers.

$H4_1$: There is significant difference in the extent of leadership traits development in managers due to BI tool based quality decision-making

2. LITERATURE REVIEW

The research portal (EBSCO, IEEE, PROQUEST, GOOGLE SCHOLAR) were searched with the following key words and phrases: Business Intelligence Tool, Role of Business Intelligence Tool in decision level Impact of Business Intelligence Tool on Managers, Impact of Business Intelligence tool on leadership traits development, Impact of Business Intelligence Tool on decision categories, Impact of Business Intelligence Tool on decision levels, Impact of Business Intelligence tool on quality of decision-making and business performance. This resulted in collection of 86 articles relevant to the study and are summarized as below:

- Studies focusing on BI tool concepts and Architecture. [4][5]
- Importance of BI tool and usage in business decisions. [6][7][8][9] [10] [11]
- Emerging trends of BI tool such as Big Data, Cloud Analytics. [12] [13]

The review suggests limited use cases of BI tool in various industry sector and no use case in IT sector. The review confirmed the existence of the gap and the uniqueness of the research work.

3. RESEARCH METHODOLOGY

The quantitative research methodology is followed and questionnaire survey was designed to capture the impact of BI tool on decision categories and leadership traits development in managers. The primary data is collected from 51 employees (managers & above) of 30 IT companies using BI tool for decision-making at pune.

4. DATA ANALYSIS AND HYPOTHESES TESTING

4.1 Data Analysis

The response data were analyzed with IBM SPSS 20.

- Most of the respondents agree to usage of BI tool in following decision levels/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)

The histograms of usage of BI tool in operational, tactical and strategic decision-making is provided in figure 2-4.:
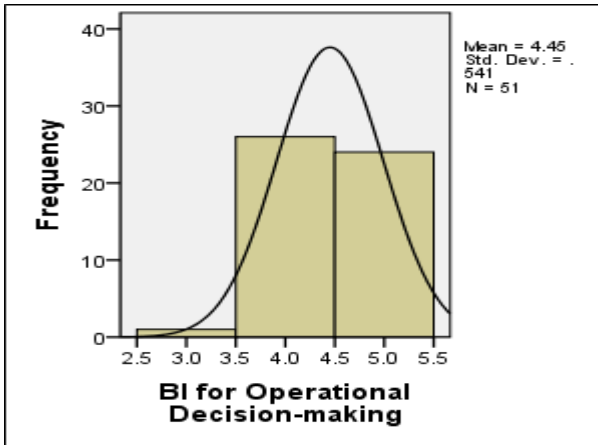
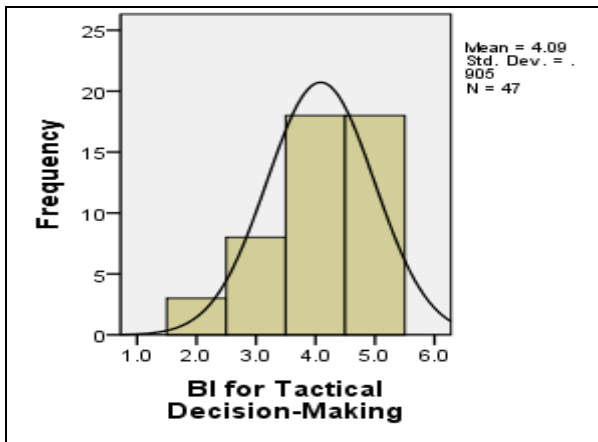Figure 2. BI tool for operational decision-making

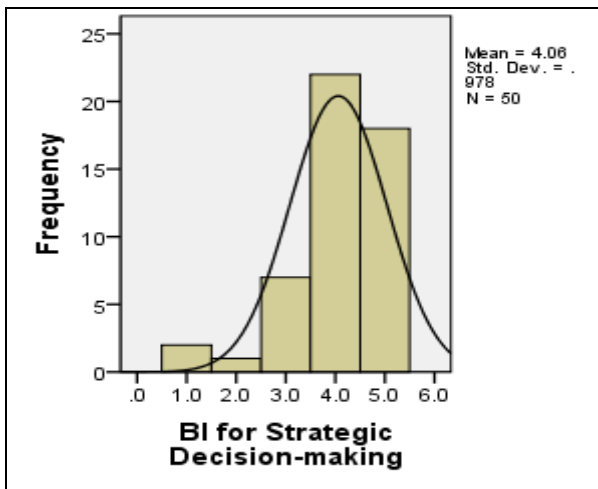

Figure 3. BI tool for Tactical decision-making

Figure 4. BI tool for Strategic decision-making

- Most of the respondents agree to the development of following leadership traits:
  - Dynamic. (Mean = 3.71, Std. Deviation = 0.842)
  - Confident. (Mean = 4.12, Std. Deviation = 0.711)
  - Motivated. (Mean = 3.68, Std. Deviation = 0.844)

- Most of the respondents neither agree nor disagree the development of charismatic and influential leadership traits. (Mean = 3.48, Std Deviation = 0.953)

The histograms of development of leadership traits in managers due to BI tool based quality decision-making is provided in figure 5-7.
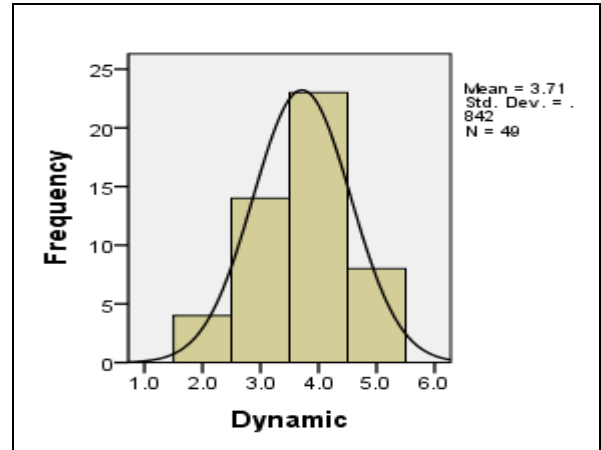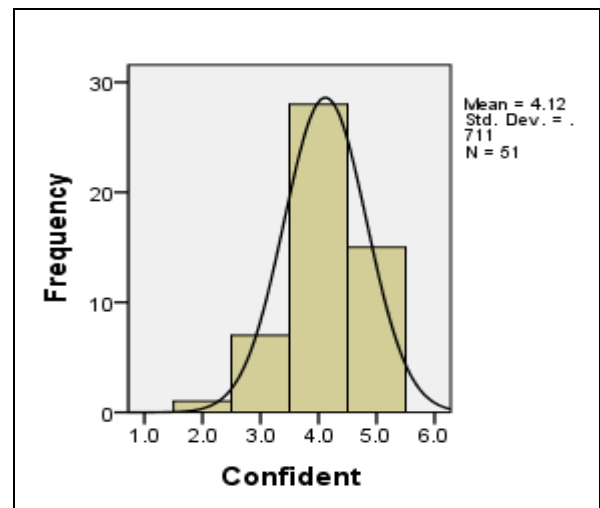

Figure 5. Dynamic leadership trait development

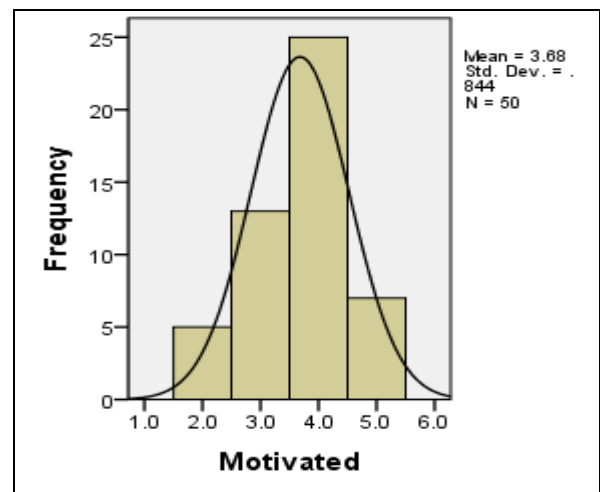Figure 6. Confident leadership trait development

Figure 7. Motivated leadership trait development

4.2 Hypotheses Testing
4.2.1 Hypothesis Testing – H1

A four group between subjects MANOVA was conducted on 3 dependent variables (Operational decision, Tactical decision, Strategic decision) and Quality decision-making based on BI tool (independent variable) to find the impact of BI tool based quality decision-making on decision categories.

The quality of decision based on BI tool were measured using following seven items (On-time decision, Faster decision, Appropriate decision, Effective decision, Right amount of effort for making decision, Making informed decision & Providing inputs for multiple problems at the same time) on a 5 point likert scale (1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree). This was converted to a single composite variable (Quality decision-making) using transform /compute option in IBM SPSS.

Quality decision-making based on BI tool measured on a 5 point scale (1 = Inferior quality decision, 2 = Poor quality decision, 3 = Acceptable quality decision, 4= Good quality decision, 5= Superior quality decision). Each dependent variable (Operational decision, Tactical decision, Strategic decision) is measured on a 5 point likert scale (1 = Strongly disagree, 2 = Disagree,3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree). The test results are discussed in table 1.

		Tests of Between-Subjects Effects					
Source	**Dependent Variable**	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Quality decision-making	**Operational decision**	0.338	2	0.169	0.56	0.575	0.025
	Tactical decision	9.782	2	4.891	7.72	0.001	0.26
	Strategic decision	17.159	2	8.58	13.569	0.000	0.381
Error	**Operational decision**	13.279	44	0.302			
	Tactical decision	27.877	44	0.634			
	Strategic decision	27.82	44	0.632			

Table 1. Tests of Between-Subjects Effects

The test result confirms that BI tool based quality decision-making has no impact on operational decision [F (2, 44) = 0.560, p = 0.575)], BI tool based quality decision-making has significant impact on tactical decision [F (2, 44) = 7.720, p = 0.001)] & BI tool based quality decision-making has significant impact on Strategic decision [F(2, 44) = 13.569 ,p = 0.000)].

4.2.2 Hypothesis Testing – H2

Friedman (χ^2) test is used for determining difference in the preference of IT firms for BI tool usage with reference to decision-making categories in the organization

Friedman Test	N	Chi-Square	df	Asymp. Sig.	Result
	47	8.220	2	.016	Significant

Table 2. Friedman test statistics usage for BI tool in decision-making categories

$\chi^2(2) = 8.220$, P =0. 016.Friedman (χ^2) test result confirms that there is significant difference in preference of IT firms for BI tool usage with reference to decision-making categories in the organization. The mean rank data of usage for BI tool in decision-making categories is used to determine the difference. The mean rank result confirms that BI tool has top usage in operational decision-making category in the IT firms as described in table 3.

Usage for BI tool in decision-making categories	Mean Rank
Operational decision-making	2.22
Tactical decision-making	1.91
Strategic decision-making	1.86

Table 3. Mean Rank of usage for BI tool in decision-making categories

4.2.3 Hypothesis Testing – H3

Chi-Square test of contingency is used to determine the relationship between BI tool based quality decision-making and development of leadership traits in managers.Dynamic, Confident, Sense of Service, Charismatic & Influential leader, Motivated were the five leadership traits measured on a 5 point scale (1 = Strongly disagree, 2 = Disagree, 3=Neither agree nor disagree, 4 = Agree, 5 = Strongly agree).This was recoded into 3 point scale (1 = Disagree, 2 =Neutral, 3=Agree) using "Recode into different variable" command in SPSS. The. Quality decision-making based on BI tool measured on a 5 point scale (1=Inferior quality decision, 2 =Poor quality decision, 3= Acceptable quality decision, 4= Good quality decision, 5= Superior quality decision). The result of Chi-Square test of contingency is provided table 5.

Chi-Square Test of Contingency					
Variables	N of Valid Cases	Value	df	Asymptotic Significance (2-sided)	Result
Quality decision-making <-> Dynamic	49	15.837	4	0.003	Significant
Quality decision-making <-> Confident	51	14.983	4	0.005	Significant
Quality decision-making <-> Sense of Service	50	25.957	4	0.000	Significant
Quality decision-making <-> Charismatic & Influential leader	50	13.231	4	0.01	Significant
Quality decision-making <-> Motivated	50	12.202	4	0.016	Significant

Table 4. Result of Chi-Square test of contingency

Since all the test results are significant, hence there is significant relationship between BI tool based quality decision-making and development of leadership traits in managers.

4.2.4 Hypothesis Testing – H4

Friedman (χ^2) test is used for determining difference in the extent of leadership traits development in managers due to BI tool based quality decision-making.

Friedman test	N	Chi-Square	df	Asymp. Sig.	Result
	49	42.504	4	.000	Significant

Table 5. Friedman test statistics of development of leadership traits in managers

$\chi^2(4) = 42.504$, P =0. 000.Friedman (χ^2) test result confirms that there is significant difference in the extent of leadership traits development in managers due to BI tool based quality decision-making. The mean rank result of leadership traits development due to BI tool based quality decision-making is used to determine the difference. The mean rank result confirms that confident is the top leadership traits developed in managers due to BI tool based quality decision-making.

Leadership traits development due to BI tool based quality decision-making	Mean Rank
Confident	3.65
Sense of Service (Best Placed to defend your interest)	3.50
Dynamic	2.82
Motivated	2.64
Charismatic & Influential leader	2.39

Table 6. Mean rank of development of leadership traits in managers

5. FINDINGS & RECOMMENDATIONS

5.1 Research Findings

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

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

- 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]

The findings of development of leadership traits in manager due to BI tool based quality decision-making are:
- 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)
- Most of the respondents neither agree nor disagree the development of charismatic and influential leader trait. (Mean = 3.48, Std. Deviation = 0.953)
- The hypothesis findings of BI tool based quality decision-making and development of leadership traits in manager are:
  o There is significant relationship between BI tool based quality decision-making and development of dynamic trait in manager. [$\chi^2(4)$ = 15.837, P =0.003]
  o There is significant relationship between BI tool based quality decision-making and development of confident trait in manager. [χ2(4) = 14.983, P =0.005]
  o 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]
  o 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]

o   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]

- There is significant difference in the extent of leadership traits development in managers due to BI tool based quality decision-making. [$\chi2(4)$ = 42.504, P =0.000]

5.2 Recommendations to the IT Organization

- The IT industry is having top usage of BI tool in operational decision, in order to have high return from the investment the managers must increase usage of BI tool in tactical and strategic decision

- The IT organization should encourage managers to use the BI tool for decision-making as it enables building leadership traits in managers.

6. ASSUMPTIONS AND LIMITATIONS OF THE STUDY

It is assumed that the respondents have provided accurate and complete response to the questionnaire. The data collection from larger sample comprising of managers & above is a challenge due to sensitive nature of the subject.

7. CONCLUSION & SCOPE FOR FURTHER RESEARCH

The survey result confirms that business intelligence tools are used for operational, tactical and strategic decision-making in the IT organizations. The Friedman ($\chi2$) test results confirm that BI tool has top usage at operational decision-making 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.

The survey result confirms that BI tool based quality decision-making enable development of dynamic, motivated and confident leadership traits in managers. The Friedman ($\chi2$) test results also confirm that confident is the top leadership traits developed in managers due to BI tool based quality decision-making. The Chi-Square test of contingency further confirm that BI tool based superior quality decision lead to development of dynamic, confident, motivated and charismatic & influential leadership traits in managers and BI tool based good quality decision lead to development of confident leadership traits in managers.

The study focused on impact of BI tool based quality decision-making on development of dynamic, confident, motivated and charismatic and Influential leadership traits in managers. Researchers can study impact of BI tool based quality decision-making on other leadership traits. The study has found relationship between BI tool and decision categories, further studies can be performed to find the impact of emerging trends such as Big data on decision levels.

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