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Adoption of Business Intelligent Dashboard and Decision Making At Bhge

Noshin Bohra[1], Mahesh Shirole[2]
[1]*CE & IT Dept., VJTI Mumbai*
[2]*CE & IT Dept., VJTI Mumbai*
Corresponding Author; Noshin Bohra

ABSTRACT
Efficient internal process contributes much towards the growth and success of any organization. As an organization grows, the amount of data required in an organization also becomes massive. Collecting and analyzing vast quantities of data can be a tedious process. Lack of availability of data in right form at the right time can result in delayed decision making. In Baker Hughes, a General Electric company (BHGE), the business operations need an oversight of the organizations activity which helps in assigning clear-cut roles and responsibilities, with the management of risk, resources, and allocation as well as with revealing the best course of action always. To achieve this, all the metrics relevant to Finance, Resources, and Quality is stored and analyzed in excel format. Data is exported to the excel format from various data sources to visualize it and analyze using the features available in spreadsheets or a third-party tool. The main objective of the study is to examine the benefits of business intelligence dashboard, challenges of BI dashboard system and performance implications of the new system in BHGE.

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I. INTRODUCTION

The General Electric (GE) company describes itself as composed of a number of primary business units or "businesses." Each unit is itself a vast enterprise, many of which, even described as a standalone company. BHGE, a part of GE is widespread and use diff erent systems to perform their duties. This has led to massive increase in data thus becoming difficult for the executive to go through all the data to make quick decisions and be able to monitor the changing trend in the organization. In BHGE, the business operations need an oversight of the organizations activity which helps in assigning clear-cut roles and responsibilities, with the management of risk, resources, and allocation as well as with revealing the best course of action always. To achieve this, all the metrics relevant to Finance, Resources, and Quality is stored and analyzed in excel format. Data is exported to the excel format from various data sources to visualize it and analyze using the features available in Spreadsheets or a third-party tool. Due to these factors BHGE has opted to the implementation the business intelligence dashboard system to help the executive make use of the growing data for easy analysis and quick decision making.

Dashboard have triggered the whole organization to start thinking and living a performance culture.BI Dashboard has helped BHGE to create awareness of business driver and progress towards the set goals. Matters arising are opened up to the core and the teams seeking lasting solutions together. Alignment accountability top down, across functions and roles through the mission analysis alignment process are achieved. This has led to team work positively and interdependence becoming clearer. Due to mission planning operational level in the regions has released tangible gains and this has led to empowerment of teams to move fast and focus on the right thing. Reporting and data mining are the main components of BI operational business application such us customer information, meter information, new connection, power interruptions and payment of electricity bills read from and write data to the operational database. Adding of customer details in the database does not need high level decisions to achieve. Management in the tactical and strategic level makes use of the BI application to improve the decision making [4]. BHGE is motivated by strategic and economic growth for it to opt for the introduction of the business intelligence dashboard for easy and quick decision making. Due to availability massive data which cannot be easily accessed and quickly analyzed during decision making, the use of diff erent systems which are in diff erent platforms and formats has lead BHGE management to be faced with a problem of determining the

performance of each branch and identifying the trends in the market.

II. LITERATURE SURVEY

The literature review surveys past studies that have been done on Business Intelligence Dashboard and established the theoretical foundations of the issues to be investigated by the study. The literature review mainly captures the theoretical framework surrounding the concept, concept of business intelligence dashboard system, implementing a BI dashboard system, and critical review of the benefits and challenges affecting the adoption of BI dashboard system. Mashudi et al. [1] presented BI system implementation by establishing data warehouse from various sources, providing ad-hoc reporting, and creating interactive dashboard visualization. Challenges were the incomplete, inaccurate and delayed data and the unavailability and unreliability of IT infrastructure hinder the delivery of BI solution.

Vivian et al. [2] presented dashboard that extracts and communicates team role distribution and team emotion information in real-time. Challenge was it is based on term frequency and phrases detected in discussion text pertaining to certain roles, emotions and sentiment. Particular team members may appear to be inactive according to the frequency of behaviours presented in the dashboard but actually be contributing technical information. Calisir et al. [3] presented that knowing the factors that affect the quitting decision of IT professionals is important for companies to decrease the turnover rate of qualified employees which could be achieved using a dashboard. Challenge was the model variables explained 47 % of intention to quit job and 31% of job satisfaction. Meylian et al. [5] believed Executive dashboard is highly necessary for university's board of leadership as one of the tools in the decision-making process to win the increasingly competitive market. So Access information in visual form to accelerate and improve the readability of the information itself. Challenge was warehouse data adjustment must always be done to meet the ever changing needs pace. The current executive dashboard application is not equipped with data mining yet.

ICT is the Information and Communication Technology network. Studies show that ICT has brought significant change and has impacted the world in a number of ways, i.e. poverty alleviation, economic productivity and sustainable development [5,8,10]. The cost of doing business has been reduced by ICT in the international and transnational arena [7]. While the use of computers and their connections is necessary for socio-economic development, Hinson and [5] a more comprehensive or inclusive use of ICT have been necessary in most parts of the world [12]. BI helps in business analysis in that it provides the information that management needs to make sound business decisions, increase company net revenue and decrease of the operating margins [6]. These is achieved by lowering of customer service which the BI aids at identifying causes of customer reward programs and identifying causes of customer loss through data analysis. Analysis of markets products and customer demographics data enable more sufficient application of target market programs [18]. BI system support the increases in market share by enabling better understanding and execution of the business plan to enable increase on sales. Better operational efficiencies though better understanding of the operational data [7].

III. RESEARCH METHODOLOGY

For developing the dashboard, the system will be implemented using MVC architecture. Model encapsulates the core KPIs and functionality. The model represents enterprise data and the business rules that govern access to and updates of the KPIs and metrics. View encapsulates the presentation of the metrics. The view renders the contents of a model. It accesses KPIs through the model and specifies how that data should be presented. It is the view's responsibility to maintain consistency in its presentation when the model changes. Controller accepts inputs from the user and makes request from the model for the data to provide a new view. The controller translates interactions with the view into actions to be performed by the model. In a web application, user interactions appear as GET and POST HTTP requests. The actions performed by the model include activating business processes or changing the state of the model. Based on the user interactions and the outcome of the model actions, the controller responds by selecting an appropriate view. The proposed system is considered as stack of tiers. A tier is a logical representation of concerns in the system. Each tier is responsible for set of tasks that are performed by the components associated with in the tier. Each tier is logically separated from another and is loosely coupled with the adjacent tier. The general structure of a web application request and response:

1. User requests are directed to the controller through the interface (i.e. browser).
2. The controller accesses required data and builds the model, possibly delegating the processing to helper classes.
3. The controller selects and passes control to the appropriate JS responsible for presenting the view

4. The view page is presented to the requesting user.
5. The user interacts with the controller to enter/modify data, traverse through results.

A descriptive research design will be used for computing the effectiveness and acceptance of dashboard. This implies that the study will be descriptive in nature. The data will be collected from the members or the population but use of the survey research to describe existing phenomena through interviews on the individual attitude, behavior, perception and firsthand experience. The quantitative data will be utilized for this study. The status of various variables will be examined. The reliability of the data from this type of population will be more reliable [3]. This descriptive research will help bring out a more accurate, reliable and increase validity of the systematic description of BI dashboard in BHGE. The sampling method will be the stratified random sampling. A sample of 50 staff members will be used that is 15% of the target population.

3.1 DATA COLLECTION

The instrument of data collection will be semi structured questionnaires. The self-completing, four stage questionnaire will be used to address the research objectives.

- The first section will be about personal details of the respondents,
- The second section will be about benefits of BI Dashboard,
- The third one will be on the challenges of Dashboard and
- The fourth will be on the prediction factors.

The respondents are staff members who use the system and make decisions using the system.

3.2 DATA ANALYSIS

Data collected will be analyzed for both descriptive and inferential statistics. The choice of descriptive statistics will be necessary for systematic summarizing of all the data to be collected and be represented using statistical measures such as central tendency, tables and graphs. SPSS software will be used to compute descriptive statistics for all the questions under investigation and inferential statistics will be used to determine the benefits and challenges affecting the adoption of BI Dashboard for decision making using prediction, with specific reference to BHGE. To determine the relationship between adoptions, personal characteristics and determinants of prediction process a simple regression model will be used. The following regression model will be used to determine the effect of BI dashboard on decision making at BHGE.

□ = □1 + □2□2 + □3□3 + □ (3.1)

Variable for:
Y= Prediction
X2= Benefits of Dashboard
X3= Challenges of Dashboard
e = error

IV. RESEARCH FINDINGS AND RESULTS

4.1 DATA ANALYSIS

All questionnaires were administered, completed and collected for analysis. Completed questionnaires were entered into an SPSS data frame for processing. The data collected is shown in Appendix B. Analysis was done by determining the descriptive statistics in terms of frequency and percentages with regard to the individual characteristics of the respondents such as age, gender, level of education, and employment status. Using SPSS, computations for the responses to the benefits, challenges and prediction process were also computed. The findings are presented in the form of frequency tables, pie charts and graphs. Through a follow-up strategy involving telephone calls, reminder e-mails and texts, over a 14 day period, we succeeded in obtaining responses from all the respondents sampled. The response rate was 100% and all questionnaires administered were collected and processed. To establish the personal characteristics of the respondents; age, gender, level of education, organization status, benefits of dashboard, challenges of dashboard and prediction process were surveyed.

4.2 RESEARCH FINDINGS

4.2.1 ANALYSIS OF RESPONSES TO THE BI DASHBOARD BASED ON PERSONAL INFORMATION

Percentage of respondents according to their Age

With regard to age, results indicate that a majority of the respondents were under 35 years. The age of respondents below 30 years accounted for 34% of sample population. The age bracket 31-35 years also accounted for 34% of the sample population and 20% of the employees were 36-40 years. Only 6% of the respondents were above 40 years old. It is evident that it takes time to grow to the management level.

Percentage of respondents according to their Education level

Of the respondents surveyed majority were post graduate and had Master's Degree (20%), 12% had PhD qualifications, while only 9% had Bachelor's Degree. Those with high school level of education constituted the lower caste staffs

who were 9% of the survey. Dashboard system is mostly used by the top managers of the organization where funds are available to further their studies.

Percentage of respondents according to their Organization Status

Stratified sampling had been used to create population categories. Executive level represents the Chief Managers and Managers, Senior Standard level represents the engineers and technicians, and Standard level represent the new joiners and trainers. The research sought to establish the distribution of the respondents with respect to various job positions at BHGE. The findings indicate that the majority 24% was in standard level, 12% in contract, and 7% in executive and in senior standard level.

Percentage of respondents for Successful Integration of BI system within the existing system

Integration with the existing system means the data mining of information from all systems at BHGE so that dashboard can achieve 100% real time display. 60% of the population agreed BI dashboard system has integrated well with the existing systems used by the other department at BHGE, while 40% of the staff feels that the system does not integrate well and more needs to be done.

4.2.2 Analysis Of Effectiveness Of Bi Dashboard Based On Benfits Of Dashboard

To establish the benefits of dashboard, the researcher asked questions pertaining to improvement of data accuracy, increased efficiency in the business process, improved customer service, integration of the process, alignment of the vision mission and values, performance reviews, goal management, coordinate goal achievement, security of the system, can the system display data in diff erent format and if the system be used to make the development plan by BHGE.

Improved customer service is one of the cited benefits of dashboard system for decision making by prediction. According to the finding, respondents agreed that the system has led to improved customer service to some extent with 28% strongly agreeing, 36% agreeing, 28% not sure and 4% not agreeing that data accuracy is achieved with the system. Dashboard system improves efficiency in decision making by the management. According to respondent, users strongly agree that the system efficiency is achieved with 60% holding this opinion. BHGEs core value is customer first and this contributed to the introduction of the dashboard system. The users agreed that the system helps to achieve customer satisfaction. Integration of a seamless process is one of the advantages of intelligent dashboard. Out of the respondents 68% agreed that it is possible to integrate many systems at BHGE, 24% were undecided and 8% in disagreement. For BHGE to achieve its goal, the mission, vision and values must be upheld. The users agree that this have been achieved with 62% in agreement and 14% not in agreement. Goal management was one of the benefits of dashboard system; the users believed that with the use of system the company is able to manage its goals with 56% in agreement. Respondents agreed BI Dashboard system can be used by managers to drill down the data that is presented in the system with 64% in agreement and 22% not sure. When the users were asked if dashboard can be used to show information at diff erent times, the user agreed with 76% of the user in concurrence. There was a general agreement that BI dashboard can be a tool for development planning that the management is able to come up with a strategic plan for a period of 5 year which is measured every month. 66% of the users agreed, 18% of them were undecided and 16% thought that it not possible to make plan with dashboard system.

Mean of responses of almost all the benefits are above 3.5 which means on the scale of 1 (strongly disagree) to 5 (strongly agree), respondents believe that there are more benefits than challenges and hence approve that integration of dashboard was indeed a good decision.

4.2.3 Analysis Of Effectiveness Of Bi Dashboard Based On Challenges Of Bi Dashboard System

To establish the challenges of dashboard system, we asked questions pertaining to cost eff ectiveness, security of data displayed, time saving for busy managers, design issues that aff ect the quality of decision making, system resistance by the users, completeness of data, how easy is it to change the KPI, how well are users trained on the capability of the system and if data displayed on dashboard is complete.

BI dashboard system is a cost eff ective tool for prediction thus decision making at BHGE, respondents agree that the system is cost eff ective with 28% strongly agreeing, 30% agree, 24% average and 18% think that the system is not cost eff ective. Concerning data security of the system, 16% of users agree it is a challenge. With regard to time saving when using the system, 64% users are in agreement. When the respondent was asked about the design issues if it has aff ected the decision making of the organization the users agreed that improvement must be done on the system with 68% in agreement while the rest were

not aware. Concerning the completeness of the information presented in the dashboard system the users agree with the fact that the data is complete with 28% strongly agreeing, 38% agreeing, 22% not sure and 12% not agreeing stating that it is a challenge to maintain completeness of data. There was a concern about how easily the key performance indicators can be changed. Respondents agreed with 18% not being aware if that was possible and 68% being in agreement that with the use of system, KPI can be traced. The results showed that majority of respondents i.e. 70% agreed that user training must be done. This is evident by the so many undecided factors on the respondent meaning that the staff is either ignorant or are resisting the system.

It is clear that respondents think system could be made more cost eff ective and secure as mean is 3.6 and 3.64 respectively. The value can go up till 4.5 so as to make a desirable system. Mean for time saving and design issues are 3.7 and 3.82 which are good enough keeping in mind that the manual system consumed a lot of time. Completeness of data is another challenge that needs to be kept in mind as data needs to be fed continually to get the up to date information, 3.76 value is quite low and this needs to be upgraded. The major challenge is majority of respondents having mean 3.90 feels user training is must for people to use dashboard. This has to be kept in mind and training needs to be taken.

4.2.4 Analysis Of Effectiveness Of Bi Dashboard Based On Prediction Factors

Dashboard is used more frequently by higher management and non-technical people. Dashboard assist in the prediction process. It is also a great tool for communication as it keeps information transparent throughout the organization at all times. Users acknowledged that dashboard keep everyone in the organization constantly informed about the diff erent processes and action plan being undertaken in various departments. However the staff strongly agrees that data accuracy act as a major hindrance to prediction process. This is attributed to the fact that data is gathered from diff erent systems in the organization and when the system does not integrate well with dashboard, the accuracy of the information is compromised.

Respondents responded positively to the Dashboard's monitoring strategy, spotting trends and getting insights, interactive nature, data accuracy and data availability with the mean of 3.48, 3.48, 3.56, 3.56 and 3.64
respectively out of 5 which is quite good. This clearly states that people are looking forward to continue with the dashboard.

4.3 Results

A multivariable linear regression is applied to determine the relationship between a dependent variable (Prediction in this case) and several independent variables (the benefits and challenges in this case). Since there can be only one dependent variable, we combine all the Prediction factors using the statistical measure mean to get the single variable. We will call this variable Prediction. Prediction variable is computed by taking mean of the responses by individual respondents for prediction factors. Now taking our equation 3.1 into consideration, Y is our prediction variable we computed, a2X2 denotes various independent factors which is the multiplication of the stated responses to benefits of dashboard (X2) and the slopes of regression lines determined for each of the responses to benefits of dashboard (a2) and the and a3X3 denoted various independent factors which is the multiplication of the stated responses to challenges of dashboard (X3) and the slopes of regression lines determined for each of the responses to challenges of dashboard (a3). e is the standard error. a1 is the Y intercept that is a constant. Using SPSS software we compute the results for regression.

4.3.1 COEFFICIENTSTABLEAS COMPUTED BY SPSS SOFTWARE

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.712	.650		5.635	.000
Improved Customer Service (ICS)	.138	.109	.119	1.274	.211
Increasing Efficiency in the Business Process (IEB)	-.095	.069	-.097	-1.366	.178
Integration of Seamless Process (ISP)	-.029	.103	-.027	-.284	.778
Align Vision Purpose and Values (AVP)	.026	.051	.069	.503	.618
Goal Management (GM)	.005	.047	.014	.111	.913
The Entire New System is Secure (ESS)	.101	.094	.253	1.073	.291
Dashboard allows you to Extensively Drill Down Data (DD)	.252	.063	.481	3.971	.000
Does Dashboard Provide better Business Development Plans (BDP)	-.037	.099	-.101	-.420	.677
Cost Effectiveness (CE)	-.055	.068	-.150	-.809	.424
Security of Data (SD)	-.046	.051	-.128	-.902	.373
Time Saving (TS)	-.029	.061	-.082	-.479	.636
Design Issues Affect the Quality of Decision Making (DI)	-.036	.062	-.104	-.612	.545
Data in the Dashboard is Complete (DC)	-.176	.069	-.440	2.536	.016
Easily change the Key Performance Indicators (KPI)	.012	.065	.033	.185	.854
User Training (UT)	-.081	.069	-.185	-1.190	.243

In the Table above, B value of constant i.e. 3.712 is a1 in our equation which is the Y (prediction) intercept for all regression lines. Rest all B values correspond to the slope of regression lines of corresponding independent variable. So this gives the estimated value of prediction as:

$$\square = 3.712 + 0.138 * (\square\square\square) - 0.095 * (\square\square\square) - 0.029 * (\square\square\square) + 0.026 * (\square\square\ \square) + 0.005 * (\square\square) + 0.101 * (\square\square\square) + 0.252 * (\square\square) - 0.037 * (\square\square\square) - 0.055 * (\square\square) - 0.046 * (\square\square) - 0.029 * (\square\square) - 0.038 * (\square\square) - 0.176 * (\square\square) + 0.012 * (\square\square\square) - 0.081 *$$

(□□) (4.1)

Standard error gives margin of error. All the Bs are just estimates. To get the range or interval in which the model fits, standard error comes into picture. Suppose we determine, critical value for 95% or alpha = .05 Degree of freedom (df) = sample size - number of independent variables (including constant) = 50 16 = 34. Check value for intersection of alpha = .05 and df =36. Let it be x. This x is actually the critical value. Now calculate
r = x * Std Error.
So the range of is given by

(□ − □) □□ (□ + □) (4.2)

This means we are 95% confident that value of B is between this range. Coming to t-score, t-score = B/Std Error.
t-score represents number of standard deviations from mean. Sig. is similar to p-value. if p-value is less than .05, the hypothesis is rejected. Beta value is the B value determined after standardization of actual value which is calculated by dividing each value by standard deviation.

4.3.2 Anova Table As Computed By Spss Software

The Analysis of Variance table is also known as the ANOVA table (for ANalysis Of VAriance). It tells the story of how the regression equation accounts for variablity in the response variable. The column labeled Model has three rows: Regression, Residual, and Total. The column labeled Sum of Squares describes the variability in the dependent variable, Prediction (in our case). If a prediction had to be made without any other information, the best that could be done, in a certain sense, is to predict every value to be equal to the sample mean. The error that is the amount of variation in the data that can't be accounted for by this simple method is given by the Total Sum of Squares. The total amount of variability in the response is the Total Sum of Squares. When the regression model is used for prediction, the error (the amount of uncertainty that remains) is the variability about the regression line. This is the Residual Sum of Squares (residual for left over). It is sometimes called the Error Sum of Squares. The Regression Sum of Squares is the difference between the Total Sum of Squares and the Residual Sum of Squares. Since the total sum of squares is the total amount of variablity in the response and the residual sum of squares that still cannot be accounted for after the regression model is fitted, the regression sum of squares is the amount of variablity in the response that is accounted for by the regression model. Each sum of squares has a corresponding degrees of freedom (df) associated with it. Total df is n-1, one less than the sample size. The Regression df is the number of independent variables in the model.

In the Table above, the sum of squares for regression is calculated as the sum of squares of the estimated value of the dependent variable - mean value. Estimated value is the one derived from 4.1. The sum of squares for residual is calculated as the sum of squares of the estimated value of the dependent variable - the actual value of the dependent variable. The sum

Model	Sum of Squares	df	Mean Square	F-Value	Sig.
Regression	4.477	15	0.298	1.920	0.057
Residual	5.286	34	0.155		
Total	9.763	49			

of squares for total is the sum of above two which can also be calculated as as the sum of squares of the actual value of the dependent variable - mean value. The degree of freedom (df) for regression is the number of independent variables (including constant) - 1 = 16 - 1 = 15. df for residual is the sample size - number of independent variables (including constant) = 50- 16 = 34. df for total is the sum of above two = 15 + 34 = 49.

□□□□□□□□□□ = □□□□□□□□□□□□/□□ (4.3)

An F-Value or F-Statistic is a value we get when we run an ANOVA test or a regression analysis to find out if the means between two populations are significantly different.

□ – □ □□□□ = □□□□□□□□□□□□□□□□□□□□□□□□/ □□□□□□□□□□□□□□□□□□□□□□

(4.4) This can be annotated as F(15,34)=1.920

4.3.3 Model Summary As Computed By Spss Software

R, the multiple correlation coefficient and square root of R, is the correlation between the predicted and observed values. R is the squared multiple correlation coefficient. It is also called the Coefficient of Determination. It is the fraction of the variability in the response that is fitted by the model. If a model has perfect predictability, the Residual Sum of Squares will be 0 and R=1. If a model has no predictive capability, R=0.

Dependent Variable : Prediction

Predictors : (Constant), User Training, Dashboard allows you to extensively Drill Down data, Security of Data, Does Dashboard provide better Business Development Plans, Integration of Seamless Process, Increasing Efficiency in the Business Process, Goal Management, Align Vision

Model	R	R Square	Adjusted R Square	Std. Error of the Estimat
Regression	.677a	.459	.220	.39431

Purpose and values, Time Saving, Easily change the Key Performance indicators, Cost Effectiveness, Data in the Dashboard is complete, Design Issues affect the quality of Decision Making, The Entire New System is Secure, Improved Customer Service.

The Table gives the summary of the model.

□□□□□□□ = □□□□□□□□□□□□□□□□□□□□□□□□□□□/□□□□□□□□□□□□□□□□□□□ (4.5)

Sum of Squares of Total is taken from ANOVA table 4.13.

□□□□□□□□□□□□□□□□ = 1 − (1 − □)) ∗ ((□ − 1)/(□ − □ − 1))

(4.6)

where n is the sample size and p is the number of independent variables (including constant). Standard Error of the Estimate = Square Root of Mean Square of Residual (from ANOVA Table). R Square = .459 means that 45.9% of variance in the actual and the estimated values is explained by this model.

V. CONCLUSION AND FUTURE SCOPE

5.1 Summary

This study sought to investigate BI adoption at BHGE. The exploration was guided by the following objectives, the extent to which BHGE has adopted BI Dashboard system, effect of Business Intelligence dashboard system for decision making at BHGE, benefits of adoption of Business Intelligence Dashboard system at BHGE and the challenges of Business Intelligence Dashboard system adoption at BHGE. The study shows that the aim the company wanted to accomplish has been realized to a large extent and the new BI dashboard system has improved decision making. The study also clearly indicated that the major challenges the company is urgently required to address are; completeness of the data which means without the complete data the decision made will not be a true reflection of the status of the organization, data accuracy and integration of the dashboard with the other systems at BHGE. The respondents agree that there are quite a number of other challenges in the implementation process although they are of the opinion that these are minor and can easily be resolved if they are addressed promptly.

5.2 Conclusion

The findings of the research support the notion that, objective of the company in implementing the new dashboard system has been achieved although a lot more needs to be done. Shifting from manual system of analyzing data to the use of the system was well calculated and the benefits are gradually being realized as improvement goes on. There are few challenges but these are minimal considering the larger picture of the benefits and decision making improvement that have so far been achieved. The study has also shown that BHGE has successfully implemented the new system within a short time without the usual adoption problems that come with new innovation. BHGE employees who were the focus of the study have accepted the changes though with some users resisting. They agree that more requires to be done, especially the data accuracy improvement and training on the new system to eliminate the undecided factor. Dashboard assist in the decision making process it is also a great tool for communication as it keeps information transparent throughout the organization at all times. Users acknowledged that dashboard keep everyone in the organization constantly informed about the different processes and action plan being undertaken in various departments.

5.3 Recommendations

It is required to create more awareness of the new system especially among the users. Feedback mechanism from the users should be established so as to identify the challenges facing new innovation and rectify them quickly. The challenges should be anticipated and resolved quickly before they become problematic to users. More staff should be introduced and trained on how to use the system to increase the usability and have more people on board to help the company realize it strategic plan. BHGE should focus more on improving customer service as the findings clearly indicate that improved customer service increases the probability of decision making using the BI dashboard system. This is because BHGE is customer based and by use of BI system, better and quick decisions are made. From the findings in

chapter 4, performance reviews should be encouraged more often because they have an impact in the success of the system. The surveys that are normally conducted to review the performance should be taken more seriously and all the stake holders should be involved in setting up the missions and measures of the organization. From the research, the dashboard system enables the users to extensively drill down the data and this contributes to the overall success of the system and decision making. This means that the organization should integrate all the systems to the dashboard for the availability of the data. All users should also be encouraged to use the system to increase efficiency. From the findings individual performance planning and development is possible through the performance reviews conducted by managers which include values, development plans, careers aspirations and career success. Dashboards will enable talents reviews by panels which both rate 33 and calibrate individual performance and potentials. Succession plans and key roles for each individual can be established.

5.4 Limitations

The study had a number of limitations. Respondents were at first fearful about giving out information about the new system since they were unsure where the information was to be used. This contributed to the delay of the research. Majority of the respondents were very busy owing to the facts that most of the users are in the top management who have very tight schedules. This lead to the respondent not been dedicated and taking the questionnaire seriously. This had a negative impact on the research since one cannot get the feeling of all the participants. The research had to be undertaken during working hours which caused a lot of inconvenience to the respondents who worked in diff erent departments and some even in diff erent regions. Financial constrain was another factor that aff ected our research, since one had to keep on calling the users to remind them and also moving from one region to another in order to collect the questionnaire.

5.5 Future Scope

The challenges like accuracy of data need to be studied more in order to ensure they are resolved. This should be done by integrating all the processes in BHGE into one system. Due to this, measures should be put to enforce data integrity. Market studies should be carried out to analyze the needs of the staff so as to get a system that best suits them and any upgraded versions available. This will also prevent the users from having so many systems when they can just have one system that perform all the tasks. BHGE should have studies focusing on other countries that have already implemented this system in order to avoid making the same mistakes and have a better system that is up-to- date. This is to avoid the organization from having to implement so many systems all a system becoming obsolete after a very short time. Since BI dashboard can be used as a tool for development planning. This enables the management to come up with a strategic plan for a 5 year period which is measured every month. This means a lot of training on performance should be done and factory visits should be encouraged so that the organization can compare the challenges and hence identify where they went wrong.

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