Thesis for the Degree of Master of Computer Information System

Extension of Business Analysis Guideline - BABOK

V3 for the Nepalese Context

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December 2021

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Supervised by Prof. Purushottam Kharel, Ph.D.

A thesis submitted in partial fulfilment of the requirement for the degree of Master of Computer Information System

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DECLARATION

I hereby declare that this thesis entitled '**Extension of Business Analysis Guideline - BABOK V3 for the Nepalese Context'** is based on my original research work. Related works on the topic by other researchers have been duly acknowledged. I owe all the liabilities relating to the accuracy and authenticity of the data and any other information included hereunder.

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Atut Gorkhali

P.U. Registration Number: 2018-1-46-0004

Date: December 19, 2021

RECOMMENDATION

This is to certify that this thesis entitled '**Extension of Business Analysis Guideline - BABOK V3 for the Nepalese Context'** prepared and submitted by **Atut Gorkhali,** in partial fulfilment of the requirements of the degree of Master of Computer Information System awarded by Pokhara University, has been completed under my supervision. I recommend the same for the acceptance by Pokhara University.

_____

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CERTIFICATION

This thesis entitled '**Extension of Business Analysis Guideline - BABOK V3 for the Nepalese Context'** prepared and submitted by **Atut Gorkhali** has been examined by us and is accepted for the award of the degree of Master of Computer Information System by Pokhara University.

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ACKNOWLEDGEMENT

I would like to express my gratitude toward my thesis supervisor Prof. Dr. Purushottam Kharel, for his precious guidance, support, and advice throughout the duration of this Master thesis. I would also like to sincerely thank Assoc. Prof. Dr. Roshan Chitrakar for his timely review and precious comments throughout this journey.

I am thankful to all the participants who contributed during the data collection phase.

Furthermore, I would also like to thank the department of graduate study for their valuable insights and knowledge, which has helped me to broaden my knowledge, and for supporting me in every way during the thesis.

Finally, I would like to thank my family for their patience and support during my thesis and for all the encouragements to do better.

Atut Gorkhali

PU Registration: 2018-1-46-0004

Date: December 19, 2021

ABSTRACT

Business Analysis (BA) is a critical and significant success aspect of software projects. BABOK V3 guide considered as a standard book provides description of skills and techniques that a business analyst requires to work efficiently.

This exploratory study is conducted with the aim of proposing an extension of current version of BABOK in the context of Nepal. Fourteen vacancies reviewed from official websites showed potential variance against the current version of BABOK, which are namely quality assurance of the software and support after release. Two hundred and forty one Nepalese software engineers working in software companies in Nepal has participated in the study. Data were collected through online survey method. Spearman correlation and binary logistic regression were used to determine the efficiency BAs' involvement in testing and change resistance.

The study results show when change resistance management is introduced it improves the change strategy, analyzing potential values and, solution recommendation respectively. Most of the respondents stated behavioral approach to be most efficient to address resistance to change. Introduction of testing techniques has positive impact on reducing solution limitation and thereby, improving the outcome of solution performance analysis as well. Further analysis has determined black box testing to be positive predictor to improve solution value.

Hence, extension of current version of BABOK guideline is required to enhance productivity of business analyst.

Keywords: Requirement Engineering, Business Analysis, BABOK V3 Guideline Improvement, Software Testing, Change Resistance

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CHAPTER 1

INTRODUCTION

1.1. Background

Requirement's description is a systematic assessment of the outcome that a system needs to realize. It must describe the reason for a system to be desired, based on existing or forecasted settings which may be inner processes or an outward environment [1]. It needs to describe the process and kind of software functionalities being produced. Requirement engineering is a crucial process in determining the capabilities of new software products. Therefore, it has become an integral part of software development process. It helps to develop various high-quality software requirement documents such as functional requirement document, software requirement document, interface requirement document and nonfunctional requirement document[2]. Software requirement specification commonly refers to all these documents.

Requirement engineering is essential for any project to achieve the desired result and to provide solution for the problem when required [3]. As the design of the software depends on the prepared software specification, the validity and, the accuracy of details in such documents are critical. Failure to capture accurate requirements often leads to projects failure [4]. Requirement engineering is however a complex task and there are several associated problems [5]. Some of the common associated problems are lack of proper communication, knowledge, documentation, management, and psychosocial technical problems.

Business analyst acts as a bridge between different stakeholders to handle requirement-engineering tasks. There are many software companies in Nepal varying in size and maturity level that follows different business analysis, software engineering processes, and methodologies for software development. There are many BA standard and guidelines available in market however BABOK V3 is one of the most comprehensive guidelines[6].

BABOK is globally recognized standard of business analysis providing guidelines to business professionals within six core knowledge areas namely solution evaluation, business analysis planning and monitoring, strategy analysis, elicitation and collaboration,

requirements life cycle management and requirement analysis and design definition. It describes the skills, deliverables and techniques that business analyst requires to produce better outcomes[7].

1.2. Statement of Problem

Business analyst is often required to verify the accuracy of software based on the business requirements they have gathered and, specified in requirement document. They are also required to deal with stakeholders to implement the solution that brings changes to the organization.

BABOK V3 has been one of the standard guidelines for business analyst to perform their job. The current version of the guideline has incorporated six knowledge areas along with the tasks of each knowledge areas. It has also defined change strategy; however, has not outlined the tasks and techniques required for managing change resistances and software testing that need to be performed by business analyst.

Many business analysts are assigned with the task of assuring the accuracy of developed software solution, the current BABOK guideline has included several tasks such as measures of solution performance, analyze performance measures, and assess solution limitation however, it does not address the task and techniques for software testing to be performed by business analyst. Additionally, Business analysts are also required to deal with stakeholders at different stages of the software development including the implementation phase. The guideline should support the business analyst by providing necessary tools and techniques to deal with the change resistance they often face during their work. Hence, there is need of study on potential extension against the current version of BABOK guideline to address the missing tasks.

1.3. Research Questions

This study focuses on the business analysis practices in the field of software engineering in Nepal. The following are the principal research questions for this thesis based on the literature review on the business analysis practices and available standards. These research questions are in alignment with the research objective of the study.

1. What is the most effective change-resistance management approach to improve business analysis approach?
2. What are the most effective testing techniques to improve solution evaluation in business analysis approach?

1.4. Research Hypothesis

Table 1.1 Research Hypothesis and Description

S.N.	Research Hypothesis	Description
H1	If Change Resistance Management is introduced, it improves Change Strategy.	With addition of guideline to handle change resistance, it will improve the change strategy.
H2	If change resistance management is introduced, it improves Analyzing Potential Value and Solution recommendation.	When resistance to change is handled, improved alternatives of solution can be proposed.
H3	If Change Resistance Management is introduced in business analysis, it improves enterprise assessment to reduce the enterprise limitations.	There are external factors at enterprise level affecting the full value realization of solution. With change resistance in place, enterprise limitation would reduce.
H4	If Testing techniques is defined, it has positive impact on reducing solution limitations.	When testing techniques is defined, it enables business analysis stakeholders to confirm the solution is working as per the agreed requirement and evaluation criteria. This will improve the solution limitation.
H5	If testing techniques is well defined, it has positive impact on Analyzing Performance Measure to improve the outcome of Solution Performance Analysis	When testing techniques is well defined, it helps to confirm the accuracy of solution and improve solution performance analysis.

1.5. Research Objectives

General Objective

- To propose extension of BABOK Guideline V3 in the context of Nepal

Specific Objectives

- To examine the impact of software testing for business analysis to improve solution value.
- To examine the impact of change resistance management for Business Analysis in software development
- To investigate the task and techniques appropriate for business analyst to test the solution and manage the resistance to change during software development life cycle.

1.6. Significance of the Study

Business analysis and requirement engineering is crucial and complex part of the software engineering process and project management. When not managed properly, this can cause project delays, code reworks, business gaps, defective software and finally project failure. With help of IIBA's BABOK guideline V3, business analysis are streamlined.

This thesis investigates the completeness of the guideline and proposes own extension on the current guideline. A comprehensive academic study on the impact of inclusion of such activities will enable to propose improvement extension on BABOK guideline in the context of Nepal.

Supporting clients after release of the solution requires handling clients that may oppose the changes brought by the solution. Hence, this thesis explores the importance of inclusion of change resistance management in the BABOK guideline. Similarly, inclusion of guideline for software testing techniques would enable business analysts to perform software quality assurance.

CHAPTER 2

LITERATURE REVIEW

2.1 Related Theories

2.1.1 IIBA's BABOK V3 Standard

IIBA's BABOK V3 provides six knowledge areas for business analysis process. Knowledge areas characterize exact business analysis proficiencies that incorporate several sub-areas also known as task. The six knowledge areas are as follows:

1. Business analysis planning and monitoring

This knowledge area depicts the way to specify the tasks important to carry out a comprehensive business analysis. This knowledge area includes procedure and techniques to recognize key stakeholders, manage requirements, techniques for BA process and governing mechanism to track and control necessary changes. It includes several tasks that provide different output artifacts necessary for different phases of business analysis.

- Plan the business analysis approach.
- Plan stakeholder engagement.
- Plan business analysis governance.
- Plan business analysis information management.
- Plan business analysis performance improvements

2. Elicitation and collaboration

Business analysts perform different tasks and uses tools and techniques to acquire information from diverse stakeholders and verify them. It is a critical knowledge area to gather key requirements. Collaboration represents the co-ordination between different stakeholders working together to identify and negotiate business information using different techniques such as survey, interviews, workshops, focus groups, observation, and process analysis etc. According to BABOK V3, elicitation and collaboration is never a stage, rather

it is an ongoing process in business analysis. Elicitation and collaboration are carried out in two different ways.

a. Planned: Interview sessions, surveys, workshops, and experiments can be organized in planned manner.
b. Unplanned: There can be events that are unplanned collaboration.

There are five tasks associated with this knowledge area.

- Prepare for Elicitation.
- Conduct Elicitation
- Confirm Elicitation Results
- Communicate Business Analysis Information
- Manager Stakeholder Collaboration

3. Requirements of life cycle management

The initiation and conclusion of requirement information and maintenance is handle using different tasks in Requirement of life cycle management knowledge area. Association among requirement are well managed and any impact of changes are assessed and analyzed. It is collection of tasks to align the participants, requirement ideas, and business to ensure control over the way of implementation of those requirements. There are five tasks involved in this knowledge area.

- Trace Requirements
- Maintain Requirements
- Priorities Requirements
- Assessment Requirement Changes
- Approve Requirements

4. Strategy analysis

Strategy analysis signifies the tasks that are essential for the goal achievement plan. It analyzes the vision, aim of the business, and recognizes the state that stakeholders want to be after the completion of process. Feasibility of recognized goal and final state along with possible challenges and risks are also analyzed. There are four tasks associated with strategy analysis.

- Analyze Current State
- Define Future State
- Assess Risks
- Define Change Strategy

5. Requirement analysis and design definition

This knowledge area describes the works to perform to manage, identify, and analyze alternative potential solution, validate, and verify the requirement information, model the requirements discovered from elicitation and collaboration process. Some of the major activities within these knowledge areas are organization and analyzation of requirement through proper use of documented texts and models. Tasks done for requirement analysis and design definition are as follows:

- Specify and Model Requirements
- Verify Requirements
- Validate Requirements
- Define Requirements Architecture
- Define Design Options
- Analyze Potential Value and Recommend Solution

6. Solution Evaluation

This knowledge area covers the tasks that are critical for the success of any project and is done to ensure all requirements are fulfilled, planned values are realized and offering optimal performance. There five tasks associate with solution evaluation.

- Measure Solution Performance
- Analyze Performance Measure
- Assess Solution Limitations
- Assess Enterprise Limitations
- Recommend Actions to Increase Solution Value[7]

2.1.2 Change Resistance Management Techniques

Change management is a systematic process to deal with a change. It includes various aspects such as coordinating resources, applying tools, and managing knowledge for organizational success [8]. Understanding the different types of resistance will be helpful to managers in preparing employees for change as employee resistance to change is the most unpredicted problems which business executives have to face[9]. During the software development life cycle, Business analysts are required to identify and establish the change strategy for the project. There are several approaches to handle the change and resulting resistances [10].

2.1.2.1 Behavior Approach

Behavior approach uses reward and punishment technique to motivate individuals to change. It deals with different sub techniques such as performance management, rewarding system, feedback management, and such. It works by first identifying the behavior that affects the performance, status of such behaviors, reason for the behavior, potential reward, and punishment for changing the behavior and finally analyzing the effectiveness of the approach.

2.1.2.2 Cognitive Approach

Cognitive Approach works by setting goals and the result-based coaching to make the change happen. The resistance to the change can be addressed by managing the rational objectives and working towards the objectives by keeping belief and attitude for change resistance group in the mind.

2.1.2.3 Psychodynamic Approach

When software development and implementation take place, the stakeholders go through a psychological process due to the changes takes place as accordance to the change strategy. Here the psychodynamic approach enables the handing of change resistance by dynamically addressing the different factors causing the resistance. In these approaches, the change resistance group are handled by addressing their emotion, understanding them, and counselling them.

2.1.2.4 Humanistic Approach

Humanistic approach is combination of some of the key elements of the previous approaches. In this approach, the resistance to change is handled using communication and consultation, developing values and culture, and addressing the emotion of change resistance group.

An expert survey with the aim to develop diagnosing model of resistance to change and explain its practical use was conducted in Ukraine. The survey result showed economic factors (decrease in salary), increase in workload, uninformed employees, and fear of unknown were most significant cause of resistance. The survey also identifies proper education, effective communication, facilitation, motivation, negotiation, cooperation, and coercion as possible methods for managing resistance to change depending on the type of organization, nature of resistance and stage of intervention[9].

2.1.3 Software Testing Technique

Software testing is a process of executing system to determine error. It should be applied in all the phase of software development life cycle from the requirements elicitation phase of software development to when the product is ready for installation or shipping, following a successful system test [11]. The main purpose of software testing is to identify defects while developing software along with providing information about the level of quality to ensure that software meets the specified requirements [12].

There are several methods to perform software testing by business analysts when they are assigned with the software-testing task. Different techniques provide various option for quality assurance focusing on different quality factors such as usability, security, capability, portability, maintainability, reliability and so on [13]. Some of the fundamental and famous software testing techniques are as follows:

i. White Box Testing
ii. Black Box Testing
iii. Non-Functional Testing
iv. Acceptance Testing
v. Usability Testing

The result of case study conducted by interviewing seven quality assurance specialists determined the trends of testing techniques used in R & D teams. All the QA specialist responded that regression testing was in used followed by black box testing and non-functional testing [12].

An industrial survey on contemporary aspects of software testing conducted by Causevic et. al. determined that developer was responsible for unit level testing using a white box approach while integration and system level testing were done by dedicated tester mostly as a black box testing [14].

A preliminary survey on software testing practices in Australia conducted by Ng et.al among 65 organization. This survey showed that majority of the respondents (70%) were found to appoint person who is solely responsible for managing software testing activities in their organization indicating that testing is becoming a more independent process in the industry.

The survey result also identifies user acceptance testing and regression testing were the two most common testing techniques for all the software application being developed[15].

2.1.4 Spearman's Correlation Rank Coefficient

Spearman's correlation coefficient measures the strength and direction of monotonic relationship between two variables. It is denoted by ρ[16], [17].

Monotonic relationship has two assumptions 1. When the value of one variable increases, so does the value of the other variable or two. When the value of one variable increase, the other variable value decrease

Assumptions for Spearman's Correlation

- Relationship between two variables is nonlinear.
- Variables measured are at least ordinal.
- One of the variables not following normal distribution.

Its value ranges from +1 to -1.

$$\rho = 1 - \frac{6\sum_i^2 d}{n(n^2-1)}$$ Eq 1. Formula for calculating Spearman's Correlation

Where $d_i = R_{1i} - R_{2i}$

R_{1i} = rank of i in the first set of data

R_{2i} = rank of i in the second set of data and

n = number of pairs of observations

In this study, the study variables were categorical in nature having rank, so for further analysis spearman rank correlation is used.

2.1.5 Binary Logistic Regression

When the dependent variable is dichotomous, for predictive analysis it is appropriate to conduct regression analysis. It is used to describe data and to explain the relationship

between one dependent dichotomous variable and one or more nominal, ordinal, interval, or ratio-level independent variables[18]–[21].

It gives the information about measures of how relevant an independent variable is and signifies the direction of the relationship either positive or negative.

$$P = \frac{exp\ (a+b_1x_1+b_2x_2+\cdots)}{1+exp\ (a+b_1x_1+b_2x_2+..)}$$ Eq 2. Formula for calculating Binary Logistic Regression

Where:

P=the probability that a case is in a particular category,

exp= the exponential function (approx. 2.72),

a=the constant (or Intercept) of the equation and

b=the coefficient (or slope) of the predictor variables

We have analyzed using SPSS for the analysis,

Key variables to be noted while calculating logistic regression using SPSS

B- This is the value for the logistic regression equation for predicting the dependent variable from the independent variable. They are in log-odds units. It is calculated using the formula

Log (p/1-p) =b0+b1*x1+b2*x2+… Eq 3. Formula for calculating B value

Where p is the probability

The value of B indicates about the relationship between the independent and dependent variables. It indicates the amount of increment or decrement that is determined by the sign of the coefficient in the predicted log odds of dependent variable of interest holding all other predictor constant. Because these coefficients are in log-odds units, they are often difficult to interpret. Therefore, they are often converted into odds ratios. It can be done by exponentiation of the coefficient value that is denoted by **Exp (B)**

Exp (B) - it indicates that for every, one unit increase in independent variable, it is expected to change as much as the value of Exp (B) in dependent variable.

S.E. - It is the standard error associated with the coefficients. The standard error is used for testing whether the parameter is significantly different from 0.

Wald and Sig- Wald value reflects the Wald chi-square value. Sig denotes the p value. p value less than alpha is statistically significant. In our study we have choose alpha to be 0.05, coefficient having p value of 0.05 or less would be statistically significant.

df- It denotes the degree of freedom for each of the test of the coefficients. It is calculated as N-1 where N is the number of observations.

2.1.6 Cronbach's Alpha

Cronbach's alpha is a convenient test used to estimate the reliability, or internal consistency, of a composite score [22]. Reliability of the test refers to the ability of the test to generate similar answer when conducted multiple times under similar condition.

$$\propto = \left(\frac{k}{k-1}\right)\left(1 - \frac{\sum_{i=1}^{k} \sigma_{yi}^2}{\sigma_x^2}\right)$$ Eq 4. Formula for calculating Cronbach's Alpha

Where:

k refers to the number of scales items

σ_{yi}^2 refers to the variance associated with item i

σ_x^2 refers to the variance associated with the observed total scores

The resulting α coefficient of reliability ranges from 0 to 1 in providing overall assessment of a measure's reliability. Although the standards for what makes a good α coefficient are entirely arbitrary on theoretical knowledge of the scale in question, many researchers recommend as follow:

Table 2.0.1 Interpretation of Cronbach's Alpha value

Cronbach's Alpha	**Internal Consistency**
α >=0.9	**Excellent**
0.7 =< **α** < 0.9	**Good**
0.6 =< **α** < 0.7	**Acceptable**
0.5 =< **α** < 0.6	**Poor**
α < 0.5	**Unacceptable**

2.1.7 Quartile

The statistical term describes a division of observations into four defined intervals based on the values of the data. It measures the spread of values above and below the mean by dividing the distribution into four groups.

A quartile divides the data into three point's namely lower quartile denoted by Q_1, median Q_2 and upper quartile Q_3 to form four groups of the dataset. The first group of values contains the smallest number up to Q1; the second group includes Q1 to the median. The third set is the median to Q3, the fourth set comprise Q3 to the highest data point of the entire set [23].

$Q_i = (\frac{i(N)}{4})^{th}$ value, i=1, 2, 3 Eq 5. Formula for calculating i^{th} quartiles for frequency data

Where,

N is total number of observations.

$Q_i = l + (\frac{\frac{iN}{4} - F<}{F}) \times h$; i=1, 2, 3 Eq 6. Formula for calculating i^{th} quartiles for continuous frequency distribution

Where,

L is the lower limit of the ith quartile class

N=Σf total number of observations

F frequency of the ith quartile class

F< cumulative frequency of the class previous to ith quartile class

h is the class width

2.1.8 p-value

The p value is a measure of the evidence against null hypothesis H_0. In another word, we can also say that it provides evidence of association, relationship.

As null hypothesis (H_o) always states that there, is no difference and thus, refers to a situation in which "no difference" exists while alternative hypothesis (H_1) is a statement of what investigator believed to be true if sample data cause to reject null hypothesis. It is also termed as "research hypothesis".

When p value is less than the chosen significance level then the null hypothesis is rejected. The choice of significance level to reject H_0 is arbitrary. Commonly the 5% (less than 1 in 20 chances of being wrong), 1% and 1% ($P<0.05$, 0.01 and 0.001) levels have been used. Most of the researcher consider p value is following ways [24]:

Table 2.2 Interpretation of p value

p-value	Interpretation of evidence

<0.01	Very strong evidence against H_0
0.01-0.05	Strong evidence against H_0
0.05-0.10	Weak evidence against H_0
>0.1	Little or no evidence against H_0

A large p value is not strong evidence in favor of H_0. A large p value can occur for 2 reasons:

- H_0 is true
- H_0 is false but the test has low power

2.2 Related Works

2.2.1 Role of Business Analyst

Business analyst have emerged to have crucial role in recent business scenarios. They function as bridge between IT and business by using different techniques to assess processes, determine requirements, and deliver evidence-based recommendations and reports to concerned stakeholders. Business analysts are considered as an agent of change whose action and decision have an impact on delivery of quality software solution

An exploratory study conducted in Australia determined that business analysts were primarily employed to undertake the activities articulated in the BABOK. However, the study identified not all part of the BABOK as equally important. The study also identified that some skills and competencies that were highly considered by business analyst were not included in BABOK. These included project management, implementation, technical skills, data management, and testing. This study also revealed an increasing emphasis on AGILE and Business rather than Technical Analysis. The study has also suggested for integrated extension for improvement of core BABOK[25]

2.2.2 Role of business analyst in Nepal

Reviews of vacancies from official websites of different companies showed that out of six knowledge areas of BABOK, business analyst vacancy job description are commonly based

on four knowledge areas namely, Elicitation and collaboration, Requirement life cycle management, Solution evaluation and Requirement analysis and design definition. Potential variance against BABOK's guideline are also identified which mainly included quality assurance of the software and support after release.

Following job description for business analyst are consolidated.

Table 2.3 Business Analyst Job Description in Nepal

S.N.	Job Description	Related BABOK Knowledge Area	Related BABOK Task	No of Vacancy
1	Review existing system and their documentation.	Elicitation and Collaboration	Conduct Elicitation	13
2	Work together with management, Subject matter experts, and clients to comprehend and assess business process.	Elicitation and Collaboration	Conduct Elicitation	11
3	Create flowcharts, specification, and diagrams	Elicitation and Collaboration	Confirm Elicitation Results,	14
4	Manage Change Requests	Requirements Life Cycle Management	Maintain Requirement, Assessment Requirement Changes	12
5	Manage Backlog	Requirements Life Cycle Management	Maintain Requirement	9

6	Handle User Acceptance Test	Solution Evaluation	Measure Solution Performance	10
7	Develop clear acceptance criteria for features to be developed.	Requirements Analysis and Design Definition	Specify and Model Requirement	13
8	Task prioritization	Requirements Life Cycle Management	Prioritize Requirements	8
9	Support after release.	-	-	7
10	Quality Assurance of the software	-	-	8
Total				**14**

Table above shows some of the sampled business analyst's job description against BABOK's V3 guideline found in Nepali job market. Based on the review of the job portals and the website, business analysts were also responsible for assuring the quality of the solution and maintaining relation with client during and after the implementation of the system and all of these were not addressed in the current version of BABOK guideline.

The review of advertisement in Nepal showed that majority of the advertisement included elicitation and collaboration, requirement life cycle management and solution evaluation. The list of reviewed websites/jobs portals are as follows.

2.2.3 BABOK Knowledge Area

An exploratory study in Australia was conducted to explore expectation of employers from business analyst and to determine whether it has been captured by BABOK. The study result identified most of the advertisement (57%) included elicitation and collaboration knowledge area followed by requirement analysis and design definition accounting 26% and strategy

analysis with 17%. The study also identified that 25% of the reviewed had not mentioned any BABOK knowledge at all [25].

2.2.4 BABOK Tasks

Results of the exploratory study conducted in Australia identified conduction of elicitation and managing stakeholder collaboration were the frequently mentioned individual task type within the most frequently referenced knowledge areas of BABOK accounting 57% and 31% respectively in the reviewed advertisements [25].

2.2.5 Software Development methodologies

A survey conducted in Turkey with the aim to determine software engineering practice, identified that although waterfall was a rather old but still widely used methodology, more than half of the respondents (53%) used it. The next widely used methodology were Agile/lean development and Incremental models with usage rates of 45% and 38% respectively. The other methodologies had lower usage rates, namely: prototyping (28%), spiral (16%), and product-line development (12%) [26].

CHAPTER 3

METHODOLOGY

3. Research Design

3.1 Research Approach

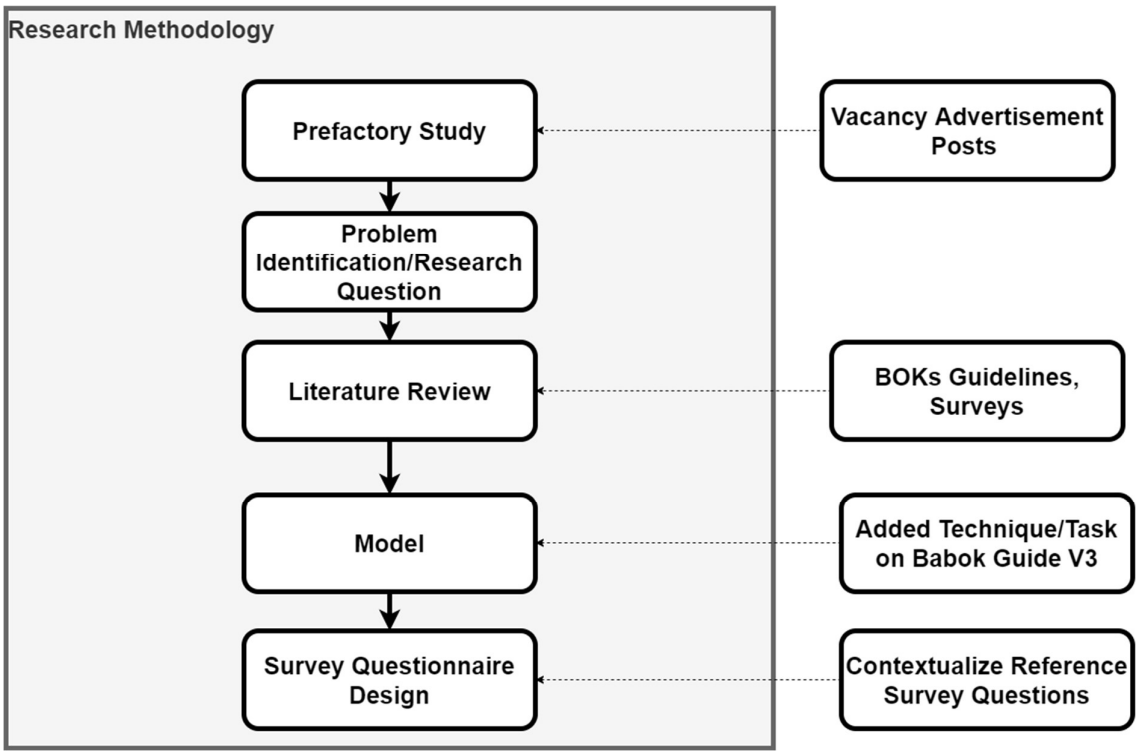

Figure 3.1 Research Approach

Figure above describes the research approach for this thesis. A pre-study on Nepalese job market was conducted as part of problem identification process to generate research questions. Comprehensive literature review on similar studies, guidelines, standards was carried out to capture deep understanding required for this study and to prepare survey questionnaire.

A thesis model has been proposed by adding new tasks/techniques on existing BABOK guide V3.

3.1.2 Inductive Research

This study used inductive research approach to resolve the research questions and fulfill the proposed research objectives. An observation-based review of various job portal and company career sections was conducted to understand the state of Business analysts in Nepal. This review led to the development of hypothesis that BABOK guideline should include new task and techniques itself to enhance the quality of produced software.

3.1.3 Quantitative Research

Quantitative Research method has been used to collect primary data through survey technique in this study. The responses from the participant are ordinal and numerical data.

3.1.4 Description Research

Descriptive research method has been used in this study to describe demographic characteristics of the respondent's organization/team which includes variables such as software methodology being used, nature of project, project size, number of employees, number of business analysts in the organization, BABOK Knowledge area and its related tasks as well as business analysis performance status, implementation and efficiency of change resistance and testing approaches in terms of frequencies and percentages.

3.2 Type of Data

This study is based on primary and secondary data. For secondary data, manual review of job description provided in vacancy advertisement from various Nepalese software organizations is carried.

Furthermore, for the primary data, questionnaire has been prepared with reference to an Australian survey paper published on Australasian Conference on Information Systems.

3.3 **Data Collection Model**

This study followed data collection model as mentioned in the figure below. It has been conducted over three phases namely they are planning, investigation and analysis phases.

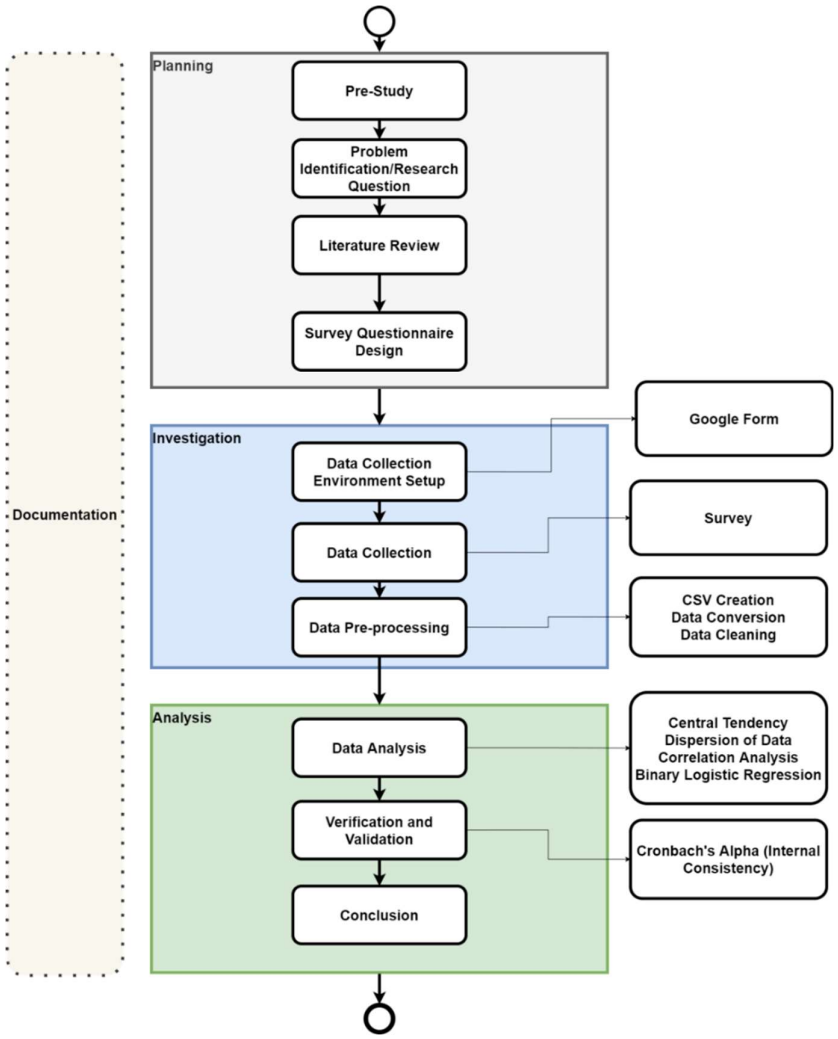

Figure 3.2 Data Collection Model

3.4 **Study area**

For secondary data, review of advertisement across Nepal has been done. As for primary data, online survey targeting Nepalese software engineers who resided and worked within software companies in Nepal was conducted.

3.5 **Study population**

Nepalese software engineers from software companies located in Nepal were included in the study.

3.6 Study period

The duration of this study is from April 2020 to September 2021.

3.7 Sample selection method and sample size

Given the exploratory nature of the study, non-probability sampling method was considered appropriate for sample selection. Purposive sampling method is selected as appropriate technique for the sampling. A total of 241 sample participated in this study.

3.8 Sampling instrument

i. The content of the questionnaire was developed through the information from the literature.
ii. Structured questionnaire developed as a google form has been used as a tool for data collection.
iii. Study tools is divided into following categories:

3.8.1 General Section:

Included demographic variables are methodology organization used number of employees in the team, number of members involved in business analysis, nature, and size of project mostly worked on.

3.8.2 BABOK six-knowledge areas implementation

It consists of six components to determine team's involvement and efforts on different knowledge areas as follows:

i. Team's Business analysis planning and monitoring involvement and efforts
ii. Team's Elicitation and collaboration involvement and effort
iii. Team's Requirement life cycle management involvement and effort
iv. Team's strategy analysis involvement and effort
v. Team's requirement analysis and design definition involvement and effort
vi. Team's solution evaluation involvement and efforts

It consists of five-point Likert scale with thirty questions. Out of total thirty questions, two questions are negatively stated, and twenty-eight questions are positively stated.

3.8.3 Business Analysis Performance Status

This section consists of five five-point Likert Scale questionnaires to determine the performance of the team on different parameters.

3.8.4 Extension Tasks on Existing BABOK standard to improve the business analysis outcome

This section included two components and twelve five-point Likert scale questions to identify the effect of extended task and techniques on quality of business analysis Performance Status

3.9 Data processing and analysis

The survey data from the Google Form was extracted in csv format. The csv file was then loaded into the excel program where manual data cleaning was performed using built-in filter, sorting and function tools in the application.

The collected data were then loaded, edited and coded manually in SPSS tool (Statistical package for social science). Data has been summarized using appropriate descriptive statistic such as frequency, mean, standard deviation, and quartile. Spearman's rank correlation was used as test correlation between the variables.

The inference was made based at p-value of 0.05 and 95% of CI. Regression analysis was performed using binary logistic regression.

3.10 Operational Definition

3.10.1. Total number employees and number of business analysts in the organization/team

Categorization of number of employees and number of software employee involve in business analysis in the company was done based on quartile.

3.10.2. BABOK Six Knowledge Areas Implementation

Categorization of the total value of each BABOK knowledge areas was done based on quartile i.e., frequent referred to scores in the top 25 % (quartile) of the distribution, whereas less referred to score in the bottom 25% (quartile) of the distribution.

Categories of BABOK each knowledge areas were observed as follow:

a. **Business analysis planning and monitoring involvement and effort**

Table 3.1 Operation Def. Business analysis planning and monitoring

Category	Less involvement and effort	Occasional involvement and effort	Frequent involvement and effort
Score	<=14	15-21	>=22

b**. Team's Elicitation and collaboration involvement and effort**

Table 3.2 Operation Def. Team's Elicitation and collaboration

Category	Less involvement and effort	Occasional involvement and effort	Frequent involvement and effort
Score	<=14	15-22	>=23

c. **Team's Requirement life cycle management involvement and effort**

Table 3.3 Operation Def. Team's Requirement life cycle management

Category	Less involvement and effort	Occasional involvement and effort	Frequent involvement and effort
Score	<=17	18-24	>=25

d. **Team's strategy analysis involvement and effort**

Table 3.4 Operation Def. Team's strategy analysis

Category	Less involvement and effort	Occasional involvement and effort	Frequent involvement and effort
Score	<=14	15-21	>=22

e. **Team's requirement analysis and design definition involvement and effort**

Table 3.5 Operation Def. Requirement analysis and design definition

Category	Less involvement and effort	Occasional involvement and effort	Frequent involvement and effort
Score	<=21	22-28	>=29

f**. Team's solution evaluation involvement and efforts**

Table 3.6 Operation Def. Team's solution evaluation

Category	Less involvement and effort	Occasional involvement and effort	Frequent involvement and effort
Score	<=14	15-21	>=22

g. **Business analysis performance status**

Table 3.7 Operation Def. Business analysis performance status

Category	**Poor**	**Average**	**Good**
Score	<=14	15-20	>=21

* The subcategories of business analysis performance status were divided into two categories based on median value with < 3 considered as unsatisfactory and ≥ 3 considered as being satisfactory.

*Involvement of business analyst in different type of testing are categorized based on median value with < 3 considered as not involved and ≥ 3 considered as being involved.

3.10.3 Rating Scale

Scales for BABOK six knowledge area implementation as applied in 3.10.2.

- Less means very few involvement
- Occasional means not regularly that is sometimes involvement.
- Frequent means many times involvement.
- Poor means very None or very minor performance
- Average means average performance
- Good means very excellent Performance

3.11 Validity of the tool

Cronbach's alpha was calculated to determine internal consistency of the questionnaire, which was found to be good as per internal consistency verification criteria.

Thorough review of vacancy for business analyst was done form official website only. In addition, survey questionnaire was prepared with reference to literature review and face validity was established by consulting with supervisor.

3.12 Study Variables

3.12.1 Dependent Variables

For this thesis, following variables are set as dependent variables.

1. Performance on Quality of Change Strategy
2. Occurrence of the Enterprise Limitation
3. Occurrence of the Solution Limitation
4. Performance on Analysing Performance Measure
5. Performance on Analysing potential value and solution recommendation

3.12.2 Independent Variables

For this thesis, following variables are set as independent variables.

1. Implementation of change resistance management techniques during business analysis
2. Identification and planning of solution testing techniques during Business Analysis.

3.13 Conceptual Framework

The present study is focused to propose the extension of current version of BABOK to incorporate the potential variance so that business analyst have a standard guideline for

better outcome. It also includes identifying most effective change-resistance management approach and techniques and testing techniques to improve solution evaluation and thereby improve business analysis approach. The figure illustrates each part of research instrument and how they are related to proposed hypothesis and how proposed hypothesis are further related to the objectives of the study.

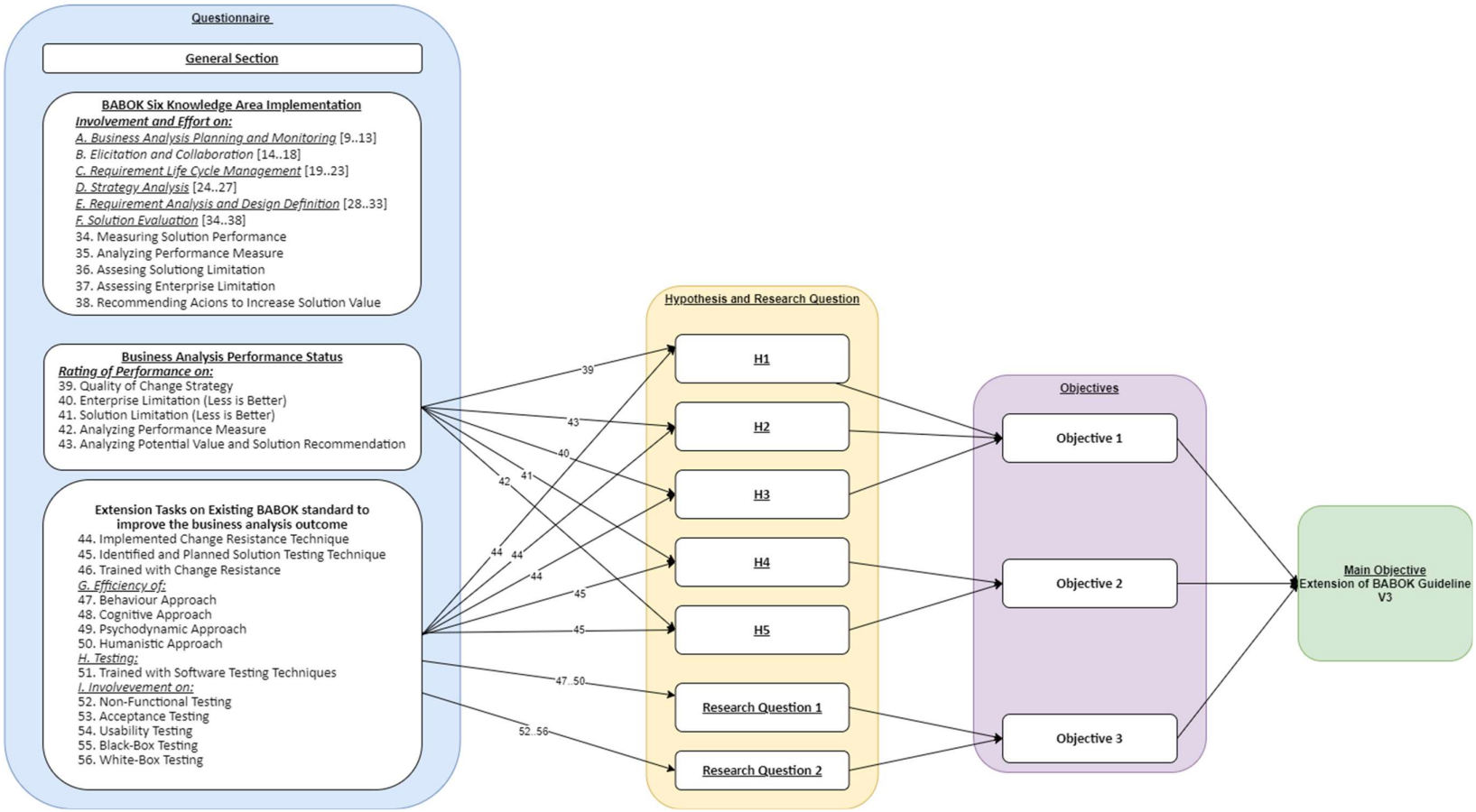

Figure 3.3 Conceptual Framework for the Study Questionnaire

CHAPTER 4

RESULT AND DISCUSSION

4.1 Results

4.1.1 Univariate Analysis

Variables (n=201)

4.1.1.1 Demographic Information: Software Methodology, Nature of Project, Project Size

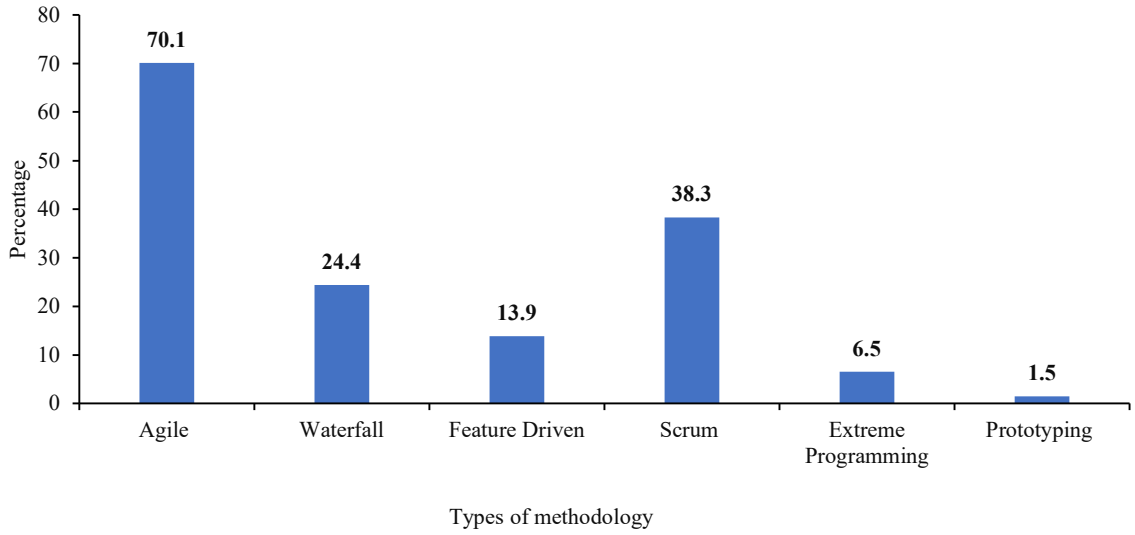

Figure 4.1 Software methodology mostly used by Respondent's organization/Team

Table 4.1 Software methodology mostly used by Respondent's organization/Team

$methodology Frequencies

		Responses		Percent of Cases
		N	Percent	
methodology used[a]	Methdology agile	141	45.2%	70.1%
	Methodology waterfall	48	15.4%	23.9%
	methodology feature driven	32	10.3%	15.9%
	methodology scrum	76	24.4%	37.8%
	methodology extreme programming	12	3.8%	6.0%
	methodology prototyping	3	1.0%	1.5%
Total		312	100.0%	155.2%

a. Dichotomy group tabulated at value 1.

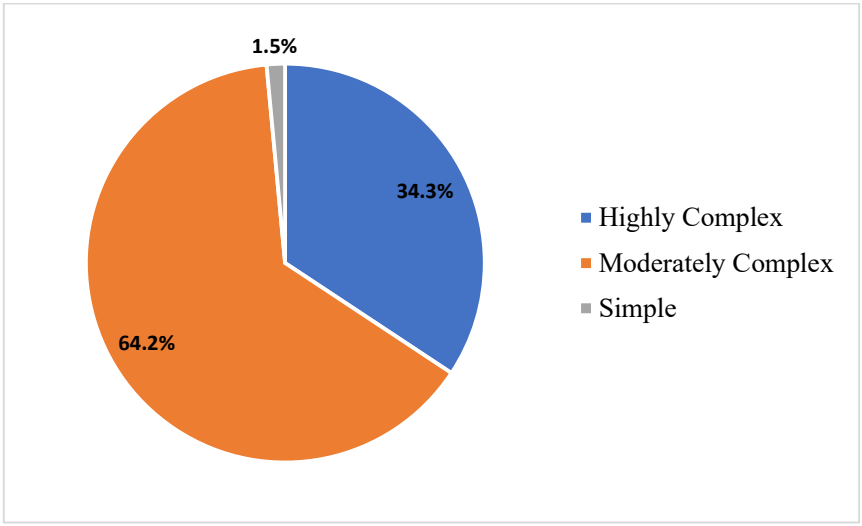

Figure 4.2 Nature of the project mostly worked in respondent's organization/Team

Table 4.2 Nature of the project mostly worked in respondent's organization/Team

Please state what nature of the project your team mostly works on.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Highly Complex	69	34.3	34.3	34.3
	Moderately Complex	129	64.2	64.2	98.5
	Simple	3	1.5	1.5	100.0
	Total	201	100.0	100.0	

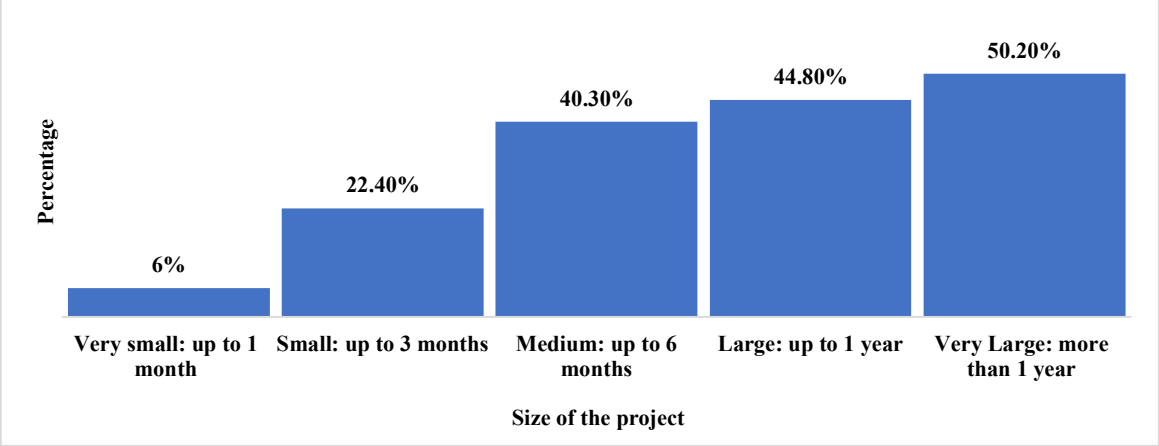

Figure 4.3 Size of project mostly worked in respondent's organization/Team.

Table 4.3 Size of project mostly worked in respondent's organization/Team.

$size Frequencies

		Responses		Percent of Cases
		N	Percent	
size of the project[a]	very small project upto 1 month	12	3.6%	6.0%
	small project upto 3 month	45	13.7%	22.4%
	medium project upto 6 month	81	24.6%	40.3%
	large project upto 1 year	90	27.4%	44.8%
	very large project more than 1 year	101	30.7%	50.2%
Total		329	100.0%	163.7%

a. Dichotomy group tabulated at value 1.

Agile software methodology commonly used by respondent with 70.1% followed by scrum (38.3%) and Waterfall (24.4%). In term of nature of project, 64.2% of the organization where the respondents were engaged handled moderately complex project. Likewise, majority of the organization handled project of more than 1 year's accounting 50.20%. Conversely, only 6% of respondent were involved in the project of less than a month.

4.1.1.2 Demographic Information: Number of Employees, Number of Business Analyst

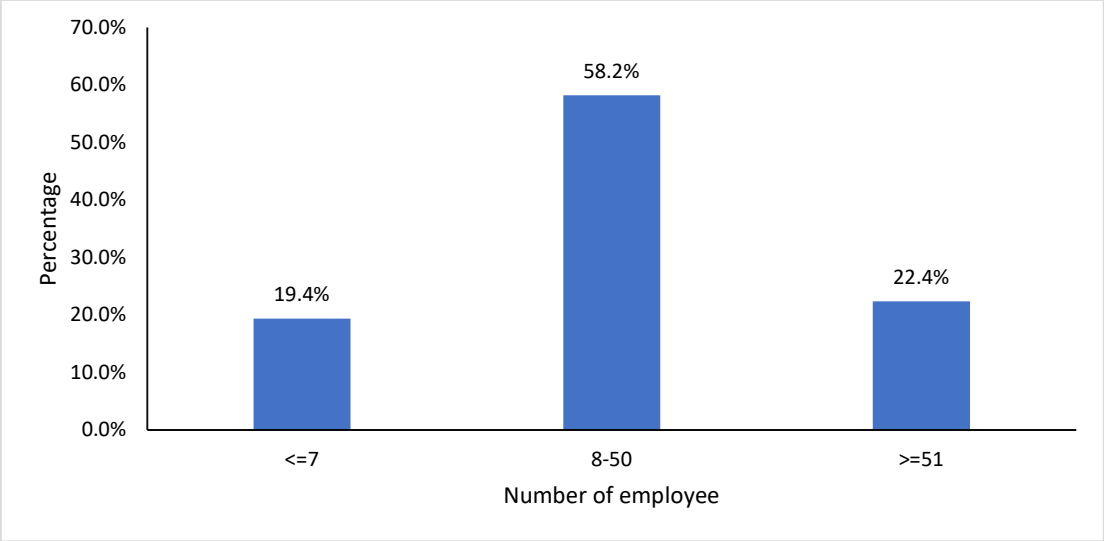

Figure 4.4 Number of employees in the respondent's software development team

Table 4.4 Number of employees in the respondent's software development team

Number of employees in software development team

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	8 to 50	117	58.2	58.2	58.2
	Less than equals to 7	39	19.4	19.4	77.6
	More than equals to 51	45	22.4	22.4	100.0
	Total	201	100.0	100.0	

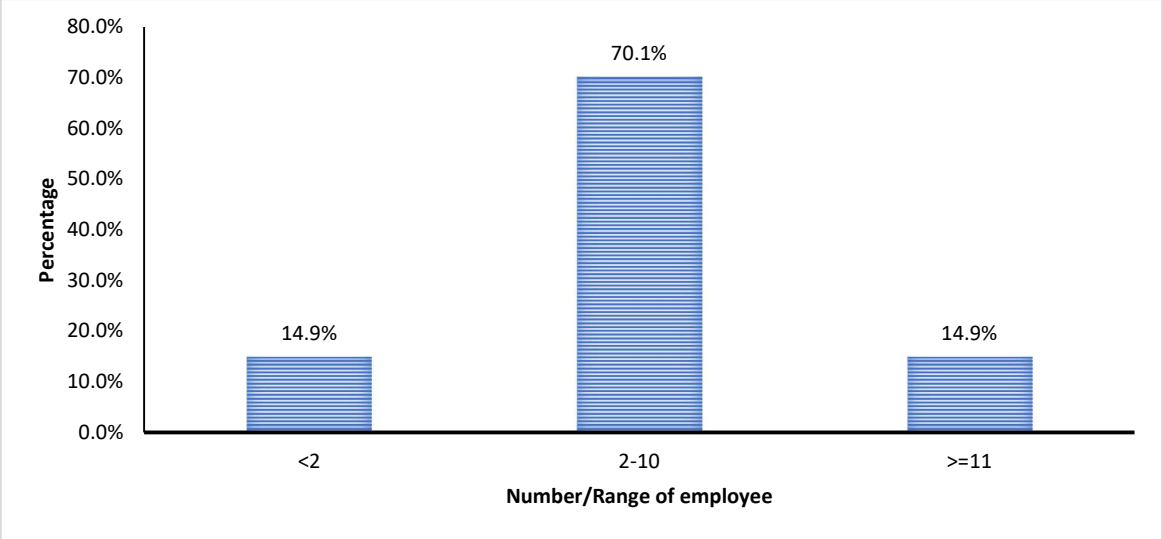

Figure 4.5 Number of business/software employee in business analysis

Table 4.5 Number of business/software employee involved in business analysis.

Number of Business/Software employee involve in business analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2-10	141	70.1	70.1	70.1
	Less than 2	30	14.9	14.9	85.1
	More than equal to 11	30	14.9	14.9	100.0
	Total	201	100.0	100.0	

The number of employees' software development team in a company varied from minimum 4 employees to maximum of 307 with an average of 55 employees. In case of number or employees in business analysis, a company had maximum of 25 employees involved in business analysis and about 70.1% of the respondents stated that they had 2 to 10

business/software employee involved in business analysis in their current company. Three respondents stated that they had no employees in business analysis in their company.

4.1.1.3 BABOK Six Knowledge Area Implementation: Involvement and Effort

4.1.3.1. Business analysis planning and monitoring

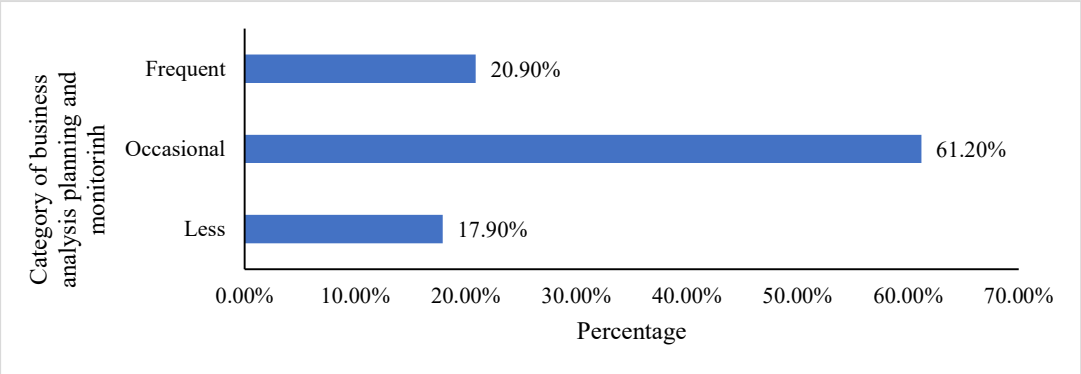

Figure 4.6 Involvement and effort on business analysis planning and monitoring

Table 4.6 Involvement and effort in business analysis planning and monitoring

category of business analysis planning and monitoring involvement and effort

N	Valid	201
	Missing	0

category of business analysis planning and monitoring involvement and effort

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequent	42	20.9	20.9	20.9
	less	36	17.9	17.9	38.8
	Ocassional	123	61.2	61.2	100.0
	Total	201	100.0	100.0	

More than half of the respondents (61.2%) had stated that their team in the organization had occasional involvement and effort in business analysis planning and monitoring with mean score 18.23± 3.98.

4.1.3.2 Teams Elicitation and Collaboration

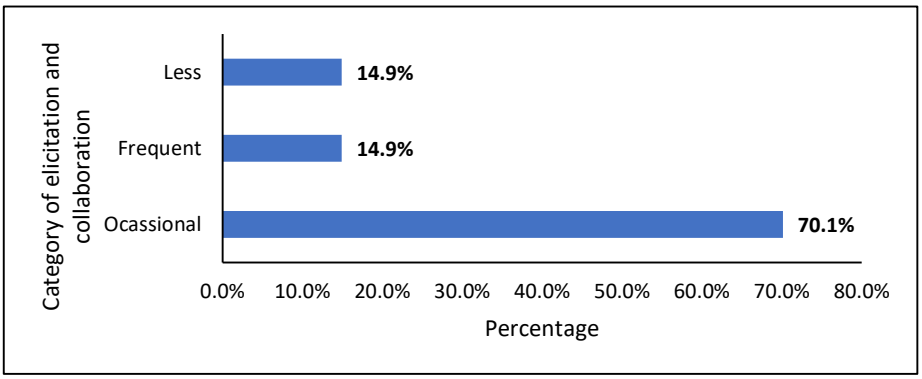

Figure 4.7 Involvement and effort on elicitation and collaboration

Table 4.7 Involvement and effort on elicitation and collaboration

category of total of elicitation and collaboration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequent	30	14.9	14.9	14.9
	less	30	14.9	14.9	29.9
	Ocassional	141	70.1	70.1	100.0
	Total	201	100.0	100.0	

Most of the respondents (70.1%) had stated that their team in the organization had occasional involvement and effort in elicitation and collaboration with mean score 18.43± 4.13.

4.1.3.3 Requirement Life Cycle Management

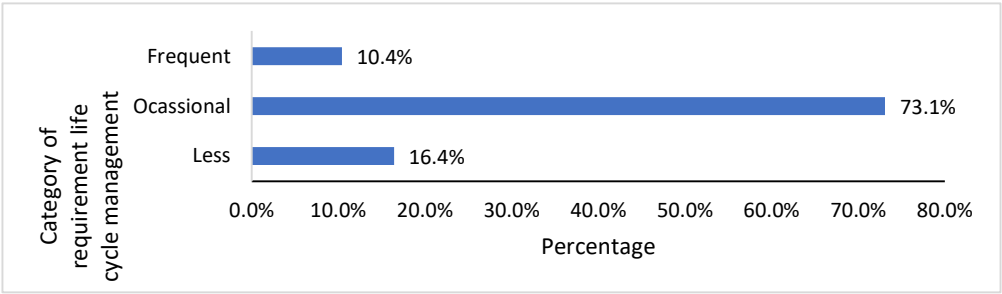

Figure 4.8 Involvement and efforts on requirement life cycle management

Table 4.8 Involvement and effort on requirement life cycle management tasks

category of total of requirement life cycle management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequent	21	10.4	10.4	10.4
	less	33	16.4	16.4	26.9
	Ocassional	147	73.1	73.1	100.0
	Total	201	100.0	100.0	

Most of the respondents (73.1%) had stated that their team in the organization had frequent involvement and effort in requirement life cycle management with mean score 20.02± 4.36.

4.1.3.4 Team's Strategy Analysis

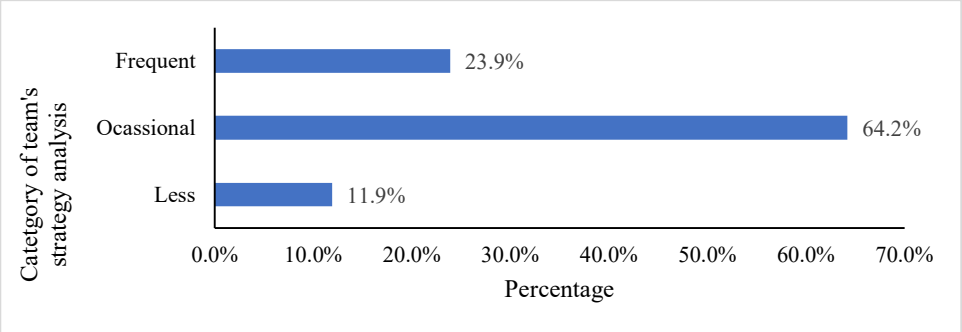

Figure 4.9 Involvement and Efforts on Team's Strategy Analysis

Table 4.9 Involvement and effort in strategy analysis

category of strategy analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequent	48	23.9	23.9	23.9
	Less	24	11.9	11.9	35.8
	Ocassional	129	64.2	64.2	100.0
	Total	201	100.0	100.0	

Most of the respondents (44.8%) had stated that their team in the organization had occasional involvement and effort in requirement life cycle management with mean score 14.71± 3.74.

4.1.3.5 Requirement Analysis and Design Definition

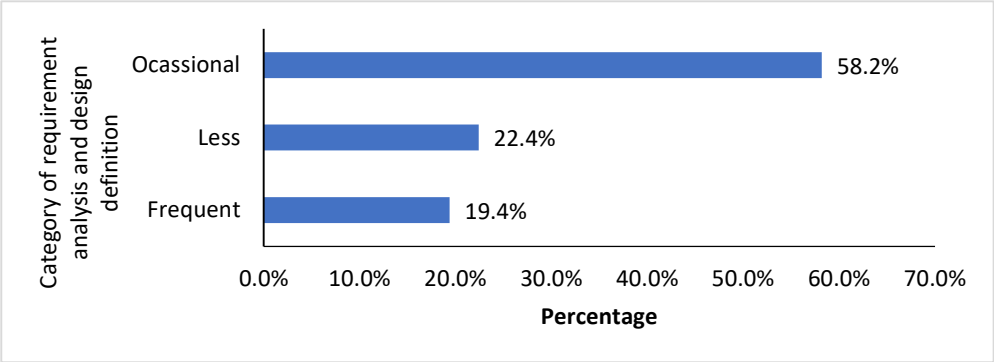

Figure 4.10 Involvement and Effort on Requirement Analysis and Design Definition

Table 4.10 Involvement and effort on requirement analysis and design definition

category of total requirement analysis and design definition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequent	39	19.4	19.4	19.4
	less	45	22.4	22.4	41.8
	Ocassional	117	58.2	58.2	100.0
	Total	201	100.0	100.0	

Most of the respondents (58.2%) had stated that their team in the organization had occasional involvement and effort in requirement analysis and design definition with mean score 24.2± 4.65.

4.1.3.6 Solution Evaluation

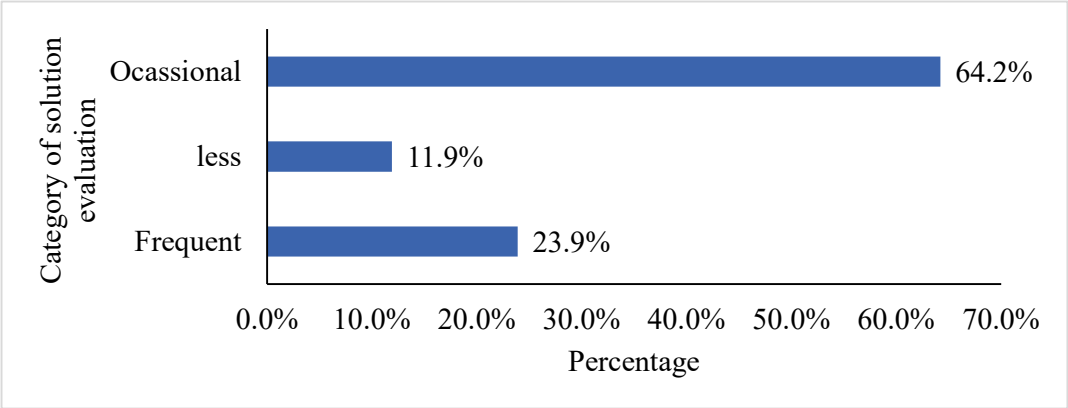

Figure 4.11 Involvement and Effort on Solution Evaluation

Table 4.11 Involvement and effort in solution evaluation

category of total solution evlaution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequent	48	23.9	23.9	23.9
	less	24	11.9	11.9	35.8
	Ocassional	129	64.2	64.2	100.0
	Total	201	100.0	100.0	

Most of the respondents (64.2%) had stated that their team in the organization had occasional involvement and effort in requirement analysis and design definition with mean score 14.85± 3.46.

4.1.1.4 Business Analysis Performance Status

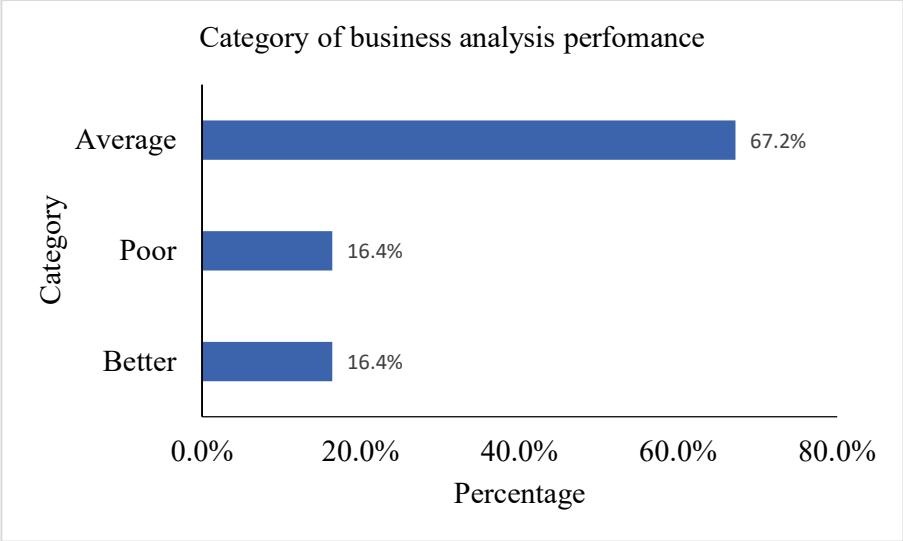

Figure 4.12 Performance Status of Business Analysis

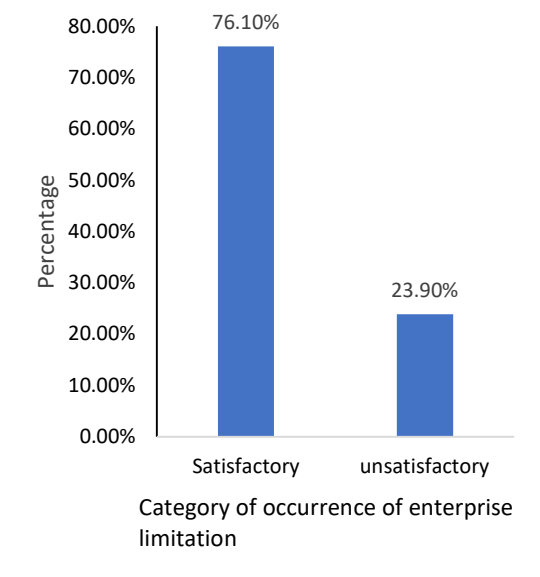

Figure 4.14 Category of occurrence of enterprise limitation

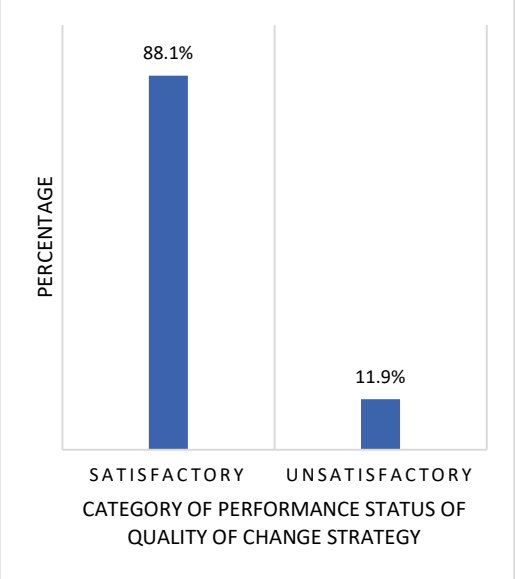

Figure 4.13 Category of performance status of quality of change strategy

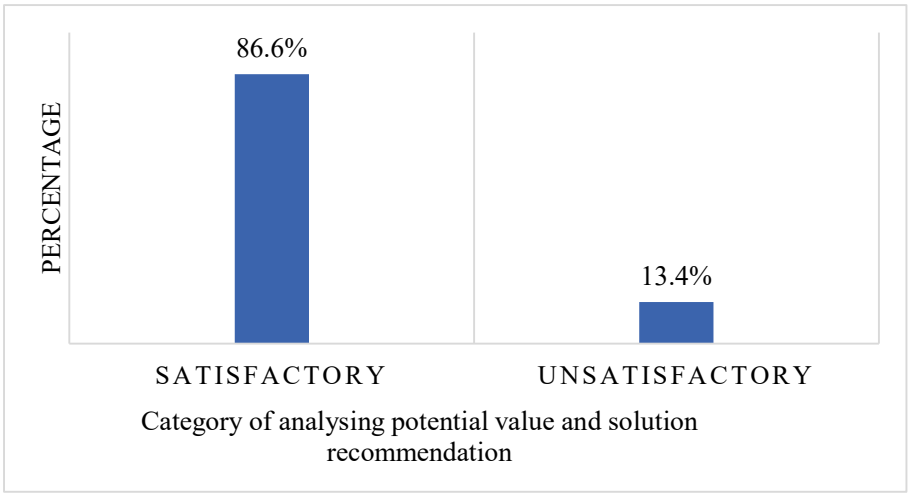

Figure 4.15 Category of analyzing potential value and solution recommendation

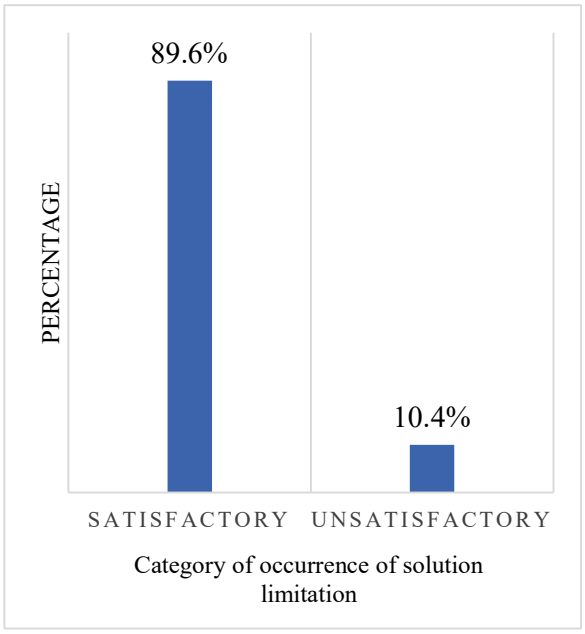

Figure 4.16 Category of occurrence of solution limitation

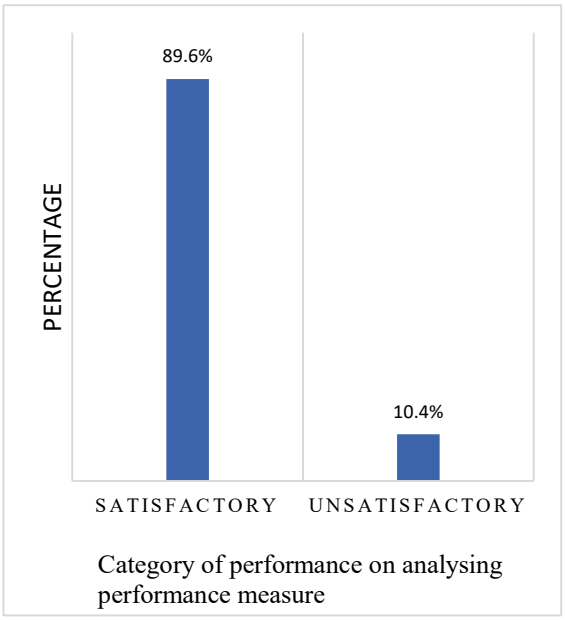

Figure 4.17 Category of performance on analyzing performance measures

Table 4.12 Category of total business analysis performance and its sub parts

category of total business analysis performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Average	135	67.2	67.2	67.2
	Better	33	16.4	16.4	83.6
	Poor	33	16.4	16.4	100.0
	Total	201	100.0	100.0	

category of quality of change strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	unsatisfactory	24	11.9	11.9	11.9
	satisfactory	177	88.1	88.1	100.0
	Total	201	100.0	100.0	

category of occurrence of enterprise limitation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	satisfactory	153	76.1	76.1	76.1
	unsatisfactory	48	23.9	23.9	100.0
	Total	201	100.0	100.0	

category of occurence of solution limitation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	satisfactory	180	89.6	89.6	89.6
	unsatisfactory	21	10.4	10.4	100.0
	Total	201	100.0	100.0	

category of performance on analysing performance measure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	satisfactory	180	89.6	89.6	89.6
	unsatisfactory	21	10.4	10.4	100.0
	Total	201	100.0	100.0	

category if analyzing potential value solution recomeendation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	satisfactory	174	86.6	86.6	86.6
	unsatisfactory	27	13.4	13.4	100.0
	Total	201	100.0	100.0	

Majority of the respondent's organization (67.2%) had average business analysis performance status with mean score 17.31±3.85. Based on performance, majority of the respondents stated that their team had performed satisfactorily accounting 89.6% on quality of change strategy and analyzing performance measures respectively and, 86.6% on analyzing potential value and solution recommendation. In case of occurrence of enterprise limitation more than three fourth of the respondents (76.1%) stated that they had faced frequent enterprise limitation. Similar, finding was observed in occurrence of solution limitation accounting 89.6%.

4.1.1.5 Implementation and Efficiency of change resistance and testing approaches

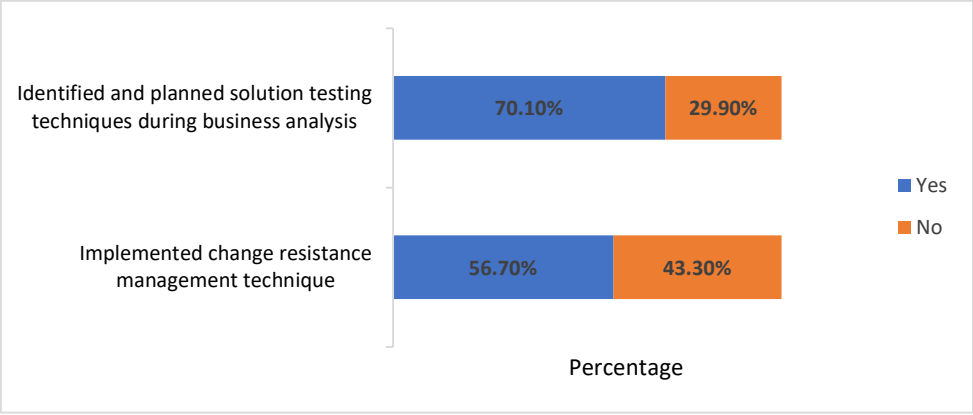

Figure 4.18 Status of change resistance management and solution testing techniques implementation

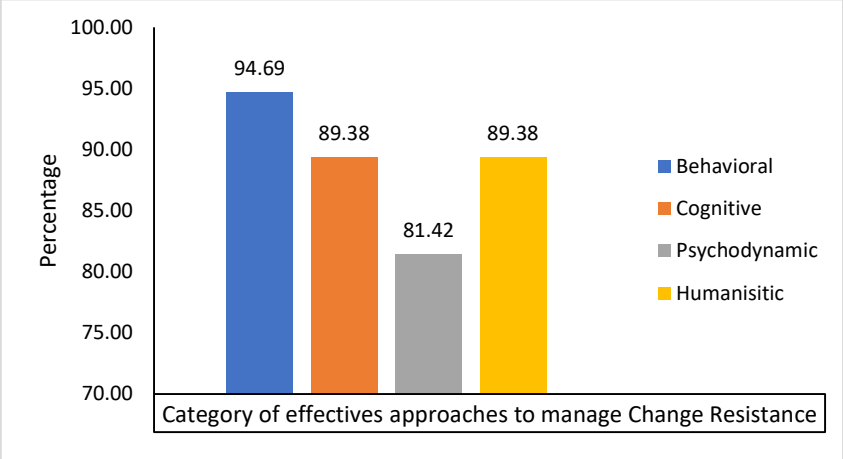

Figure 4.19 Categorization of efficiency of approaches to address resistance to change

Table 4.13 Implementation of change resistance management technique and efficiency of approaches to address resistance to change

implemented change resistance management techniques

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	88	43.6	43.8	43.8
	Yes	113	55.9	56.2	100.0
	Total	201	99.5	100.0	
Missing	System	1	.5		
Total		202	100.0		

The above table shows that, most of the respondent's organization (56.7%) had implemented change resistant technique during business analysis. Similarly, the figure no 51 shows that among four different approaches taken to address resistance to change, most of the respondents (94.50%) stated that behavior approach was most efficient approach followed by cognitive and humanistic at 89.38 %.

4.1.1.6 Business Analyst's Software Testing Involvement

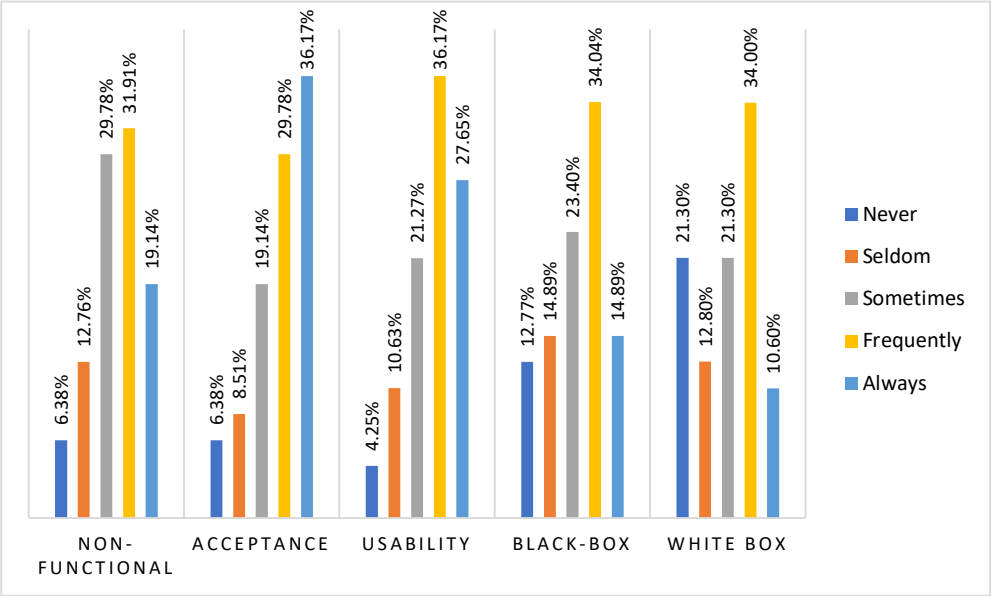

Figure 4.20 Involvement of business analyst in different type of software testing

Table 4.14 Identified and planned solution testing technique during business analysis and business analyst's software testing involvement

Identified and planned solution testing techniques during Business Analysis.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	60	29.7	29.9	29.9
	Yes	141	69.8	70.1	100.0
	Total	201	99.5	100.0	
Missing	System	1	.5		
Total		202	100.0		

Non-Functional Testing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	9	4.5	6.4	6.4
	Seldom	18	9.0	12.8	19.1
	Sometimes	42	20.9	29.8	48.9
	Frequently	45	22.4	31.9	80.9
	Always	27	13.4	19.1	100.0
	Total	141	70.1	100.0	
Missing	0	60	29.9		
Total		201	100.0		

Acceptance Testing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	9	4.5	6.4	6.4
	Seldom	12	6.0	8.5	14.9
	Sometimes	27	13.4	19.1	34.0
	Frequently	42	20.9	29.8	63.8
	Always	51	25.4	36.2	100.0
	Total	141	70.1	100.0	
Missing	0	60	29.9		
Total		201	100.0		

Usability Testing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	6	3.0	4.3	4.3
	Seldom	15	7.5	10.6	14.9
	Sometimes	30	14.9	21.3	36.2
	Frequently	51	25.4	36.2	72.3
	Always	39	19.4	27.7	100.0
	Total	141	70.1	100.0	
Missing	0	60	29.9		
Total		201	100.0		

black-box Testing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	18	9.0	12.8	12.8
	Seldom	21	10.4	14.9	27.7
	Sometimes	33	16.4	23.4	51.1
	Frequently	48	23.9	34.0	85.1
	Always	21	10.4	14.9	100.0
	Total	141	70.1	100.0	
Missing	0	60	29.9		
Total		201	100.0		

white-box testing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	30	14.9	21.3	21.3
	Seldom	18	9.0	12.8	34.0
	Sometimes	30	14.9	21.3	55.3
	Frequently	48	23.9	34.0	89.4
	Always	15	7.5	10.6	100.0
	Total	141	70.1	100.0	
Missing	0	60	29.9		
Total		201	100.0		

The table above shows that three quarter of the total respondents (70%) stated that they had identified and planned software techniques. In terms of various type of software testing, most of them were frequently involved in some type of software testing. Among the five different type of software testing technique, most of them (36.17%) were involved in acceptance and usability testing respectively. While 21.30% respondents stated that they have never been involved in white-box testing.

4.1.1.7 Business Analyst's Trainings: Change Resistance Technique, Software Testing Techniques

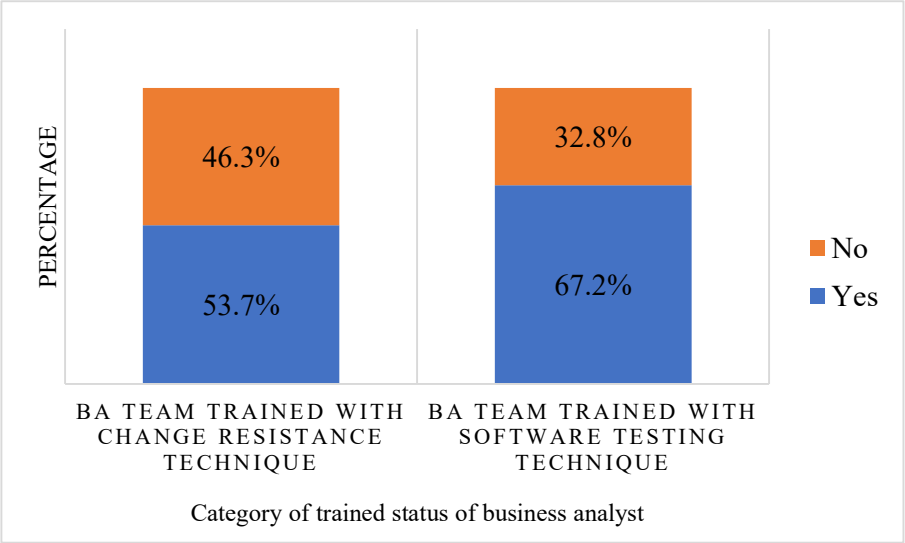

Figure 4.21 Business Analyst's Trainings: Change Resistance Technique, Software Testing Techniques

Table 4.15 Business Analyst's Trainings: Change Resistance Technique, Software Testing Techniques

Business analyst team trained with change resistance techniques

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	93	46.3	46.3	46.3
	Yes	108	53.7	53.7	100.0
	Total	201	100.0	100.0	

Business analyst team trained with software testing techniques

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	66	32.8	32.8	32.8
	Yes	135	67.2	67.2	100.0
	Total	201	100.0	100.0	

The above table shows that majority of the organization (67.2%) had their business analyst trained with software testing technique. In terms of training in change resistance techniques, more than half (53.7%) business analyst have been trained.

4.1.2 Bivariate Analysis

Hypothesis 1. When Change resistance management is introduced, it will improve change strategy.

4.2.1 Correlation: Quality of change strategy and implemented change resistance management techniques

implemented change resistance management techniques * category of quality of change strategy Crosstabulation

			category of quality of change strategy		
			unsatisfactory	satisfactory	Total
implemented change resistance management techniques	No	Count	18	69	87
		% within category of quality of change strategy	75.0%	39.0%	43.3%
	Yes	Count	6	108	114
		% within category of quality of change strategy	25.0%	61.0%	56.7%
Total		Count	24	177	201
		% within category of quality of change strategy	100.0%	100.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Monte Carlo Sig.		
						Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Interval by Interval	Pearson's R	.236	.066	3.422	.001[c]	.001[d]	.001	.002
Ordinal by Ordinal	Spearman Correlation	.236	.066	3.422	.001[c]	.001[d]	.001	.002
N of Valid Cases		201						

Interpretation:

0 to 0.19 indicates a very weak correlation

0.22 to 0.39 indicates a weak correlation

0.4 to 0.59 indicates a moderate correlation

0.6 to 0.79 indicates a strong correlation

0.8 to 1 indicate a very strong correlation

Table 4.16 Correlation between quality of change strategy and implemented change resistance management techniques

Variables (n=201)	**Category of quality of change strategy**		Correlation value (ρ)	p value
	Unsatisfactory (%)	Satisfactory (%)		
Implemented change resistance management techniques				
No	18(75%)	69(39%)	0.236	0.01*
Yes	6(25%)	108(61%)		

***p =0.01**

The above table shows that there exists strong evidence of a positive correlation between implementation of change resistance management technique and quality of change strategy. It also shows that implementation of change-resistance management technique and quality of change strategy has a weak positive correlation.

4.2.2 Binary logistic regression analysis for quality of change strategy

Categorical Variables Codings

		Frequency	Parameter coding (1)
implemented change resistance management techniques	No	87	.000
	Yes	114	1.000

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Step 1[a]	implemented CRMtechniques(1)	1.547	.496	9.725	1	.002	4.696	1.776	12.412
	Constant	1.344	.265	25.777	1	.000	3.833		

a. Variable(s) entered on step 1: implementedCRMtechniques.

Table 4.17 Binary logistic regression analysis for quality of change strategy

Variables	AOR (B)	95% CI for AOR		p value
		Lower	Upper	
Implementation of change resistant technique				
No	1			
Yes	4.696	1.776	12.412	0.002*

*p < 0.05

AOR* Adjusted Odd Ratio

The above table shows that those who have implemented change resistant technique are around 5 times more likely to have satisfactory performance on quality of change strategy than those who have not implemented change resistant technique and it was statistically significant (p=0.002). Thus, the results accept the hypothesis that when change resistance management is introduced, it will improve change strategy.

Hypothesis 2. When change resistance management is introduced, it will improve analyzing potential value and solution recommendation.

4.2.3 Correlation among Performance on analyzing potential value and solution recommendation with implemented change resistance management techniques

implemented change resistance management techniques * category to increase solution value Crosstabulation

			category to increase solution value		
			Poor	Better	Total
implemented change resistance management techniques	No	Count	18	70	88
		% within category to increase solution value	66.7%	40.2%	43.8%
	Yes	Count	9	104	113
		% within category to increase solution value	33.3%	59.8%	56.2%
Total		Count	27	174	201
		% within category to increase solution value	100.0%	100.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.182	.069	2.607	.010[c]
Ordinal by Ordinal	Spearman Correlation	.182	.069	2.607	.010[c]
N of Valid Cases		201			

Table 4.18 Correlation of performance on analyzing potential value and solution recommendation with implemented change resistance management techniques

Variables (n=201)	**Team performance on analyzing potential value and solution recommendation**		Correlation value (ρ)	p value
	Poor (%)	Better (%)		
Implemented change resistance management techniques				
No	18(66.7)	70(40.2)	0.182	0.01*
Yes	9 (33.3)	104(59.8)		

***p =0.01**

The above table shows that there exists strong evidence of a positive correlation between implementation of change resistance management technique and team performance in analyzing potential value and solution recommendation. It also shows that implementation of change resistance management technique and team performance in analyzing potential value and solution recommendation has a very weak correlation (ρ=0.01).

4.2.4 Binary logistic regression analysis for improvement of potential value and solution recommendation

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Step 1[a]	implemented CRMtechniques	1.089	.437	6.224	1	.013	2.971	1.263	6.991
	Constant	1.358	.264	26.410	1	.000	3.889		

a. Variable(s) entered on step 1: implementedCRMtechniques.

Table 4.19 Binary logistic regression analysis for improvement of potential value and solution recommendation

Variables	**AOR**	**95% CI for AOR**		**p value**
		Lower	**Upper**	
Implementation of change resistant technique				
No	1			
Yes	2.971	1.263	6.991	0.013

The above table shows that those who have implemented change resistant technique are nearly 3 times more likely to have satisfactory performance on analyzing potential value and solution recommendation than those who have not implemented change resistant technique given all other variables are kept constant and it was statistically significant (p=0.01). Thus, the result accept the hypothesis that when change resistance management is introduced, it will improve analyzing potential value and solution recommendation

Hypothesis 3. If change resistance management is introduced in business analysis, it will improve enterprise limitations.

4.2.5 Correlation between involvement made in assessment of enterprise limitations and implementation of change-resistance management techniques

Table 4.20 Correlation between involvement made in assessment of enterprise limitations and implementation of change-resistance management techniques

Variables (n=201)	**Assessment of enterprise limitation**		Correlation value (ρ)	P value
	Frequent (%)	Less (%)		
Implemented change resistance management techniques.				
No	72(42.1)	15(50)	0.057	0.421
Yes	99 (57.9)	15(50)		

The above table shows that there was no significant evidence of correlation between implementing change resistance management technique and team's involvement in assessment of enterprise limitation (p=0.421).

implemented change resistance management techniques * category of assesing enterprise limitation Crosstabulation

			category of assesing enterprise limitation		
			less (1-2)	Frequent (>3)	Total
implemented change resistance management techniques	No	Count	15	72	87
		% within category of assesing enterprise limitation	50.0%	42.1%	43.3%
	Yes	Count	15	99	114
		% within category of assesing enterprise limitation	50.0%	57.9%	56.7%
Total		Count	30	171	201
		% within category of assesing enterprise limitation	100.0%	100.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.057	.071	.802	.423[c]
Ordinal by Ordinal	Spearman Correlation	.057	.071	.802	.423[c]
N of Valid Cases		201			

a. Not assuming the null hypothesis.

**Since there was no correlation between assessment of enterprise limitation and implementation of change-resistance strategy, further analysis was not conducted. The result does not accept the hypothesis when change resistance management is introduced in business analysis it will improve enterprise limitations*.

Hypothesis 4. If solution-testing techniques is defined, it has positive impact on reducing solution limitation

4.2.6 Correlation between occurrence of solution limitation and defined software testing techniques

team software testing techniques? * Category of occurrence of the solution limitation Crosstabulation

			Category of occurrence of the solution limitation		
			less (1-2)	Frequent (3-5)	Total
team software testing techniques?	No	Count	12	54	66
		% within Category of occurrence of the solution limitation	57.1%	30.0%	32.8%
	Yes	Count	9	126	135
		% within Category of occurrence of the solution limitation	42.9%	70.0%	67.2%
Total		Count	21	180	201
		% within Category of occurrence of the solution limitation	100.0%	100.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.177	.075	2.534	.012[c]
Ordinal by Ordinal	Spearman Correlation	.177	.075	2.534	.012[c]
N of Valid Cases		201			

Table 4.21 Correlation between occurrence of solution limitation and defined software testing techniques

Variables (n=201)	**Occurrence of Solution Limitation**		**Correlation value (ρ)**	**p value**
	Frequent occurrence of solution limitation (%)	**Rare occurrence of solution limitation (%)**		
software testing technique defined				
No	54(30)	12(57.1)	0.177	0.01*
Yes	126(70)	9(42.9)		

p<0.1

The above table shows that there exists moderate evidence of a positive correlation between software testing technique being defined and occurrence of solution limitation. It also shows that defined software testing technique and occurrence of solution limitation has a very weak correlation (ρ=0.12).

4.2.7 Binary logistic regression analysis for occurrence of solution limitation

Categorical Variables Codings

		Frequency	Parameter coding (1)
Identified and planned solution testing techniques during Business Analysis.	No	60	1.000
	Yes	141	.000

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Step 1[a]	teamsoftwaretestingtechniques(1)	1.135	.470	5.832	1	.016	3.111	1.238	7.816
	Constant	1.504	.319	22.211	1	.000	4.500		

Table 4.22 Binary logistic regression analysis for occurrence of solution limitation

Variables	AOR	95% CI for AOR		p value
		Lower	Upper	
Defined software testing technique				
No				
Yes	3.111	1.238	7.816	0.016

P<0.05

The above table shows that when software testing technique is defined it reduces the occurrence of solution limitation by 3.111 given all other variables are kept constant and it was statistically significant (p=0.01). Thus, the result accepts the hypothesis that when solution-testing technique is defined it has positive impact on reducing solution limitation.

Hypothesis 5. If solution-testing techniques is well defined, it has positive impact on analyzing performance measure to improve the outcome of solution performance analysis.

4.2.8 Correlation between analysis of performance measure and defined software testing technique

team software testing techniques? * analyzing performance measure Crosstabulation

			analyzing performance measure		
			poor(1-2)	Good(3-5)	Total
team software testing techniques?	No	Count	12	54	66
		% within analyzing performance measure	57.1%	30.0%	32.8%
	Yes	Count	9	126	135
		% within analyzing performance measure	42.9%	70.0%	67.2%
Total		Count	21	180	201
		% within analyzing performance measure	100.0%	100.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.177	.075	2.534	.012[c]
Ordinal by Ordinal	Spearman Correlation	.177	.075	2.534	.012[c]
N of Valid Cases		201			

Table 4.23 Correlation between analysis of performance measure and defined software testing technique

Variables (n = 201)	**Analyzing performance measure**		**Correlation value (ρ)**	**P value**
	Poor (%)	Good (%)		
Software testing technique defined.				
No	12(57.1)	54(30)		
Yes	9(42.9)	126(70)	0.177	0.01

The above table shows that there exists moderate evidence (p=0.01) of a positive correlation between software testing technique being defined and analyzing performance measure. It also shows that defined software testing technique and analyzing performance measure has a very weak correlation (ρ=0.177).

4.2.9 Binary logistic regression analysis for analyzing performance measures.

Categorical Variables Codings

		Frequency	Parameter coding (1)
team software testing techniques?	No	66	.000
	Yes	135	1.000

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Step 1[a]	teamsoftwaretestingtechniques	1.135	.470	5.832	1	.016	3.111	1.238	7.816
	Constant	1.504	.319	22.211	1	.000	4.500		

Table 4.24 Binary logistic regression analysis for analyzing performance measures.

Variables	**AOR**	**95% CI for AOR**			**p value**
		Lower	**Upper**		
Identified and planned solution testing technique during Business analysis No	1				
Yes	3.111	1.238	7.816		0.01*

The above table shows that those organizations who have identified and planned solution testing technique during business analysis are 3.111 times more likely to have satisfactory analyzing performance measures than those who have not, given all other variables are kept constant and it was statistically significant (p=0.01). Thus, the result accepts the hypothesis that when solution-testing technique is well defined it has positive impact on analyzing performance measure to improve the outcome of solution performance analysis.

4.2.10 Binary logistic regression analysis for examining the impact of involvement of business analyst in different process testing to improve solution value.

N=141

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Cat_nonfunctional	-.040	.938	.002	1	.966	.961	.153	6.045
	cat_acceptance	-16.477	7.277E3	.000	1	.998	.000	.000	.
	cat_usability_testing	-18.963	7.277E3	.000	1	.998	.000	.000	.
	Cat_blackboc_testing	2.487	.909	7.483	1	.006	12.022	2.024	71.415
	cat_whtitebox	1.395	.885	2.483	1	.115	4.034	.712	22.865
	Constant	66.997	2.058E4	.000	1	.997	1.249E29		

a. Variable(s) entered on step 1: Cat_nonfunctional, cat_acceptance, cat_usability_testing, Cat_blackboc_testing, cat_whtitebox.

Table 4.25 Binary logistic regression analysis for examining the impact of involvement of business analyst in different process testing to improve solution value.

Variables	**AOR**	**95% CI for AOR**		**p value**
		Lower	**Upper**	
Involvement in Black box Testing				
Involved	12.022	2.024	71.415	0.006*

***p<0.01**

Binary logistic regression was performed to examine the impact of involvement of business analyst in different process testing to improve solution value. It was determined that only involvement in black box testing was found to be statistically significant (≤p0.01**)**. When business analyst is involved in black box testing than there would be twelve times improvement in solution value given all other variables are kept constant (p=0.006).

Table 4.26 Bivariate analysis summary

Correlation	Correlation Value	P-Value
Correlation between quality of change strategy and implemented change resistance management techniques	0.236	0.01
Correlation among Performance on analyzing potential value and solution recommendation with implemented change resistance management techniques	0.182	0.01
Correlation between involvement made in assessment of enterprise limitations and implementation of change-resistance management techniques ***H3 hypothesis rejected due to >0.1 p-value.***	0.057	0.42*
Correlation between occurrence of solution limitation and defined software testing techniques	0.177	0.01
Correlation between analysis of performance measure and defined software testing technique	0.177	0.01

Regression	B, Exp (B)	P-Value	Hypothesis Accepted
Binary logistic regression analysis for quality of change strategy	4.696	0.002*	H1
Binary logistic regression analysis for improvement of potential value and solution recommendation	2.971	0.013	H2
Binary logistic regression analysis for occurrence of solution limitation	3.111	0.016	H4
Binary logistic regression analysis for analyzing performance measures.	3.111	0.01	H5

4.1.3 Cronbach's Alpha Result

Table 4.27 Cronbach's Alpha Result

Category	Obtained Value
Business Analysis Planning and Monitoring	**0.865**
Requirement life cycle effort	**0.907**
Planning effort	**0.865**
Elicitation and collaboration involvement and effort	**0.871**
Requirement analysis and design definition involvement and effort	**0.890**
Strategy analysis involvement and effort	**0.871**

The internal consistency for each sub-category was found to be good as per internal consistency verification criteria.

4.2 Discussions

Sociodemographic variables

In this study, majority of the respondents (70%) stated that they used agile as a software methodology followed by scrum and waterfall accounting 24.4% and 13.9% respectively. Similarly, the results of the study conducted by Meredith et.al in Australia (2019) showed that the use of agile methodology has doubled over the course of study period (2012-2018)[25]. Agile methodology is flexible, responsive, and consistent overcoming the drawbacks of traditional methodologies thereby, becoming popular in use.

Involvement of Business analyst in BABOK Knowledge Areas and Tasks

In this study, review of 14 advertisement from official sites showed that out of six knowledge area four knowledge areas namely elicitation and collaboration, requirement life cycle management, requirement analysis and design definition and solution evaluation are mentioned. Among these four-knowledge area elicitation and collaboration is found to be included in each advertisement being reviewed. Similar finding is observed in the

exploratory study conducted in Australia by Meredith. However, the study result showed that all most 15% of the reviewed advertisement over the study period, involved business analysis planning and monitoring while it is not identified in this study [25].

In term of BABOK task the present study identified conduction of elicitation and confirmation of elicitation result under elicitation and collaboration; maintain requirement, prioritize requirement and assessment requirement change under requirement life cycle management; specify and model requirement under requirement analysis; measure solution performance under solution evaluation to be mostly frequently implemented. Similar results are found in the study conducted by Meredith in Australia.

The study also determined conduction of elicitation and managing stakeholder under elicitation and collaboration to be most frequently implemented task. In terms of requirement life cycle management and solution evaluation task since these two BABOK knowledge area are referenced less than defined criteria for analysis, they are not further analyzed. While in case of requirement analysis and design definition similar finding is identified in the study [25].

Both study results identified that not all the BABOK parts are considered equally important by the organization that employs business analyst. The variation between two study results can be due to the difference in study duration and number of advertisements reviewed over the study period as well as difference in the pace of development.

Role of Business Analyst

In the present study, the review of the 14 advertisements showed that business analyst required to have some skills and competencies, which are not included in the current version of BABOK such as quality assurance of the software and support after release. Similarly, the study conducted by Meredith in Australia identified addition competencies and skills namely project management, implementation, technical skills, data management and testing are required by business analyst which are not included in the current version of BABOK [25].

Impact of implementation of Change Resistance Management in software development

In this present study, more than half (56.7%) of the respondents stated that have implemented change resistance management techniques during analysis. On further analysis, the study result showed that implementation of change resistance management technique is positive predictor for quality of change strategy, performance on analyzing potential value and solution recommendation respectively and it is statistically significant.

In other words, when change resistance management technique is implemented during business analysis, there would be satisfactory performance on quality of change strategy, satisfactory performance on analyzing potential value and recommendation. In term of occurrence of solution limitation, implementation of change resistance management is found to be negative predictor, indicating that when change resistance management technique is implemented, it reduces the occurrence of solution limitation, and it is found to be statistically significant.

In term of various approach to manage change resistance, about 75% of the respondents rated behavior approach efficiency to be excellent. However, a survey conducted among experts determined factors namely humanistic, psychodynamic and cognitive to be significant cause of resistance to change [9]. Although the results of two studies varied both indicates the need of the approaches addressing various factor that causes resistance to change.

Impact of different software testing for business analysis

In this present study, result showed that more than half (70%) of the respondents stated that they have implemented solution testing technique. The result determined that defined software testing technique has a weak positive correlation between occurrence of solution limitation and analyzing performance measure respectively.

The study results also showed that when solution-testing techniques are identified and planned there would be less occurrence of solution limitation and there would be satisfactory analysis of performance measure. In this study, most of the respondents (36.17%) are involved in acceptance and usability testing respectively. However, on further analysis the

study result showed that involvement of business analyst in black box testing is positive predictor to improve solution value and is statistically significant. Similarly, many studies result have determined the use of different software testing techniques namely, white box testing, black box testing, unit testing, acceptance testing and regression testing to improve software quality. The similarity in both the studies indicate the importance of software testing to improve quality of software [11], [12], [14].

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

Review of various advertisement regarding job description for business analyst showed that business analyst are assigned with roles and responsibilities that are not mentioned in the current version of BABOK.

Table 5.1 Proposed Extended BABOK V3 Guideline

#	Knowledge Area	Tasks	Extension Impact
1	Business Analysis Planning and Monitoring	Plan Business Analysis Approach	
		Plan Stakeholder Management	
		Plan Business Analysis Governance	
		Plan Business Analysis Management	
		Identify Business Analysis Performance Improvement	
2	Elicitation and Collaboration	Prepare for Elicitation	
		Conduct Elicitation	
		Confirm Elicitation Results	
		Communicate Business Analysis Information	
		Manage Stakeholder Collaboration	

3	Requirement Life Cycle Management	Trace Requirements	
		Maintain Requirements	
		Prioritize Requirements	
		Assess Requirements Changes	
		Approve Requirements	
4	Strategy Analysis	Analyze Current State	
		Define Future State	
		Asses Risks	
		Define Change Strategy	
		Change Resistance Management	Task Added
5	Requirement Analysis and Design Definition	Specify and Model Requirements	
		Verify Requirements	
		Validate Requirements	
		Define Requirements Architecture	
		Define Design Options	
		Analyze Potential Value and Recommendation	
6	Solution Evaluation	Measure Solution Performance	

		Analyze Performance Measure	
		Assess Solution Limitations	
		Assess Enterprise Limitations	
		Software Testing	Added Task
		Recommend Actions to Increase Solution Value	

Table 5.2 Proposed Techniques for Added Tasks of extended BABOK V3 Guideline

#	**Knowledge Area**	**Added Tasks**	**Proposed New Techniques**
1	Strategy Analysis	Change Management	• Behavioral Approach
2	Solution Evaluation	Software Testing	• Black Box Testing

Although the current version of BABOK has mention about change resistance management, it has not given the further details. The results of this study determined that when change resistance technique is implemented it would improve quality of change strategy, analyzing potential value and solution recommendation respectively. However, there is no statistically significant evidence that implementation of change resistance would improve enterprise assessment.

In terms of various approach to address change resistance, majority of the respondents (94.50%) rated behavioral approach to be most efficient. Similarly, the study results also determined that when solution techniques are identified and planned it has positive impact on reducing solution limitations and improving analyzing performance measure to improve the outcome of solution performance analysis. On further analysis, the study result determined black box testing as a positive predictor to improve solution value. Hence, additional tasks in terms of software testing and change resistance management is required in current BABOK.

In summary, the result of this study supports the update of current version of BABOK to improve the work done by business analyst and thereby improve software solution quality.

5.2. RECOMMENDATION

In regards to the conclusion of this study, extension of current version of BABOK is recommended along with following suggestion:

There is the need of additional task related to change resistance management and software testing to be included in current version of BABOK.

Further study considering other properties of business analysis and software engineering such as software development methodology, use in the organization, team size, and business analyst size in the team and BA experience/expertise need be conducted.

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APPENDIX 1: Survey Question

General Section		
Q.N.	Question	Options
1	Please select the methodology your organization uses most often for Business Analysis.	Agile Waterfall Feature Driven Scrum Extreme Programming Other
2	Please state the number of employees in your team.	1-100
3	Please select the standard/framework that your organization follows for software requirement management?	IIBA PMI ISO PMMI Other
4	Please state the number of members involved in business analysis in your team.	1-100
5	Please state what nature of the project your team mostly works on.	Simple Moderately Complex Highly Complex
6	Please state the size of the Project that your team mostly works on.	Very Small: Up to 1 Months Small: Up to 3 Months Medium: Up to Six Months Large: Up to 1 Year Very Large: More than 1 Year
7	Please state how much your customer are digitally literate and open to digital adoption.	1 Strongly Disagree 2 3 4 5 Strongly Agree
8	Please rate the riskiness of the major projects your team is carrying out.	1 Non-Existence 2 3 4 5 Critically Risky

BABOK Six Knowledge Areas Implementation		
1	Rate your team's Business Analysis Planning and Monitoring Involvement and efforts	
1.1	How much effort and involvement are made on planning Business Analysis Approach? **Describes the planning of business analysis work from creation or selection of a methodology to planning the individual activities, tasks, and deliverables.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
1.2	How much effort and involvement are made on planning Stakeholder Management **Describes understanding which stakeholders are relevant to the change, what business analysts need from them, what they need from business analysts, and the best way to collaborate.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
1.3	How much effort and involvement are made on planning Business Analysis Governance **Defines the components of business analysis that are used to support the governance function of the organization. It helps ensure that decisions are made properly and consistently, and follows a process that ensures decision makers have the information they need. Examples of this include requirements management, business analysis risk management, and allocation of business analysis resources**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
1.4	How much effort and involvement are made on planning Business Analysis Management	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently

	Defines how information developed by business analysts (including requirements and designs) is captured, stored, and integrated with other information for long-term use	5 – Always
1.5	How much effort and involvement are made on Identifying Business Analysis Performance Improvement **Describes managing and monitoring how business analysis work is performed to ensure that commitments are met and continuous learning and improvement opportunities are realized**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
2	Please rate your team's Elicitation and Collaboration Involvement and efforts	
2.1	How much effort and involvement are made on Preparing for Elicitation **The purpose of Prepare for Elicitation is to understand the scope of the elicitation activity, select appropriate techniques, and plan for (or procure) appropriate supporting materials and resources.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
2.2	How much effort and involvement are made on Conducting Elicitation? **The purpose of Conduct Elicitation is to draw out, explore, and identify information relevant to the change.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
2.3	How much effort and involvement are made on Confirming Elicitation Results **The purpose of Confirm Elicitation Results is to check the information gathered during an elicitation session for accuracy and consistency with other information.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently

		5 – Always
2.4	How much effort and involvement are made on Communicating Business Analysis Information **The purpose of Communicate Business Analysis Information is to ensure stakeholders have a shared understanding of business analysis information.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
2.5	How much effort and involvement are made on Managing Stakeholder Collaboration **The purpose of Manage Stakeholder Collaboration is to encourage stakeholders to work towards a common goal.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
3	Rate your teams Requirement Life Cycle Management Involvement and efforts	
3.1	How much effort and involvement are made on maintaining Trace Requirements **The purpose of Trace Requirements is to ensure that requirements and designs at different levels are aligned to one another, and to manage the effects of change to one level on related requirements.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
3.2	How much effort and involvement are made on Maintaining Requirements? **The purpose of Maintain Requirements is to retain requirement accuracy and consistency throughout and beyond the change during the entire requirements life cycle, and to support reuse of requirements in other solutions.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always

3.3	How much effort and involvement are made on prioritizing Requirements? **The purpose of Prioritize Requirements is to rank requirements in the order of relative importance.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
3.4	How much effort and involvement are made on Assessing Requirements Changes **The purpose of Assess Requirements Changes is to evaluate the implications of proposed changes to requirements and designs.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
3.5	How much effort and involvement are made on Approval of identified Requirements **The purpose of Approve Requirements is to obtain agreement on and approval of requirements and designs for business analysis work to continue and/or solution construction to proceed**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
4	Rate your team's Strategy Analysis Involvement and efforts	
4.1	How much effort and involvement are made on Analysing Current State **The purpose of Analyze Current State is to understand the reasons why an enterprise needs to change some aspect of how it operates and what would be directly or indirectly affected by the change**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
4.2	How much effort and involvement are made on Defining Future State	1 – Never 2 – Seldom

	The purpose of Define Future State is to determine the set of necessary conditions to meet the business need	3 – Sometimes 4 – Frequently 5 – Always
4.3	How much effort and involvement are made on Assessing Risks? **The purpose of Assess Risks is to understand the undesirable consequences of internal and external forces on the enterprise during a transition to, or once in, the future state. An understanding of the potential impact of those forces can be used to make a recommendation about a course of action.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
4.4	How much effort and involvement are made on Defining Change Strategy **The purpose of Define Change Strategy is to develop and assess alternative approaches to the change, and then select the recommended approach.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
5	Rate your team's Requirement Analysis and Design Definition Involvement and efforts	
5.1	How much effort and involvement are made on Specifying and Modelling Requirements **The purpose of Specify and Model Requirements is to analyze, synthesize, and refine elicitation results into requirements and designs.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
5.2	How much effort and involvement are made on Verifying Requirements?	1 – Never

	The purpose of Verify Requirements is to ensure that requirements and designs specifications and models meet quality standards and are usable for the purpose they serve.	2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
5.3	How much effort and involvement are made on Validating Requirements? **The purpose of Validate Requirements is to ensure that all requirements and designs align to the business requirements and support the delivery of needed value.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
5.4	How much effort and involvement are made on Defining Requirements Architecture **The purpose of Define Requirements Architecture is to ensure that the requirements collectively support one another to fully achieve the objectives.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
5.5	How much effort and involvement are made on Defining Design Options **The purpose of Define Design Options is to define the solution approach, identify opportunities to improve the business, allocate requirements across solution components, and represent design options that achieve the desired future state.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
5.6	How much effort and involvement are made on Analysing Potential Value and Recommendation	1 – Never 2 – Seldom 3 – Sometimes

	The purpose of Analyze Potential Value and Recommend Solution is to estimate the potential value for each design option and to establish which one is most appropriate to meet the enterprise's requirements	4 – Frequently 5 – Always
6	Rate your teams Solution Evaluation Involvement and efforts	
6.1	How much effort and involvement are made on Measuring Solution Performance **The purpose of Measure Solution Performance is to define performance measures and use the data collected to evaluate the effectiveness of a solution in relation to the value it brings.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
6.2	How much effort and involvement are made on Analysing Performance Measure **The purpose of Analyze Performance Measures is to provide insights into the performance of a solution in relation to the value it brings.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
6.3	How much effort and involvement are made on Assessing Solution Limitations **The purpose of Assess Solution Limitations is to determine the factors internal to the solution that restrict the full realization of value**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
6.4	How much effort and involvement are made on Assessing Enterprise Limitations **The purpose of Assess Enterprise Limitations is to determine how factors external to the solution are restricting value realization.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently

		5 – Always
6.5	How much effort and involvement are made on Recommending Actions to Increase Solution Value **The purpose of Recommend Actions to Increase Solution Value is to understand the factors that create differences between potential value and actual value, and to recommend a course of action to align them.**	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always

Business Analysis Performance Status		
1	Rate your team's performance on following criteria.	
1.1	Rate your team's performance on Quality of Change Strategy	1 – None 2 – Minor 3 – Good 4 – Very good 5 – Excellent
1.2	State the occurrence of the Enterprise limitation (Less is better)	1 – None 2 – Minor 3 – Good 4 – Very good 5 – Excellent
1.3	State the occurrence of the Solution Limitation (Less is better)	1 – None 2 – Minor 3 – Good

		4 – Very good 5 – Excellent
1.4	Rate your team's performance on Analysing Performance Measure	1 – None 2 – Minor 3 – Good 4 – Very good 5 – Excellent
1.5	Rate your team's performance on Analysing potential value and solution recommendation	1 – None 2 – Minor 3 – Good 4 – Very good 5 – Excellent

Extension Tasks on Existing BABOK standard to improve the business analysis outcome		
These criteria should affect quality of business analysis Performance Status		
1	Rate your team's performance on following criteria.	
1.1	Have you implemented change resistance management techniques during business analysis	Yes

		No
1.1	Have you Identified and planned solution testing techniques during Business Analysis.	Yes No
1.2	Have your business analyst team trained with change resistance techniques?	Yes/No
1.3	Rate the efficiency of adoption of behaviour approach taken to address resistance to change? **Performance management** **Reward policies** **Values translated into behaviors** **Management competencies** **Skills training** **Management style** **Performance coaching** **360-degree feedback**	1 – None 2 – Minor 3 – Good 4 – Very good 5 – Excellent
1.4	Rate the efficiency of adoption of cognitive approach taken to address resistance to change? **Management by objectives** **Business planning and performance frameworks** **Results based coaching** **Beliefs, attitudes and cultural interventions Visioning**	1 – None 2 – Minor 3 – Good 4 – Very good 5 – Excellent
1.5	Rate the efficiency of adoption of psychodynamic approach taken to address resistance to change? **Understanding change dynamics**	1 – None 2 – Minor

	Counselling people through change **Surfacing hidden issues** **Addressing emotions** **Treating employees and managers as adults**	3 – Good 4 – Very good 5 – Excellent
1.6	Rate the efficiency of adoption of humanistic approach taken to address resistance to change? **Living the values** **Developing the learning organization** **Addressing the hierarchy of needs** **Addressing emotions** **Fostering communication and consultation**	1 – None 2 – Minor 3 – Good 4 – Very good 5 – Excellent
2.1	Have your business analyst team trained with software testing techniques?	Yes/No
2.2	Rate business analyst's involvement in Non-Functional Testing?	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
2.3	Rate business analyst's involvement in acceptance Testing?	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
2.4	Rate business analyst's involvement in usability Testing?	1 – Never

		2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
2.5	Rate business analyst's involvement in black-box Testing?	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always
2.6	Rate Business Analyst's involvement in white-box testing?	1 – Never 2 – Seldom 3 – Sometimes 4 – Frequently 5 – Always

APPENDIX 2: Secondary Data Source

S. No	Company Name	Link
1	InfoDevelopers Pvt. Ltd	https://www.infodev.com.np/job/63
2	Deer Walk	https://jobstalent.com.np/job/business-analyst-2/
3	Leap Frog	https://www.jobsnepal.com/business-analyst-78812
4	NBIT	https://www.jobsnepal.com/business-analyst-117483
5	Wolf Matrix	https://globaljob.com.np/job/sr-business-analyst/7119
6	Fonepay	https://www.linkedin.com/jobs/view/business-analyst-at-fonepay-2509129494/?originalSubdomain=np
7	Cotiviti	https://www.cotiviti.com.np/jobs/business-analyst-0
8	Rollin Plan	https://www.merorojgari.com/?post_type=job_listing&p=11075
9	Delta Tech	https://hrnepal.com/business-analyst/job
10	Naxa	https://kathmandujobs.com/jobs/25612/business-analyst-intern-job-in-kathmandu
11	EB Pearls	https://kantipurjob.com/job/detail/associate-business-analyst
12	College Nepal	https://www.collegesnepal.com/jobs/system-analyst/
13	NCHL	https://merojob.com/system-analyst-6/
14	InfoDevelopers Pvt. Ltd	https://jobaxle.com/jobs/system-analyst/2833
15	IT Nepal	https://www.jobsnepal.com/junior-system-analyst-106348[27]