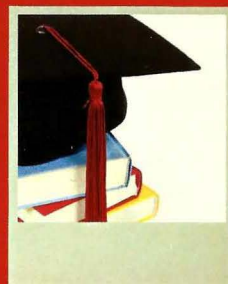




# **A HANDBOOK ON THESIS WRITING**

## **MBA PROGRAM**

GRADUATE SCHOOL OF BUSINESS  
ASSUMPTION UNIVERSITY



**A Publication of the Graduate School of Business**  
Assumption University, Bangkok, Thailand, 2008.

# A Handbook on Thesis Writing MBA Program Graduate School of Business Assumption University



*A Publication of the Graduate School of Business, Assumption University, Bangkok, Thailand, 2008.*

## PREFACE

The primary objective of the Thesis Handbook along with the accompanying appendixes containing guidelines for content, style, and process is to assist those presently enrolled or contemplating enrollment for a thesis in the Masters of Business Administration program at Assumption University. The thesis is intended to provide the student with an opportunity to synthesize and apply the knowledge gained from his or her related coursework while at the same time affording him or her to focus on a particular area of interest. It also affords the student a way to generate a level of expertise not otherwise possible by delving deep into an area of specific interest.

There is no chance that all of the thesis questions that you might have will be answered here, but a thorough reading of this handbook should provide you with some pointers in the right direction. Additionally, we hope this serves as a useful reference throughout the process. Please read it carefully and particularly note all the forms and other requirements you are supposed to complete. Finally, the guidelines are reviewed regularly and occasionally change, so please be sure that you have a current copy of the handbook.

Thesis Committee,\*  
MBA Program

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## TABLE OF CONTENTS

## Preface

## Chapter

## Page No.

<b>1</b>	<b>Basics of Technical Writing and Thesis Writing</b>	<b>1</b>
	Key Features of Technical Writing	1
	Three elements of technical writing	1
	Three general stages of technical writing	1
	Key Features of Thesis Writing	2
	Definition of a thesis	2
	Purpose of a thesis	2
	The Research Process	3
	Nature and limitation of a thesis	4
	Practical Guide in the Selection of a Thesis Topic	4
	Criteria in choosing a thesis title	4
	Three demands for a thesis	4
	Characteristics of a good thesis research problem	5
<b>2</b>	<b>Preliminaries or Front Matters</b>	<b>6</b>
	Thesis Title Page	6
	Committee Approval Sheet	6
	An Abstract	6
	Acknowledgments	7
	Table of Contents	7
	List of Tables	7
	List of Figures	7
<b>3</b>	<b>Generalities of the Study</b>	<b>8</b>
	Introduction of the Study	8
	Statement of the Problem	8
	Research Objectives	9
	Scope of the Research	9
	Limitations of the Research	9
	Significance of the Study	9
	Definition of Terms	9
<b>4</b>	<b>Review of Literature and Related Studies</b>	<b>10</b>
	Brief introduction of the chapter	10
	Definition and Features of the Independent Variable (s)	10
	Theories Related to the Independent Variable (s)	10
	Critical Analysis/Discussion of the Theories Related to the Independent Variable	11
	Discussion on the Dependent Variable	11
	Relationship of the Independent Variable to the Dependent Variable	11
	Previous Studies	11

<b>5 Research Frameworks</b>	<b>12</b>
Brief introduction of the chapter	12
Theoretical Framework	12
Conceptual Framework	12
Research Hypothesis	13
Operationalization of the Independent and Dependent Variables	14
Example of a section of the Operationalization Table	15
<b>6 Research Methodology</b>	<b>16</b>
Brief introduction of the chapter	16
Methods of Research Used	16
Respondents and Sampling Procedures	19
Research Instruments/Questionnaire	21
Collection of Data/Gathering Procedures	22
Statistical Treatment of Data	22
<b>7 Presentation of Data and Critical Discussion of Results</b>	<b>23</b>
Brief introduction of the chapter	23
The First Independent Variable	23
The Second Main Independent Variable	23
The First Main Dependent Variable	23
<b>8 Summary Findings, Conclusions and Recommendations</b>	<b>25</b>
Brief introduction of the chapter	25
Summary Findings	25
Discussions/Conclusions	25
Recommendations	25
Further Research	26
<b>9 References and Back Matters</b>	<b>27</b>
Appendixes	27
The use of References	27
Bibliography and references	27
<b>10 Choosing the Right Statistics</b>	<b>35</b>
Simulations	35
Research Situations and Solutions	51
Statistical Requirements	60
Level of Measurements	63
Characteristics of Choosing Correct Statistical Test	64
Definition of Terms in Statistics	65
Choosing the Correct Statistical Test for Nominal Data	67
Choosing the Correct Statistical Test for Ordinal Data	68
Choosing the Correct Statistical Test for Interval Data	69
Kinds of Conceptual Frameworks	70
<b>11 Appendixes</b>	<b>74</b>
Appendix A: Physical Specifications	75
Appendix B: Sample	78
Appendix C: Forms and Letters	83
Appendix D: Frequently asked Questions	98
<b>12 References</b>	<b>101</b>

## BASICS OF THESIS WRITING

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**Thesis Writing** is a requirement for graduating students particularly those who opted for Plan A (Thesis) instead of a comprehensive examination.

This book focuses on the mechanics on how to develop a thesis and is made simple for easy understanding of the processes. Many students are confronted with tasks that demand good writing skills. They need guidance on how to go about the complex job of writing a thesis or dissertation. This book will therefore serve as a guide.

**Thesis Writing is subsumed under Technical Writing.** All professional fields require technical documents that help readers perform tasks and understand specific tasks. As mentioned by some authors, thesis is classified under technical writing as it provides vital information to specific readers.

**Technical Writing** refers to the provision of specific information to clearly identified readers who will use the information for a specific purpose.

### KEY FEATURES OF TECHNICAL WRITING

#### **Three Elements of Technical Writing.**

The elements are reader, purpose and writing situation. The **reader** seeks information for a specific purpose. The **purpose** is to design a document that will serve the reader's need and help the reader understand the information. The **writing situation** consist of both reader and purpose, as well as such factors such as the sponsoring organization's size, budget, ethics, deadlines, policies, competition and priorities.

#### **Three General Stages of Technical Writing.**

The stages are planning, multiple drafting and revising/editing. In the **Planning** stage– a writer analyzes the reader, purpose and writing situation; gathers information and tentatively organizes the document. All these may recur several times during the writing.

**Multiple drafting** – a rough draft is the next step. It focuses on thoroughly developing the information you have gathered without worrying about grammar, punctuation, spelling and fine points of style. *At this stage, your main focus is on the content and organization.* Follow your initial plan of organization and write quickly. Your document may require many drafts from the beginning to the end.



**Revising and editing** – it takes place throughout the writing process but particularly after you have begun drafting. Read your draft and rethink the following elements:

- **content** - do you need more facts? are your facts relevant for the reader and purpose?,
- **organization** - have you grouped the information into topics? have you put the details in an order that readers will find easy to understand and use?
- **headings** - have you written descriptive headings that will guide your readers to specific information?,
- **opening** - does your opening establish the document's purpose and introduce the main topic?
- **closings** - does your closing provide a summary, offer recommendations or suggest actions?
- **graphic aids** - do you have enough visual aids to understand the data? are they appropriate?
- **language** - have you used appropriate language? too much technical jargon? have you defined terms your readers may not know?
- **reader usability** - can your readers understand and use the information effectively? does the document format help your reader find specific information?

After you are satisfied, then the final editing will focus on **the form and style**, such as, grammar, punctuation...and others **and finally proof reading**.

## **KEY FEATURES OF THESIS WRITING**

### **Definition of a Thesis**

A Thesis is an idea or theory that is expressed as a statement, a contention for which evidence is gathered and discussed logically (Anderson and Poole, 1998). It normally represents the culmination of a substantial piece of original work over a period of at least one year.

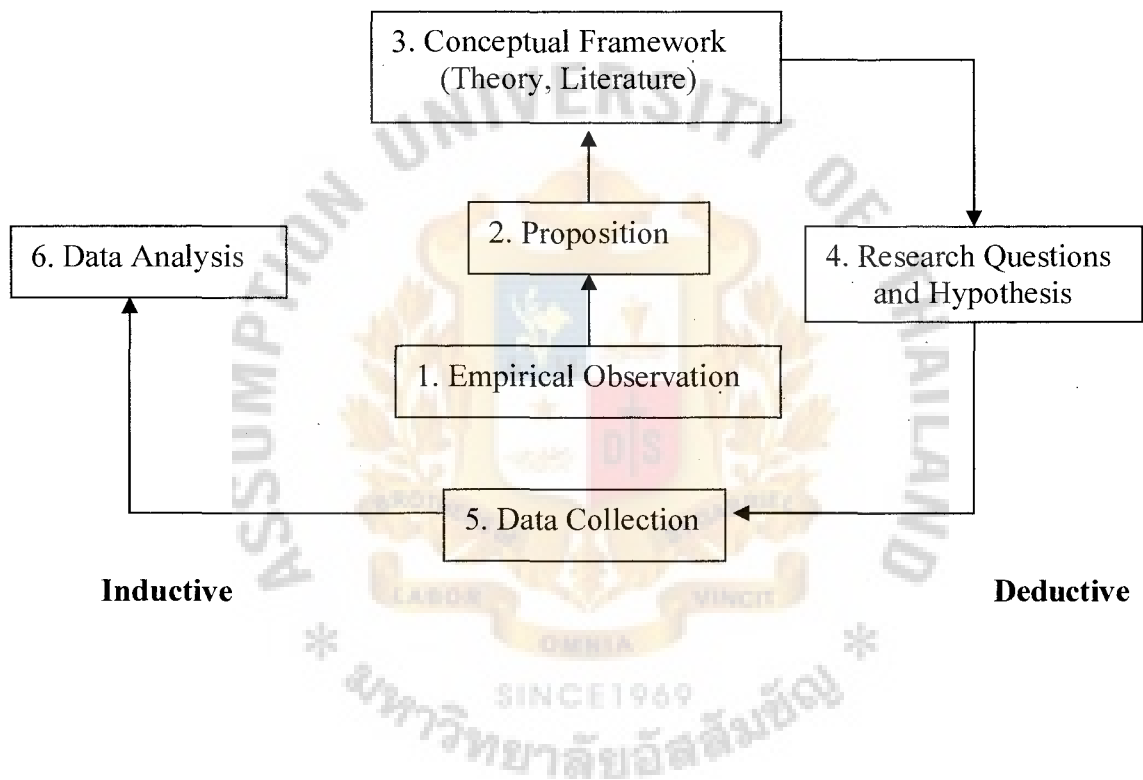
### **Purpose of a Thesis**

The Thesis is one option for fulfilling the final requirement for the Master of Business Administration degree at Assumption University. In general, a thesis involves formulating an original idea or area of inquiry which is either quantitative (e.g., typically involves either an empirically based, provable hypotheses) or is qualitative (e.g., includes explorative outcomes, along with data collection and analysis). It is expected that a thesis contributes one or more of the following for it to be deemed acceptable: a new perspective, a new application, uncover new implications or make fact-based predictions. The central part of the thesis proceeds to

methodically substantiate this researcher's position. A disciplined approach to conducting research is the basis for any acceptable thesis. The thesis must be the student's original work and should be based on factual data, which may be quantitatively or qualitatively derived and verifiable. To do an acceptable job of analysis, you will have to have laid a solid foundation based on methodical and exhaustive research.

Thesis writing is demanding and challenging work for students as it unfolds and is gratifying once it is finished. It is a tough test of intelligence and endurance.

### The Research Process.





## **The Research Wheel**

**The Research Process** involves the following steps:

1. Empirical Observation – the entry point is an infinite array of possible topics.
2. Proposition – the inductive logic serves to relate specific topic to a broader context and begins with hunches “wonder if”.
3. Conceptual Framework – it consists of statements that link abstract concepts to empirical data. A Theory allows us to move from observation to observation and make sense of similarities and differences.
4. Research Questions and Hypotheses – based on the conceptual framework, the questions and hypotheses can be formed.
5. Data Collection – refers to the gathering of information relevant to the subject under study.
6. Data Analysis – data collected are analyzed and the results/findings are interpreted as bases for further action and decision making.

## **Nature and Limitations of a Thesis**

Experts have reached no absolute agreement regarding details of form in thesis writing. In any particular situation, several forms may be acceptable. Some universities require students to follow special forms quite different from those elsewhere. An example: A department of sociology at a particular university might require students to use a particular referencing technique that would not be acceptable to the department of history at the same university. Regardless of a particular system adapted, the students may have the option to choose which ever is applicable in their study.

## **PRACTICAL GUIDE IN THE SELECTION OF A THESIS TOPIC**

### **Criteria in Choosing a Thesis Topic**

The following are some recommended criteria in the selection of a title: Using personal experience for topic discovery – reflect on your personal experiences for a topic that touches your life-style or career; talking with others to find a subject – talk with other people because collaborative learning can broaden your vision of the issues. Reading further on your subject to discover ideas – speculate about the subject and discover ideas by listing issues, asking questions, free writing and other techniques.

### **Three Demands for a Thesis**

It must examine a significant issue; It must address a reader and carry that reader to another plateau of knowledge; It must have a serious purpose, one that demands analysis of the issues, argues from a position, and explains complex details.

## Characteristics of a Good Thesis Research Problem

According to (Turabian, 1987), there are ten important characteristics of a good research problem for a thesis:

- **The problem can be stated clearly and concisely.** It is tested by writing it as a concise sentence or paragraph and sharing it with others.
- **The problem generates research questions.** It refers to the formulation of specific questions which represents the various aspects of the problem.
- **It is grounded in theory.** Good problems have theoretical and or/conceptual frameworks for their analysis. It relates to the specifics of what is being investigated to a more general background of theory which helps the results and links it to the field.
- **It relates to one or more academic disciplines.** It should be based on disciplines, such as, sociology, psychology or management science or have clear links to one or two disciplines.
- **It has a base in the research literature.** It often relates to a well-defined body of literature written by a selected group and published in journals to establish connections.
- **It has potential significance or importance.** The problem must have importance to the researcher and the others as well.
- **It is do-able within the time frame and budget.** Logistic factors are needed to carry out a thesis.
- **Sufficient data are available or can be obtained.** Data to address the problem should be accessible. There may be some restrictions on the environment and some other factors.
- **The researcher's methodological strengths can be applied to the problem.** Some problems are related to standard methodology. The researcher should have the inclination towards the methodology to be used
- **The problem is new; it is not already answered sufficiently.** Once the field is known, it becomes clear what has been done and what needs to be done.

## PRELIMINARIES OR FRONT MATTERS

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This chapter presents the chronological sections of a Thesis and its contents. It contains information on the title page, approval sheet, abstract, acknowledgments, table of contents, list of tables and list of figures.

### THE PRELIMINARIES OR FRONT MATTER OF A THESIS

The following sections make up the front matter of the thesis:

#### i. Thesis Title Page

It is usually the first page of the Thesis. It includes the following: **Title:** It should be a concise statement of the main topic and should identify the actual variables or theoretical issues under investigation and the relationship between them. It should be fully explanatory when standing alone. The recommended length for a title is from 10 to 12 words. It is centered at the top third of the page. Most universities and colleges have their own style of title page for theses, and this should follow exactly in matters of content, capitalization, centering and spacing. **Author's name and institutional affiliation:** The preferred author's name is first name, middle initial and last name because this reduces the likelihood of mistaken identity. Use the same form for publication throughout your career; that is, do not use initials on one manuscript and the full name on a later one. The affiliation identifies the location where the author conducted the investigation, which is usually an institution. It is centered at the middle of the page; name, title and university/school of the writer, centered at the bottom third of the page and date of the research/report, centered directly below the writer's name. The title page is not listed in the table of contents but it is counted as page i.

#### ii. Committee Approval Sheet

It is the page where the members of the Committee of the Oral Defense sign.

#### iii. An Abstract

It is a brief, comprehensive summary of the contents of the study. It allows readers to survey the contents of a study quickly. A well-prepared abstract can be the most important section of the study. It is a synopsis, of the most important points in a report and provides readers with a preview of the full contents. It can be specified in 200 words. It consists of a short statement of the problem, a brief description of the methods and procedures adopted and a condensed summary of the findings of the study.

#### **iv. Acknowledgments**

Citations accorded to the persons who in one way or another had helped in the realization of the study. This includes names of individuals or companies/agencies whom the researcher was indebted to, such as reading materials, facilities used or financial support to the researcher.

#### **v. Table of Contents**

It alerts the reader to pages that contain specific topics, the overall organization and content of the research and specific and supplemental materials, such as appendices. All front matter for a thesis paper is numbered in small Roman numerals. The first page of the thesis proper is numbered as page 1 in Arabic numbers, and all pages after will have Arabic numbers.

#### **vi. List of Tables**

The list of tables appears directly after the list of figures. List each table by number and title and indicate page numbers. In a list of tables, the table numbers (in Arabic, followed by a period) are placed in a column left under the heading "Table," and the page numbers are listed right under the heading "Page." The table titles should begin two spaces after the period following the table number and should agree exactly with the wording of the titles as they appear above the tables themselves. The titles are capitalized in either sentence or headline style, and run-over lines are indented three spaces. Double-space between items, single-space within.

#### **vii. List of Figures**

Any graphic aid, such as bar graph, map or flowchart that is not a table with numbers or words in columns is called a figure. The list of figures follows the table of contents. List each figure by both number and title and indicate page numbers. The figure numbers in the list are aligned by their periods under the word "Figure" and page numbers are listed right under the word "Page,". Captions are capitalized headline style.

## CHAPTER 1

### GENERALITIES OF THE STUDY

The following are the suggested format and contents of the Thesis as outlined below: A new form and style was introduced (such as center and side headings) to guide the readers how to go on into the formulation of the different chapters of the thesis.

#### 1.1 Introduction of the Study

In paragraph form, this section includes the following information: **1. Global Context** - this portion describes the situation associated in the global context of the study, in general, the world situation. How does your study link with the current problems of today? Does the research focus on groups, organization or an individual? **2. National Context** - state how the country or nation is currently experiencing the present problem and with which your study has some kind of relatedness **3. Local Context** - state how the study relates or is relevant to the area in focus. **4. Overview/history of the Organization** (subject of the study) - make brief statements for the company; it should also include in brief some information on the main topics of the study of which the organization is a focus.

#### 1.2 Statement of the Problem

The statement of the problem is the focal point of your research. It is just one sentence (with several paragraphs of elaboration).

You are looking for something wrong.

....or something that needs close attention

....or existing methods that no longer seem to be working.

Example of a problem statement:

"The frequency of job layoffs is creating fear, anxiety, and a loss of productivity in middle management workers."

While the problem statement itself is just one sentence, it is always accompanied by several paragraphs that elaborate on the problem. Present persuasive arguments why the problem is important enough to study. Include the opinions of others (politicians, futurists, other professionals). Explain how the problem relates to business, social or political trends by presenting data that demonstrates the scope and depth of the problem. Try to give dramatic and concrete illustrations of the problem. After writing this section, make sure you can easily identify the single sentence that is the problem statement.

### 1.3 Research Objectives

In paragraph form, this refers to the general objective of the study, It simply indicates the intent or purpose why the study is conducted. It must be stated in declarative sentences or in operational terms what the research seeks to achieve: what to find out? to determine ..., to identify ..., to assess ... **Follow the SMART Formula.** SMART means S-specific, M-measurable, A-attainable, R-realistic and T - time bounded.

### 1.4 Scope of the Research

In paragraph form, include the following information: **Topic in focus** – state the different main variables of the study. State what are the main independent and dependent variables; **Target respondents** - state who are your main respondents. Are they Managers? Employees? or Middle Managers? **The area in focus** – refers to the coverage of the study whether it is nationwide, regional or provincial or district-wide, where the subjects can be located.

### 1.5 Limitations of the Research

It implies limitations on the research design that you have deliberately imposed. It restricts the population to which the results of the study can be generalized. **Limitations refer to the restrictions over which you have no control.** The extent/or magnitude to which the study as to what topics or concerns. What can be done...or cannot be done.

### 1.6 Significance of the Study

This part should explain what is **the relevance or usefulness of the study.** Who would be benefited. What importance does it generates for certain individual, groups or organization. It would address the 3 W's (what, who and why) plus how?

### 1.7 Definition of Terms

This section would inform us about terms, which are either **in operational terms or literal meanings** to express clarity and correct understanding of some terms not familiar with the readers. It should contain a brief and concise definitions about two or three sentences. It should define all terms, which are presented in the conceptual framework. and other relevant terms included in the discussion of the text.



## CHAPTER 2

### REVIEW OF RELATED LITERATURE AND STUDIES

Chapter 2 is a review of the literature. It is important because it shows what previous researchers have discovered. It is usually quite long and primarily depends upon how much research has previously been done in the area you are planning to investigate. If you are planning to explore a relatively new area, the literature review should cite similar areas of study or studies that lead up to the current research. Never say that your area is so new that no research exists. It is one of the key elements that proposal readers look at when deciding whether or not to approve a proposal.

Words that describe similarities/differences are: supports, presents, confirmed, illustrates, shares, positive relationships, revealed, pointed, argued, concluded, negative relationships and contrasting results. It is necessary to show how the problem under investigation relates to previous research studies. It is important to locate the problem within a theoretical framework and in such cases, the theory needs to be reviewed as well. It would give the researcher a wider range of ideas as to the similarities in the studies which will contribute to the conceptualization of the research paradigm. This chapter should include the following information:

**Brief introduction of the chapter** – what would be the contents of this chapter? What topics are to be discussed in detail?

#### 2.1 Definition and Features of the Independent Variable

Suppose your Independent Variable is Leadership. First provide definitions of Leadership. Cite at least two to three definitions from authorized authors; discuss the role of Leadership. It includes other topics related to Leadership, such as, classification of leadership; the distinction between a leader and a manager and other related topics of the variable.

#### 2.2 Theories Related to the Independent Variable (s)

In this section, describe the major theories written on Leadership. For instance, Theory of Hershey and Blanchard (199-); Theory of Mintzberg (199-); Theory of Yukl (199-); Theory of Page (199-); Theory of McGregor (199-). Document the main points of the theory. The authors should be presented in sequence as to year, from the traditional to the contemporary. Also present graphs or figures explaining the theories. Present at least five or more theories per variable. If you have two or more

independent variables, the format for discussion must follow the same mode as cited above.

### 2.3 Critical Analysis/Discussion of the Theories Related to the Independent Variable

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**This is a useful exercise whereby you can compare the findings of several authors who have written on your Independent Variable.**

**Tabular presentation/analysis/comparison of theories/authors and their sub-Variables** – in one big table, indicate all the authors/theories side by side and analyze by looking for similarities and differences of each theory as to sub-variables.

**2.4 Discussion of the Dependent Variable:** As mentioned in 2.1, document the main points of the theory. The authors should be presented in sequence as to year, from the traditional to the contemporary. Also present graphs or figures explaining the theories. Present at least five or more theories per variable.

**2.5 Relationship of the Independent Variable (s) to the Dependent Variable:**(Related Studies coming from Journals, Magazines, Theses, Dissertations & Internet)

For instance: A Study on Leadership by (Adams, 1997) a study which relates leadership with Job Performance.

**Note: If there are two or more independent and dependent variables, the process would be the same sequence as above.**

**2.6 Previous Studies:** In the final section of Chapter 2, it is necessary that empirical work related to the topic under study is cited. In general, a previous study must briefly discuss the 4 standard sections:

- Introduction & background – introduces the research topic and question
- Methods – how the study was conducted
- Results – summary of the data that was collected
- Discussion – Discusses the implications and significance of the findings and relationship of results to a theory.

## 5

### CHAPTER 3

#### RESEARCH FRAMEWORKS

This chapter discusses the Research Frameworks. It included the theoretical framework, the conceptual framework, research hypotheses and operationalization of the variables. This chapter of the thesis will include the following:

**Brief introduction of the chapter** – in one paragraph, specify what will be the contents of this chapter.

##### 3.1 Theoretical Framework

The Theoretical Framework refers to the theories being used as a basis or reference for the study which are drawn from the literature. It contains the major ideas of authors or theorists, experts and specialists. It is a big map of ideas in global terms.

**A framework is a model, which allow the researcher to explore the relationship of variables in a logical and prescribed fashion. It clarifies questions and it summarizes the overall concept being investigated.**

It should include the following information: Link the theories and studies on which you pattern your conceptual framework; Show specific models from which most of the variables are taken; Write the main variable and its sub variables and summarize the authors together with the year, which you are employing in your framework.

##### 3.2 Conceptual Framework

It is the specific map of ideas of your topic or study. In this section, the researcher has to explain the research framework (model) together with the explanation of the variables. It is a framework which a researcher designs, and conceptualizes for the specific needs of the study. The development of a suitable framework is part of the process of planning, clarifying the research problem and conducting the analysis.

There are two different kinds of frameworks which are popularly used by researchers:

**One - dimensional framework:** The starting point for the research is often the formulation of a one-dimensional framework. Most common is the pre-test-post test

experiment. Something is measured before an educational intervention and again afterwards. Another example: Input-process-output model. It is popularly known as the Black box model.

**Two-dimensional framework:** permits analysis of the interrelationships between sets of related variables. It is formed by dividing the data sample into groups with same characteristics. It would suggest various types of inputs, which bear logical relationships to components of institutional development.

Present your conceptual framework showing the independent and dependent variables; Discuss in brief the main variables and sub-variables and the theory (ies) on which they are patterned.

### 3.3 Research Hypotheses

A **hypothesis** is a claim or statement either about a value of a single population characteristics or about the values of several characteristics.

A **test of hypothesis** is a method for deciding which of the two contradictory claims is the correct one. In carrying out a test, we initially assume that a particular one of the two is the correct one. This claim will be rejected in favor of the second (alternative) claim if sample evidence is incompatible with the initial assumption.

The **null hypothesis**, denoted by **Ho**, is the claim that is initially assumed to be true. The other hypothesis is referred as the **alternative hypothesis** and is denoted as **Ha**. In carrying out a test of Ho versus Ha, the hypothesis Ho will be rejected in favor of Ha only if sample evidence strongly suggests that Ho will not be rejected.

How are hypotheses stated? Hypotheses should synchronize with the question posed in the statement of the problem, particularly focusing on the relationship of variables.

The section on hypotheses should include the following information:

List all the statements/hypotheses which you wanted to prove in the study.

There are only two hypotheses that can be statistically tested – **the hypothesis of difference and the hypothesis of association**. Whenever the research is experimental, then the **hypothesis of difference** is the one that must be tested. This hypothesis states **that the populations from which the sample groups have been selected are in some way different from each other**. If however the research is post facto, then the hypothesis under scrutiny might be one of either difference or association.

**The hypothesis of association states that a correlation exists in the population from which the sample has been selected.** The correlation may exist between different measures taken on the same group of subjects (for example, a single group of subjects being measured on both height and weight) or between the same measure taken on different subjects (for example, obtaining IQ scores from pairs of identical twins). Testing the hypothesis of association requires different statistical tests than does testing the hypothesis of difference.

If the Hypothesis of Difference has been tested, are the samples independent or correlated? Whenever the hypothesis of difference is tested, whether in experimental or post facto research, it must be clearly determined whether the sample groups are independent or correlated. **If the selection of one sample is in no way influenced by the selection of another, then the samples are independent.** This occurs when each sample is randomly selected. **If on the other hand, the subjects to be measured are in any way paired off, either by using the same subject more than once or by equating subjects on the basis of some relevant variable then the groups are correlated.** Attempting to isolate differences between correlated sample measures requires different statistical tests than when analyzing differences between independent sample measures.

### **3.4 Operationalization of the Independent and Dependent Variables**

The construction of actual, concrete measurement techniques; the creation of “operations” that will result in the desired measurements. *The development or choice of specific research procedures (operations) that will result in representing the concepts of interest.*

An operational definition is a procedure for classifying, ordering, or quantifying something

- Classifying - crowded or not crowded
- Ordering - uncrowded, mildly crowded, severely crowded
- Quantifying - measure crowdedness in terms of the number of residents per square kilometre.

#### **Levels of measurement:**

- A zero point
- Distances between categories equal
- Categories can be rank-ordered

#### **Nominal measures**

**Reflects only categories**

**The variable gender has two attributes, male and female**

**They are distinct from one another, but they have no additional structures**

**Also political party affiliation, birthplace, etc.**

#### **Ordinal measures**

**Include the above**

**Plus we can logically rank-order the attributes**

**e.g. social class, prejudice**

### Interval measures

Include the above

Plus the intervals between the attributes have meaning

e.g scores on an intelligence test

●BUT:

We cannot say that a person with an IQ of 120 is TWICE as intelligent as one with an IQ of 60

And the 5 points difference between 110 and 115, and 95 and 100?

### Ratio measures

Include all of the above

Plus they have a true zero point

The following is an example of a section of the Operationalization Table:

Concept	Conceptual Definition	Operational Component	Level of Measurement
Information Sources	- External information sources	Q1: Read available information from printed media (such as brochures, pamphlets, point-of-sale display, others information given by service providers, third-party report, magazine, newspaper) Q2: Pay attention to advertising through TV and radio	Ordinal scale



## CHAPTER IV

### RESEARCH METHODOLOGY

**Brief introduction of the chapter** – what would be the different sections to be discussed in the chapter.

#### 4.1 Methods of Research Used

( Note: In the thesis proposal, use future tense and at the finalization stage use past tense). Select a research method and explain how you will employ it. Will you use Experimental or Post Facto? What will be the research design?

The following are **Research Methods** used by thesis and dissertation writers: (From among the methods, which would be applicable to your research?)

**Historical Research (DR)** – it is concerned with natural behavior in a real situation and the focus is on interpretation of what it means in the context. The historian attempts to discover data that already exists in some form. Problems arise from personal interest, which are kindled by exposure to a person, event or logical source of unused original data.

**Descriptive Research (DR)** – refers to as any approach that attempts to describe data. It is either quantitative or qualitative. The use of descriptive statistics is merely a convenient way of description. Data are reported in tables organized to give a suitable overall picture at a glance. They are presented in matrices or frameworks, which convey data characteristics for sub-groups or different cells in the framework. Summary statistics are used such as means, standard deviations and other measures of normalcy. It also includes tracer studies- the tracking down of people who were participants in prior educational experiences. (studying phenomena as attrition and brain-drain). It also covers sociometry. It assesses social structure in a group of individuals by ascertaining the status of each individual in the group. Sociograms are used to report findings of sociometry.

**Experimental and Quasi-Experimental Methods (EM).** It is assumed that the experimental method is the only method of research that can truly test for cause and effect relationships. The researcher manipulates at least one variable, controls some variables and observes the effects. The experimental variable that is manipulated is called Treatment and is presumed to be one making the difference.

Example:

R	O	X	O
R	O		O

The top line experimental group, which receives a treatment, is X. Subjects are randomly assigned to this experimental group or to control group at the bottom line (randomization denoted by R); O indicates observations generally referred to as pre-tests and post-tests. Comparisons between the test scores of the groups theoretically indicates the effect of the treatment. The fundamental principle of experimental design is that the participants be randomly assigned to experimental and control groups.

Quasi-experimental methods are those where there is also an artificially manipulated treatment, but where randomization is not possible. It is often called as the "Non-equivalent control group design".

Example:

O	X	O
O		O

The participants have been randomly assigned to receive the treatment or not. If we looked at the changes between pre-test and post test scores, we can make comparisons of experimental and control group.

Example:

Children who attended French Immersion – it means IQ for similar groups – higher educational aspirations may be strictly the result of their home environment and have less to do with the nature of their educational experience. Experience are formulated by 10 test hypotheses derived from theory and prior research. It is a useful tool for establishing generalizations. .

**Correlational Research.** It involves the calculation of a correlation coefficient, which is a measure of the extent to which variables vary.

Correlation Coefficients generally range -1.00 to +1.00

-1.00	Perfect negative correlation
- .95	Strong negative correlation
- .50	Moderate negative correlation
- .10	Weak negative correlation
<b>.00</b>	<b>No correlation</b>
+ .10	Weak positive correlation
+ .50	Moderate positive correlation
+ .95	Strong positive correlation
+1.00	Perfect positive correlation

Correlational Research is one way of describing in quantitative terms, the degree to which variables are related. It investigates a number of variables, such as independent variables or predictor variables or criterion variables. Multiple Correlation combines two or more independent variables to enhance the relationship with a dependent

variable. The correlation coefficient thus described denotes a linear relationship between variables.

There are two major approaches to addressing research questions using correlational methods: "Looking and Looking for."

Example: Battery of Tests

**Looking Approach** – generates correlation coefficients among all variables and then examines them to see which ones are related. It is a sort of astrological approach to research in which natural and unnatural happenings add credence to a theory of generalities.

**Looking for Approach** – is more rigorous as it involves making a prediction of significant correlations based on theory of prior research. This is akin to the hypothesis testing approach. If the theory is correct, then variable A should be related to variable B. Multiple Correlation is the technique used for combining independent variables and relating them to a dependent variable.

**Ethnographic Research (ER).** It is a research technique of direct observation of human activity and interaction in an on-going and naturalistic setting. It aims to discover and describe the culture in an educational setting. This approach emphasizes inductive analysis, description and perception in the natural setting rather than the concerns with measurement and manipulation characterized by the experimental method.

Participant observation is one of the distinctive characteristics. It is inherently descriptive. It takes the forms of words or pictures rather than numbers. Observers are concerned with the process. They tend to go looking for something. There are two basic approaches: first – open research design – little is known about the subject under consideration. It is used to develop conclusions and hypotheses and to create an overall picture of the situation. Second – focused research – used to study areas in which a great deal is already known and there exists an already identified problem, question and testable hypotheses.

**Case Study (CS).** It investigates a contemporary phenomenon, in real life contexts when boundaries between phenomenon and context are not clearly evident and in which multiple sources are used.

Some people have confused historical research with case study. Historical deals with the past and case study with contemporary events and also with Evaluation. Evaluation finds out what happened and its relationship with what was planned. Case study is concerned with how things happen and why, It does not control by using events. CS attempts to understand what is happening and link the contextual realities to the difference between what was planned and what actually occurred.

**Program Evaluation.** Evaluation is one way of assessing whether or not what we are doing is achieving what is intended to achieve. Program evaluation is to improve a new program or activity. Formative evaluation – its results are intended to feed back and improve on-going practice while summative evaluation is directed at evaluating the consequences of a program and is often seen as the principal mechanism for

making crucial resource allocation decisions about a program, including its continuation or termination.

**Policy Research.** It explores social issues and problems within real life context, attempting to account for the political and practical dimensions of a problem as well as exploration of the technical dimensions of possible solutions. It often assumes a "what if stance" Ex: What if we jailed all drinking drivers? It extends technical analyses to existing contexts, which the researcher must understand sufficiently to be able to forecast the effects of possible strategies and decision alternatives. It is firmly grounded in the policy-making arena and is best tackled by those familiar with that arena.

It is defined as the process of conducting research on or analysis of a fundamental social problem in order to provide policy makers with pragmatic, action-oriented recommendations for alleviating the problem. It explores a course of action not yet put into practice. It is conducted by think tanks or institutes set up to consider social issues. Example: Social/Behavioral Researchers use Descriptive Methods or Experimental Research and other methodologies which are applicable to the nature of the study.

## **4.2 Respondents and Sampling Procedures**

### **Respondents of the Study**

The following are the information to be included:

- Who are your primary respondents? How many levels of respondents do you intend to use (2 or 3)?
- Who constitutes the respondents, how many per level of respondents?
- What is your target population or sampling frame?
- How many employees in the company? How many top level manager? middle managers? Staff/rank & file?
- Out of your population or sampling frame, how many are your sample respondents?
- Is it total enumeration? Is it 75 %? Is it 30%?

Present the process on the determination of sample size. You can compute by using a formula or use Anderson's (1996) Table of Sample Size (see next page)

Table \_\_ Theoretical Sample Sizes for Different Sizes of Population and a 95 percent level of certainty

Population (Sampling Frame)	Required Sample for Tolerable Error			
	5%	4%	3%	2%
100	79	85	91	96
500	217	272	340	413
1,000	277	375	516	705
5,000	356	535	897	1,622
50,000	381	593	1,044	2,290
100,000	382	596	1,055	2,344
1,000,000	384	599	1,065	2,344
25,000,000	384	600	1,067	2,400

Anderson, G. *Fundamentals of Educational Research*, 1996 p.202.

### Sampling Procedures

As to Sampling Procedures, what would be the ideal number of respondents in order to get reliable responses for the study? What sampling strategies to apply? Simple random sampling, systematic, stratified and cluster sampling?

Here are some **Random Sampling Methods**:

**Simple Random Sampling** – each person has an equal chance of being selected for participation and where each combination of participants is equally similar.

**Systematic Random Sampling** – its employs intervals between prospective respondents, such as taking every nth person on a list.

**Stratified Sampling** – sub-dividing into groups and selecting a given number in each of the groups.

**Cluster Sampling** – dividing the target population into groups and then choosing the groups from which to collect your data.

Here are some **Non Random Sampling Methods**:

**Accidental Sampling** – it is based exclusively on what is convenient for the researcher. He/she includes the most convenient cases in his sample and excludes the inconvenient cases from his/her sample.

**Quota Sampling** – diverse characteristics, such as age, sex, social class or ethnicity are sampled in the proportions which they occupy in the population.

**Judgment or Purposive Sampling** – the basic idea involved in this type is that logic, common sense or sound judgment can be used to select a sample that is representative of a larger population

### 4.3 Research Instruments/Questionnaire

This section discusses the structured instrument/questionnaire which contain the questions to be asked of the respondents. All information with respect to what is asked feed back to the statement of the problem. It consists of sections which will cover all the variables used in the conceptual framework

#### Steps for Constructing Effective Questionnaires

**Determine your research questions:** what do you intend to find out; how will the information be helpful; which issues will relate to the questionnaire.

**Specify your sub-questions:** list all the issues you want to find; indicate those sub - questions to be included in the questionnaire and refine your list.

**Draft the items:** translate questions into items; formulate fill-in the blanks, multiple choice, comments, lists, Likert and rank-order questions.

**Sequence the items:** group into topic sections; group question type and rewrite as necessary.

**Design the questionnaire:** order and number questions; layout booklet formats and arrange questions on pages.

**Pilot test the questionnaire:** The questionnaire should be administered to a group of at least 20 –30 respondents to identify any problems they have with completing the questionnaire.

Measures of internal consistency estimate how consistently individuals respond to the items within a scale. The internal consistency of the measurement scales within the questionnaire should be assessed **using** SPSS to calculate **Cronbach's** Alphas for each dimension and scale within the instrument. **Cronbach's** Alpha is the most commonly used estimate of internal consistency of items in a scale. The Alpha measures the extent to which item responses obtained at the same time correlate highly with each other. Alpha is a measure of level of mean intercorrelation weighted by variances, or a measure of mean intercorrelation for standardized data.

The widely accepted social science cut-off is that alpha should be .60 or higher for a set of items to be considered a scale, but some use .75 or .80. An alpha is calculated for the whole scale and for each item within the scale. An alpha is also given which indicates what the overall scale alpha would be if a particular item is removed. If the Alpha will be higher when an item is deleted, the researcher infers that that item is not



tapping the same construct as all of the other items and therefore it should be removed from the scale.

#### **4.4 Collection of Data/Gathering Procedures**

This section discusses the methods that are used either to collect primary data (through personal interview with the aid of a questionnaire or secondary data from books, journals, articles, etc.) Is it through personal interview?, group or panel discussion?, mailed questionnaire? or through the email/Internet?

The following information should be included? How did you collect your primary data? How did you collect your secondary data? What is the action plan to collect your data from the beginning to the end of the study. How will you retrieve your data? Who will edit? encode? analyze up to its finalization?

#### **4.5 Statistical Treatment of Data**

This portion will present what statistics to be used? descriptive or inferential statistics? Example ANOVA, Multiple Regression and others.

Using statistical computers for statistical analysis, such as Statistical Package for Social Sciences (SPSS), Minitab and Statgraphics are generally used to treat the data that has been obtained. Another tools or programs from personal computers are Stata, GBStat, SysStat, Stat Pac Gold and others.

The above mentioned statistical tools are often used by colleges, universities, government institutions and business organizations. However, the statistical treatment will depend on the nature of the research study. If in doubt about what statistics to use, please consult a Statistician.

The following information should be included: What are the statistical tools to use to answer each of the questions on the statement of the problem and hypotheses? What are the tables to be constructed/presented for the results? Will you use SPSS and other computer software?

## CHAPTER V

### PRESENTATION OF DATA AND CRITICAL DISCUSSION OF RESULTS

The chapter should start with a brief introduction as to its contents. The data should be presented as outlined in the conceptual framework.

#### 5.1 The First Main Independent Variable

Present all data relevant to the First Main Independent Variable. It should also be synchronized with the questions asked in the statement of the problem and hypothesis.

#### 5.2 The Second Main Independent Variable

The same process as in 5.1 .

#### 5.3 The First Main Dependent Variable

The same process as above.

#### Presentation, Analysis and Interpretation of Data

Because of the diversity of research topics within disciplines, it is not possible to specify exact directions for this section of the thesis. Here are some general principles: organize the presentation of the argument or findings in a logical and orderly way, developing the aims stated or implied in the introduction; substantiate arguments or findings; be accurate in documentation.

All data, which pertains to the study, should be presented chronologically and analyzed with correct interpretation.

The results could be presented in tabular form, graphical presentations such as pie charts, bar graphs, histograms and other visual aids for easier understanding.

**Figures and Tables:** Unless a set of findings can be stated in one or two numbers, results that are sufficiently important to be stressed should be accompanied by a figure or table summarizing the relevant data. The basic rule of presentation is that a reader be able to grasp your major findings either by reading the text or by looking at the figures and tables. Thus, figures and tables must be titled and labeled clearly and completely, even if that means constructing a very lengthy title or heading. In the text, the explanation or interpretation should come first before the table or figure. In the interpretations: On relationships: state whether it is significant or not significant. In the hypothesis testing: state the Statistical Rule or Rejection Rule. There are two approaches used in interpreting the statistics: The use of the **p-values** or the **test**

**statistic and its critical values.** Choose one or both. If both, it should be explained in separate paragraphs, tables or figures. Do not mix data or values in one big or lengthy table.



## CHAPTER VI

### SUMMARY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

**Brief introduction to the chapter** – what details are contained in the chapter.

#### 6.1 Summary of the Findings

This section shows the summary of findings in brief statements based on the problems and hypotheses. There must be a specific answer to each of the questions and hypotheses posed in the earlier chapters of the study.

#### 6.2 Discussion/Conclusions

The discussion section can either be combined with the conclusions, or appear separately. In either case, it forms a cohesive narrative with the introduction, and you should expect to move materials back and forth between these two sections as you rewrite and reshape your thesis. Topics that are central to your thesis will appear in the introduction and probably again in the discussion.

Begin the discussion by telling the reader what you have learned from the study. Open with a clear statement on the support or nonsupport of the hypotheses or the answers to the questions you first raised in the introduction. But do not simply reformulate and repeat points already summarized in the results section. Each new statement should contribute something new to the reader's understanding of the problem. What inferences can be drawn from the findings? What are the theoretical, practical, or even the political implications of the results?

It is also appropriate at this point to compare your results with those reported by other investigators and to discuss possible shortcomings of your study, conditions that might limit the extent of legitimate generalization or otherwise qualify your inferences. Remind readers of the characteristics of your participant sample, the possibility that it might differ from other populations to which you might want to generalize; of specific characteristics of your methods that might have influenced the outcome; or of any other factors that might have operated to produce atypical results. thesis.

#### 6.3 Recommendations

This section offers vivid and specific solutions based from the results of the study. The recommendations should be action words or interventions which would partially or wholly eliminate the problem areas found in the results. Major findings should be stated using bullets followed by a brief explanation of the interventions

## 6.4 Further Research

Research often indicates the need for more research. The results may point to a new topic or hypothesis. The conclusions may provide some insight that dictate further study. The current project may suggest other possible topics or avenues of investigation. Others may want to continue working on some phase of the project. Include a few statements indicating what further research could be done on the topic. (This may be a variation on the original theory, variables used, sample size, or statistical model that has been refined and modified to obtain a more accurate reflection of reality).



## REFERENCES AND BACK MATTERS

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### 7.1 Appendixes

Appendixes are final elements in formal reports. They contain supplemental information, information that is too detailed and technical to fit well into the body of the report, or information that some readers need and others do not. It includes documents, interviews, statistical results, case histories, list of pertinent items, specifications, or lists of legal references.

Here are some guidelines: Label Appendixes with letters, such as "Appendix A" and "Appendix B" if you have more than one; Provide a title for each appendix, such as "Appendix A. Questionnaire Sample."; Indicate in the body of the report that an appendix provides supplemental information on a particular topic, such as, "See Appendix C for cost figures."

### 7.2 The Use of References

References are records of the sources of information in the report and follow the final section of the report body. It is popularly known as **Documenting sources**. This refers to the practice of citing original sources of information used in formal reports, journal articles, books, or any document that includes evidence from published works.

Cite information sources for the following reasons: readers can locate the original sources and read them if they want; you are not personally responsible for every fact in the document; you will avoid charges of **plagiarism**. Plagiarism is the unacknowledged use of information discovered and reported by others or the use of their exact words, copied verbatim.

If your research relies on other sources, remember to document information such as using a direct quotation or paraphrasing information from another source.

The documentation system frequently used are: The **American Psychological Association (APA) System and the Number -Reference System (NR)**. Although all document systems are designed to help readers find original sources, the systems do vary slightly. The APA System includes author and the date of publication while in the NR System - references are written as shown above, but the reference list is numbered: list the items alphabetically by last name of author and list the items in the order they cited in the text.

### 7.3 Bibliography and References

- (1) For those in the social sciences and versions similar to it, such as, the biological sciences, business, and the earth sciences, the style followed is The Publication Manual of the American Psychological Association (APA).



(2) Since the Master of Business Administration is a social science, the APA Style is recommended.

**APA System:** Citation in the Text. An example:

Television's portrayal of women has been called "the best of recent years" (Steenland, 1986, p.17). Since reader-response theory (Allen, 1987) suggests that viewers interpret images individually, research is now focusing on testing viewer perceptions. Atwood, Zahn, and Webber (1986) used random telephone dialing to test viewer response to women in television and found no difference between male and female viewers. A British study (Gunther & Wober, 1982) found that heavy viewers of crime action shows had lowered perceptions of women as traditionally feminine. Durkin (1983) provides a comprehensive survey of all relevant studies of audience perception involving children. A recent study (Howard et al., 1992) reported significant differences in the ratings of female television characters based on the gender of the viewer. Howard et al., also provided comparisons within and among groups of male and female viewers.

**The Number-Reference (NR) System.:** Citation in the Text. An example:

Television's portrayal of women has been called "the best of recent years" (1:17). Since reader-response theory (2) suggests that viewers interpret images individually, research is now focusing on testing viewer perceptions. Reference (3) used random telephone dialing to test viewer response to women on television and found no differences between male and female viewers. A British study (4) found that heavy viewers of crime action shows had lowered perceptions in women as traditionally feminine. A comprehensive survey (5) of all relevant studies of audience perceptions involving children was completed in 1985. A recent study (6) reported significant differences in the ratings of female television characters based on the gender of the viewer. The same study also provided comparisons within and among groups of male and female viewers.

For readers, the APA system is easier to use because it provides dates for information and the names of authors that readers may recognize as experts on the subject. The NR system requires readers to flip back and forth to the reference list to find dates and authors.

### **7.3.1 Writing in the Proper Tense for an APA Styled Paper**

1. Verb tense is an indicator that distinguishes papers in the humanities from those in the natural sciences. APA style requires the use of the past tense or present perfect tense ("Marshall stipulated" or the "work of Elmford and Mills has demonstrated"). APA style requires the present tense when you discuss the results (e.g., "the results confirm: or the study indicates") and when you mention established knowledge (eg., "the therapy offers some hope" or "salt contributes to hypertension").

2. APA style requires that you use present tense for generalizations and references to stable conditions, but it requires the past tense for sources cited: the sources **have tested** (present perfect) a hypothesis or the sources **reported** (past tense) the results of the test.

### 7.3.2 Using In-Text Citations in APA Style

1. APA style uses these conventions for in-text citations.
  1. Cites last names only.
  2. Cites the year, within parentheses, immediately after the name of the author.
  3. Cite page numbers only with a direct quotation, not with a paraphrase.
  4. Uses "p". or "pp." before page numbers.
  5. Uses double spacing side headings and permits triple-spacing before and after illustrations and tables

2. APA Style requires an in-text citation to the last name of the author and the year of publication

The study of Conniff (1990) showed that one federal agency, the Bureau of Land Management, failed to protect the natural treasures of public land holdings, and Struble (1991) offered evidence that BLM serves the needs of ranchers, not the public.

3. If you do not use the author's name in your text, place the name within the parenthetical citation:

It has been shown that the Bureau of Land Management often sacrifices wildlife and the environment to benefit miners and ranchers (Conniff, 1990; Struble, 1991).

4. Provide a page number only when you quote the exact words of a source, and do not use "p." or "pp." with page numbers:

Conniff (1990, p. 33) explained that the bureau must "figure out how to keep the land healthy while also accommodating cowpokes, strip miners, dirt bikes, birdwatchers and tree huggers, all local, all willing to sue for their conflicting rights."

5. Put the year immediately after the name of the authority; the page number may appear at the end of the quotation:

Jones (1984) found that "these data of psychological development suggest that related adolescents are atypical in maturational growth" (p. 215).

6. Write a quotation of 40 words or more as a separate block, indented an additional five spaces. Because it is set off from the text in a distinct block, do not enclose it with quotation marks:

Albert (1983) reported the following:

Whenever these pathogenic organisms attack the human body and begin to multiply, the infection is set in motion. The host responds to this parasitic invasion with efforts to cleanse itself of the invading agents. When rejection efforts of the host become visible (fever, sneezing, congestion), the disease status exists. (pp. 314-315)

7. When one work has more authors, use "&" in citations only, not in the text:

"It has been reported (Werner & Throckmorton, 1990) that toxic levels exceeded the maximum allowed levels each year since 1983."

Werner and Throckmorton (1990) offered statistics on their analysis of water samples from six rivers and announced without reservation that "the writers are unfit for human consumption, pose dangers to swimmers, and produce contaminated fish that may cause salmonella" (pp. 457-458).

8. For three to six authors, name them all in the first entry, "(Torgerson, Andrews, Smith, Lawrence, & Dunlap, 1989)," but thereafter use "(Torgerson et al., 1989)." For seven or more authors, imply "(Fredericks et al., 1989)" in the first and all subsequent instances.
9. Use small letters (a, b, c) to identify two or more works published in the same year by the same author; for example "Thompson (1986a)" and "Thompson (1986b)." Then use "1986a" and "1986b" in your list of references.

"Horton (1986; Thomas, 1982, p. 89) suggested an intercorrelation of these testing devices. But after multiple-group analysis, Welston (1989, esp. p: 211) reached an opposite conclusion."

10. If you make an in-text citation to an article or chapter of a textbook, casebook, or anthology, use the in-text citation to refer only to the person(s) you cite:

"One writer stressed that two out of every three new jobs in the 1990s will go to women (Bailey, 1988)."

11. The list of references will clarify the nature of this reference to Bailey (see "Textbook, Casebook, Anthology," 286). Corporate authors may be abbreviated after a first, full reference:

"One source has questioned the results of the use of aspirin for arthritis treatment in children (American Medical Association (AMA), 1991).

12. Thereafter, refer to the corporate author by initials: (AMA, 1991).
13. When a work has no author listed, cite the title as part of the in-text citation (or use the first few words of the material):

"The cost per individual student has continued to rise rapidly ("Money Concerns," 1991, p. 2)."

## 7.4 Preparing the List of References

Use the title "References" for your bibliography page. Alphabetize the entries and double-space throughout. Every reference used in your text should appear in your alphabetical list of references at the end of the paper. Type the first line of each entry flush left, and indent succeeding lines three (3) spaces. Use two spaces after each period in a reference (except between initials of names).

### Books

#### Book (Basic Format)

Carter, J. (1988). An outdoor journal: Adventures and Reflections. New York: Bantam.

1. List the authors (surname first with initials for given names), year of publication within parentheses, title of the book underlined and with only the first word of the title and any subtitle capitalized (but do not capitalize proper nouns), place of publication, and publisher. In the publisher's name, omit the word Publishing Company, (If Inc. but otherwise a full name: Harcourt Brace Jovanovich; Florida State University Press; Harper Collins).
2. List chronologically two or more works by the same author; for example, Fitzgerald's 1989 publication would precede his 1991 publication:

Fitzgerald, R.F. (1989). Controlling oil spills.

Fitzgerald, R. F. (1991). Alaska and its oil reserves.

3. References with the same author in the same year are alphabetized and marked with lowercase letters (a, b, c) immediately after the date:

Fitzgerald, R. F. (1990a). Water purification systems.

Fitzgerald, R. F. (1990b). Water waste today.

4. Entries of a single author precede multiple-author entries beginning with the same surname without regard for the dates:

Fitzgerald, R. F. (1990). Water purification systems.

Fitzgerald, R. F., & Smithson, C.A. (1988). Water maps.

5. References with the same first author and different second or third authors should be alphabetized by the surname of the second author:

Fitzgerald, R. F., & Smithson, C.A. (1988). Water maps.

Fitzgerald, R. F., W.R. (1989). Alaska pipelines.

## Part of a Book

Hartley, J. T., Harker, J. O., & Walsh, D.A. (1980) Contemporary issues and new directions in adult development of learning and memory. In L. W. room (Ed.), Aging in the 1980s: Psychological issues (pp. 239-252). Washington, DC: American Psychological Association.

6. List author(s), date, chapter or section title, editor (with name in normal order) preceded by "In" and followed by "(Ed.)" or "(Eds.," the name of the book (underlined, page numbers to the specific section of the book cited (placed within parentheses), place of publication, and publisher).

## Textbook, Casebook, Anthology

Make a primary reference to the anthology;

Vesternman, W.(1991). Readings for the 21<sup>st</sup> century. Boston: Allyn & Bacon. 5<sup>th</sup> edition.

7. Thereafter, make cross-references to the primary source, in this case to reference pages in alphabetical order so that cross-references may appear before or after the primary source. The year cited should be the date when the cited work was published, not when the Vesternman book was published; such as information is usually found in a headnote, footnote, or list of credits at the front or back of the anthology.

Bailey J. (1988). Jobs for women in the nineties. In Vesternman, pp. 55-63.

Fallows, D. (1982). Why mothers should stay home. In Vesternman, pp.69-70

Steinem, g. (1972). Sisterhood. In Vesternman, pp. 48-53.

Vesternman, W. (Ed.) (1991). Readings for the 21<sup>st</sup> century. Boston: Allyn & Bacon

8. The alternative to the style shown above is to provide a complete entry for everyone of the authors cited from the casebook (in which case you do not need a separate entry to Vesternman):

Bailey, J. (1988). Jobs for women in the nineties. In W. Vesternman (Ed.) (1991), Readings for the 21<sup>st</sup> century (pp.55-63). Boston: Allyn & Bacon.

Steinem. G. (1972). Sisterhood. In W. Vesternman (Ed.), (1991) Readings for the 21<sup>st</sup> century (pp. 48-53).

## Book with Corporate Author, Third Edition

American Psychiatric Association. (1980). Diagnostic statistical manual of mental disorders (3<sup>rd</sup> ed.). Washington, D.C.: Author.

## Encyclopedia

Woodley, D. J. (1990). Acne. World book encyclopedia.

9. List author, year, title of the article, title of the encyclopedia (underlined), place, and publisher. If no author is listed, begin with the title of the article.

Brazil. (1970). Harper encyclopedia of the modern world.  
New York: Harper.

### **Periodicals/Journals**

Mielke, K. W. (1988). Television in the social studies classroom. Social Education, 52, 362-365.

10. List author, year, title of the article without quotation marks and with only the first word capitalized, name of the journal underlined and with all major words capitalized, volume number underlined, inclusive page numbers not preceded by "p." or "pp."

### **Magazines**

Conniff: R. (1990, September). Once the secret domain of miners and ranchers, the BLM is going public. Smithsonian, pp. 30-47.

11. List author, data of publication (year, month with abbreviation, and the specific day for weekly and fortnightly magazines), title of the article without quotation marks and with only the first word capitalized, name of the magazine underlined with all major words capitalized, and inclusive page numbers preceded by "p." or "pp."

### **Newspaper**

Raymond, C. (1990, September 12). Global migration will have widespread impact on society, scholars say. The Chronicle of Higher Education, pp. A1, A6.

12. List author, date (year, month and day), title of article with only the first word and proper nouns capitalized, complete name of newspaper in capitals and underlined, and the section with all discontinuous page numbers.

**Abstract (Citing from an Abstract Only).** An abstract of a published article is cited as follows:

Misumi, J., & Fujita, M (1992). Effects of PM organizational development in supermarket organization. Japanese Journal of Experimental Social Psychology, 21, 93-111. (From Psychological Abstracts, 1982, 62, Abstract No. 11474)

13. An abstract of an unpublished work is cited as follows:



Havens, N. B. (1982). Verbalized symbolic play of pre-school children in two types of play environments. Abstract of doctoral dissertation, Temple University. (From Dissertation Abstracts International, 1982, 42, 5058A)

### **Review**

Jones, S. L. (1991, January 6). The paper of motivation (Review of Body Heat). Contemporary Film Review, p. 18

### **Report**

Lance, J. C. (1990). Housing regulations (KU No. 90-16). Lawrence, KS: Media Center.

### **Nonprint Material**

Corborn, W. H. (1990, November 3). "On facing the fears caused by nightmares" (Interview). Lexington, KY.

Purple, W. C. (Producer). (1990). Hitting the backhand (Videotape). Nashville: Sports Network.

Landers, J., Woolfe, R. T., & Balcher, C. (1990).

Geometry games: Level two (computer program. Emporia. KS: media works.

## CHOOSING THE RIGHT STATISTICS

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**Statistical Treatment of Data.** The following section illustrates some simulations and exercises on how to choose the correct statistical test. These simulations and exercises act as a guide to assist you in reviewing and selecting what is the appropriate statistical treatment for your study.

**1. Simulations by Sprinthall, R. *Basic Statistical Analysis, 5th Edition*, 1997 pp. 476-497.**

### SIMULATION A

It has been traditional for the man rather than the woman to receive the check when a couple dines out. A researcher wondered whether this would still be true if the woman was clearly in charge, asking for the wine list, and so on. A large random sample of restaurants was selected. One couple was used in all restaurants, but half the men assumed the traditional in-charge role, and in the other half, the women was in charge. The data were in the form of the numbers of times the check was presented to each member of the couple.

### ANALYZING THE METHODOLOGY

This is experimental research; the independent variable (man or woman in charge) was clearly manipulated. The dependent variable was whether the man or the woman received the check. Thus, if differences in the dependent variable occur here, they can be attributed to the action of the independent variable. Of the experimental designs, this was an after-only, no pretest was given, and no matching took place.

### ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISIONS

1. Scale of measurement? The measurements in this study are in the form of nominal data – the responses being categorized on the basis of which member of the couple received the check.
2. Hypothesis? The hypothesis being tested is that of difference-whether or not a difference as to who received the check would occur as a function of who appeared to be in charge. (Since this was the experimental method, it has to test the hypothesis of difference.)
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The subjects (waiters or waitresses) were independently selected, since the restaurants were randomly chosen.
4. How many sets of measurements? There are two sets of nominal measurements based on whether the man or the woman gets the check.

## **SOLUTION**

Use chi-square, in this instance a 2 x 2 chi-square, with the independent variable (who is in charge) in the rows and the dependent variable (who gets the check) in the columns.

## **SIMULATION B**

A researcher, noting the positive correlation between socioeconomic status and amount of education, assumes there will be a difference in the amount of TV viewing by the principal wage earners in high and low-socio economically placed families. A random sample of families is selected and categorized as having either high or low socioeconomic status on the basis of a number of measures (income of principal wage earners of all families were then contacted and asked for their hours per week of TV viewing). The hours per week for each socioeconomic class were compared.

## **ANALYZING THE METHODOLOGY**

This is an example of post-facto research; the independent variable (socioeconomic status) is a subject variable, not manipulated. Regardless of whether the statistical test is significant, no definitive cause and effect statement can be made. Even if the upper-class group is shown to watch significantly less, the reason for this difference can be suspected (Perhaps upper-class persons read more, or work more hours, or have expensive time-consuming hobbies, or ... the list of possibilities is endless).

## **ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISION**

1. Scale of Measurement? The measurement here are in at least interval form. If one person watches TV for 25 hours and another for 24, we know not only that one person spends more time watching TV, but also how much more time. With no evidence to the contrary, the distribution of number of hours spent watching TV is assumed to be normal.
2. Hypothesis? The hypothesis tested is that of difference-that the two groups would differ as to the extent that they watched TV.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The two groups in this case are independent of each other, each being randomly selected and then assigned to the high or low socioeconomic status.
4. How many set of measurements? There are two sets of measurements, one for upper status and one for lower status.

## **SOLUTION**

Use the independent t test. Had it been predicted that one group would watch more TV than the other, then test as a one-tail t.

## **SIMULATION C**

A researcher wished to test the hypothesis that taller men are more likely than shorter men to be judged as leaders. A random sample of 30-year old men was selected and measured for height. The men were then brought before a panel of personnel managers and ranked ordered on the basis of perceived leadership qualities. Each subject was assigned the median rank of the panel's decisions.

### **ANALYZING THE METHODOLOGY**

This is a post facto research. The independent variable (height) was not manipulated (although it could have been by using elevator shoes, or even hidden stilts). Therefore the issue of causation is not relevant here, although the probability of making accurate leadership predictions is very much at issue.

### **ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISION**

1. Scale of measurement? Despite using the panel's consensus on rankings, the data are still in ordinal form. Although we may know that Subject 1 is perceived to be imbued with more of the leadership image than is Subject 2, we do not know how much more. Also height is clearly an interval measurement, it must be converted to an ordinal rank before the statistical analysis can be completed (the men are simply rank ordered as to height).
2. Hypothesis? The hypothesis being tested here, is that of association. It is gratuitous to try and establish a difference between such already disparate measures as height and perceived leadership qualities.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? Not applicable; the hypothesis of association is being tested.
4. How many sets of measurements? There are two sets of measurements, height and leadership.

### **SOLUTION**

Use the Spearman's rank correlation coefficient. Note that in this problem, both age and sex were ruled out as variables, since only men of the same age were selected.

## **SIMULATION D**

A market researcher, working for a manufacturer of hair coloring, wished to establish whether blondes do indeed have more fun. A large random sample of female college sophomores was selected and categorized as to hair color – blonde, brunette, or red. Each subject was then asked to answer yes or no to the question, "On balance, would you say you've been having fun, this semester?"

## ANALYZING THE METHODOLOGY

This is post facto research. The independent variable (hair color) was a subject variable, not manipulated. (Here again, this could have been designed as an experiment, perhaps randomly dividing the brunettes into other groups and then giving all members of one group a blonde tint and allowing the effect statement to be made). The groups may differ on a variety of other variables related to happiness. number of dates, grade point average, etc. Also, it may be a function of the woman's personality. Perhaps socially-oriented women are more apt to use a tint, and be more optimistic.

## ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISION

1. Scale of Measurement? Since the women are measured on the basis of answering the question either yes or no, and then the frequencies of these answers are tallied, the data are nominal.
2. Hypothesis? This is one of the studies in which the hypothesis could conceivably be classified either way-difference or association. It is likely that the researcher meant this as a difference study since the hypothesis was stated as, " blondes have more fun." (Had it been the hypothesis of association, it probably should have been stated as, "There is a correlation between hair color and having fun.")
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The samples (blondes, brunettes and redheads) are independent of one another. The fact that one woman was placed in the blonde group neither caused another woman to be placed in, nor precluded her placement in, a different group.
4. How many sets of measurement? There are two sets of scores based on whether the subjects report having or not having fun.

## SOLUTION

Use chi-square, in this case a  $3 \times 2$  chi-square. Since this is a  $3 \times 2$  chi-square, the special  $2 \times 2$  computational method cannot be used. This means that all of the values for  $f_e$  (frequencies expected) must be separately calculated. Had this been a test of association, the chi-square could have been followed up with the coefficient of contingency.

## SIMULATION E

A researcher wished to test the hypothesis that older men sleep less than younger men do. Random samples of 30-year-old men, 50-year-old men, and 70-year-old men were selected. Each subject was brought to a sleep laboratory and measured as to how many hours of sleep per night occurred.

## ANALYZING THE METHODOLOGY

This is a post facto study; the independent variable (age) was a subject variable, not manipulated (Age can, of course, never be a manipulated independent variable). Even

if the results prove to be significant, great care must be taken in interpreting them. If it is found that the older men sleep less; it may be they did so as young men too. As youngsters, these men may have been more apt to rise early as a result of the differing cultural patterns that typified their younger days. (This is actually cross-sectional research).

### **ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISION**

1. Scale of Measurement? The dependent variable (hours of sleep) provides at least interval data, with an underlying distribution that is probably normal.
2. Hypothesis? The hypothesis being tested is one of difference – that different age groups have different sleep habits.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? These sample groups are independent of one another. The fact that a given man is selected for the 30-year-old group has no bearing on who is being selected in the 50- or 70-year-old groups.
4. How many sets of measurements? There are three sets, one for each age group.

### **SOLUTION**

Use the one-way ANOVA, the F ratio. If F proves to be significant, proceed with Tukey's HSD.

### **SIMULATION F**

A researcher wanted to test the hypothesis that racial prejudice is a function of personal authoritarianism. A random sample of college students was selected and measured on the F Scale, an index of personal rigidity and authoritarianism. All subjects were then given the A-S (for Anti-Semitic) scale, a measure of prejudice toward Jews.

### **ANALYZING THE METHODOLOGY,**

This is a post. facto study; the independent variable (authoritarianism) is a subject variable, not manipulated. Even if the hypothesis is validated, there will be no way to tell whether authoritarianism affects prejudice or prejudice affects authoritarianism. It is even possible that a third variable, such as a family's child-rearing practices, produces both authoritarianism and prejudice.

### **ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISION**

1. Scale of Measurement? Both the F and A-S scales are considered to be interval measures distributed normally in the population.
2. Hypothesis? The hypothesis in this case is one of association. (One group is being measured on two different response dimensions.) We can never test for differences between completely unrelated measures.



3. If the hypothesis of difference is tested, are the groups independent or correlated samples? Not applicable; the hypothesis of association is being tested.
4. How many sets of measurements? There are two sets, one for F scale and one for A-S scores. .

## **SOLUTION**

Use the Pearson  $r$ . If found to be significant, the  $r$  could be followed by a regression equation, with which specific A-S scores could be predicted from given F scores.

## **SIMULATION G**

A researcher working for a large corporation wished to test the hypothesis that the company's toothpaste, containing fluoride, reduces dental caries. A random sample of 18-year-olds was selected, and all subjects were checked for caries. A dentist then filled the cavities for all subjects having them. For the next three years, all subjects received free monthly supplies of the fluoride toothpaste. Finally, at age 21, the subjects were again checked for dental caries. The researcher then compared the number of persons with caries found in the first dental checkup with the number of persons with caries found at age 21.

## **ANALYZING THE METHODOLOGY**

This is experimental research, before-after design. The independent variable (toothpaste) is manipulated (rather than being assigned on the basis of whether the subjects, on their own, were using it). This is however, a shaky design, because maturation is a variable and may confound the independent variable. Perhaps 18-year-olds, as a group, are more apt to have caries (the cavity-prone years) than are 21-year-olds. Perhaps, there might have been a significant result even without the introduction of the independent variable. It would have been better to have had a separate control group, checked for caries at both ages, but given, instead of the fluoride brand, toothpaste that looked the same but did not contain fluoride.

## **ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISION**

1. Scale of Measurement? These are nominal data. The subjects were categorized as a group, at each age as to whether caries were detected. We do not know whether any subject had more or fewer caries than another, only whether any caries were present. Frequencies of occurrence for each age were compared. Had the subjects been rank ordered in terms of amount and/or severity of caries, the data would have been ordinal. Perhaps even interval measures could have been designed, where the subjects received scaled scores based on the number and severity of caries found.
2. Hypothesis? This is the hypothesis of difference – the assumption being that after using the fluoride toothpaste the frequency of caries within the group will diminish.

3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The groups are as correlated as possible, since the same group was used as its own control. The samples are always correlated in a before-after design.
4. How many sets of measurements? There are two sets, one taken at age 18 and other at age 21.

## **SOLUTION**

Use the McNemar test, which is a chi-square based on the change scores.

## **SIMULATION H**

A researcher wished to find out whether the perception of a person's height depends on that person's perceived status. A random sample of army inductees was selected and equally divided into four groups. An actor gave a short address to each group separately, extolling the joys of army life. For the first group, the actor was dressed as a private; for the second, as a sergeant; for the third, as a captain; and finally, for the fourth group, as a colonel. The inductees were asked to fill out a questionnaire evaluating the speech. Among the questions was one asking for an estimate of the lecturer's height.

## **ANALYZING THE METHODOLOGY**

This is experimental research, after-only design.. The independent variable (perceived status) was manipulated by having the same actor wear different uniforms. Using the same actor was a good idea, since otherwise, differences in personal characteristics might have confounded the independent variable.

## **ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISION**

1. Scale of Measurement? The dependent variable (estimated height) provided least interval data in this study.
2. Hypothesis? The researcher is looking for differences in the height estimates by the four groups.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The four groups are independent of one another. The selection of one soldier had no bearing on whether another was or was not selected. This is an after-only experimental design, in which sample groups must be independent of one another.
4. How many sets of measurements? There are four sets, one for each treatment condition.

## **SOLUTION**

Use the One-way ANOVA, the F-ratio, If F is significant, follow it up with Tukey's HSD.

## **SIMULATION I**

A researcher suspects that both meaningfulness and length of presentation affect word retention, as scored on a standardized test. Four groups of fifth-grade students were randomly selected and then assigned to different treatment conditions. Group A was given low-meaningful words and a 2-second presentation time. Group B was given a list of high-meaningful words and also a 2-second presentation time. Group C was given low-meaningful words and a five-second presentation time, whereas Group D received a high-meaningful list and a 5-second presentation time. The results of their retention scores were analyzed.

### **ANALYZING THE METHODOLOGY**

1. Scale of measurement? Standardized retention scores come in at least interval form.
2. Hypothesis? The researcher is attempting to discover if there is a difference in the retention scores.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? Since each of the four groups was randomly selected and assigned separately to the various conditions, the samples are independent.
4. How many sets of measurements? There are four sets of measures, one set for each group.

### **SOLUTION**

Use the factorial ANOVA and be especially careful to look for the possibility of a significant interaction:

## **SIMULATION J**

A researcher for an electronics corporation wished to establish whether, other things being equal, the tonal quality of a hi-fi set is judged to be better as the size of the speaker enclosure is increased. A random sample of subjects was selected and asked to listen to the same CD played on "different sound systems." Actually, the amplifier, the size and quality of the speaker and baffle, and so on, remained the same. Only the size and quality of the speaker enclosure was allowed to vary. Three enclosure sizes were used-small, medium and large. The subjects were asked to rank order their preferences, from 1 (best) to 3 (worst). The order in which the subjects were presented with the various speaker sizes was counterbalanced, so that some subjects had the large enclosure first, others the small enclosure, and so on.

### **ANALYZING THE METHODOLOGY**

This is experimental research, repeated-measure design (before-after-after). The independent variable (enclosure size) was manipulated by the experimenter. If significant result are obtained, cause and effect inferences can be made.

## ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISION

1. Scale of measurement? The dependent variable (judgment of tonal quality) is ordinal form, that is, the subjects' rank ordering of the three listening conditions.
2. Hypothesis? The study tests the hypothesis of difference – that different judgments of sound quality will occur as enclosure size is changed.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The groups in this study are definitely correlated, as the same group is used in all three treatment conditions. Groups are always correlated in repeated-measure designs.
4. How many sets of measurements? There are three sets, one for each treatment condition.

### SOLUTION

Use the Friedman ANOVA by ranks. Compare the ranks 1, 2 and 3 of each subject under the three listening conditions.

### SIMULATION K

A researcher is interested in whether coaching can have any effect on Math SAT scores. A group of 100 high school seniors was randomly selected from a large metropolitan school district. The group was then randomly divided into two subgroups. One group was given three months of daily coaching in those math skills deemed important to the SAT, while the other group spent the same amount of time each day watching reruns of the TV show “Happy Days”. At the end of the three-month period, all students took the SAT and their math scores were compared.

### ANALYZING THE METHODOLOGY

1. Scale of measurement? Standardized retention scores come in at least interval form.
2. Hypothesis? The researcher is testing the hypothesis of difference.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The two groups are independent, since the selection of one student being random had no influence on the selection of other students.
4. How many sets of measurements? There are two sets of measures, the SAT scores from each of the two groups.

### SOLUTION

Use the independent t test.

## **SIMULATION L**

A study was designed to test whether presenting one side or both sides of an argument is more effective in changing attitudes. Perhaps presenting just the pro side would be more effective because an audience might not be fully aware of the anti side. Or perhaps to appear impartial and to avoid having members of the audience go over to the anti side and therefore tune out the pro message, it would be more effective to at least present some of the anti arguments.

A large random sample was selected, and the subjects were assigned to one of two conditions. Group A heard only the pro side of the issue, whereas Group B heard the entire pro side plus a few minutes of anti arguments. Both presentations were made by the same person. A questionnaire tapping attitudes toward the issue, was then filled out by each subject.

## **ANALYZING THE METHODOLOGY**

This is experimental research. The independent variable (one-sided versus two-sided presentations) was manipulated by the researcher. As no matching occurred and no attitude testing was done prior to the presentation, this was an after-only design. If the results prove significant, causal inferences can be drawn.

1. Scale of Measurement? The questionnaire was scored as interval data and the assumption of a normal distribution was made.
2. Hypothesis? As in all experimental research, the hypothesis of difference was tested. Presumably, differences in attitudes between the two groups can be attributed to the independent variable.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? As is true of all after-only experimental designs, the groups were independently selected.
4. How many sets of measurements? There are two sets of scores to be compared.

## **SOLUTION**

Use the independent t. As no prediction regarding direction was even suggested, check the t as a two-tail test.

## **SIMULATION M**

A researcher wished to test the hypothesis that male business majors earn more in later life than do either male liberal arts or education majors. A random sample of alumni was selected from the university files from each of the three subject major categories. To attempt to control for length of experience on the job, all subjects were selected from the same graduating class-the class that graduated 10 years ago. All the

selected alumni were contacted and asked to indicate their yearly incomes. The men were promised that the information would be held in strict confidence and would not be given to the chairman of the upcoming alumni fund drive. Because a few of the subjects reported enormously high incomes, the resulting distribution became so skewed that it was decided to rank order the incomes.

## **ANALYZING THE METHODOLOGY**

This is post facto research. The independent variable, college major, was a subject variable, not manipulated.

1. Scale of Measurement? Although income is an interval measurement, skewed distribution forced a rank ordering of the data, thus creating a series of ordinal measures.
2. Hypothesis? The researcher was testing for differences among the income ranks of the three groups
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The groups are independent. The assignment of alumni into subject major categories is strictly independent. The selection of one person from the "education" category did not demand or preclude another subject being selected from the "liberal arts" category.
4. How many sets of measurements? There are three sets. one for each of the subject major categories.

## **SOLUTION**

Use the Kruskal-Wallis H test for three or more independent groups and ordinal data.

## **SIMULATION N**

A researcher wished to increase the predictability of student pilot scores on the FAA's written general aviation exam. Dependable relationships were found to exist between number of ground school and FAA exam scores and also between IQ and exam scores. Finally, a small, but significant relationship was found to exist between IQ and number of hours of ground school. (Note that for the private pilot's license. the number of hours of ground school is not fixed by the FAA. A few student pilots put in many hours and a few study on their own and never attend at all.)

## **ANALYZING THE METHODOLOGY**

This is post facto research. Although the pilots did experience different conditions (attending ground school or not) this was their choice, not the choice of the experimenter. Also, IQ can never be a manipulated variable. Thus. the two independent variables (ground school and IQ) were subject variables, not manipulated.

## **ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISIONS**



1. Scale of Measurement? The three measures (hours of ground school, IQ, and scores on the FAA exam) all yielded at least interval scores. The distributions all appear to be normal.
2. Hypothesis? The researcher has attempted to test for associations among the three measures.
3. If the hypothesis of difference is tested, are the groups dependent or correlated samples? Not applicable; the hypothesis of association is being tested.
4. How many sets of measurements? There are three sets-hours of ground school, FAA examination scores, and IQ.

## **SOLUTION**

Use the Multiple R. The three separate values of the Pearson  $r$  (between ground school and the exam scores, between IQ and the exam scores, and between IQ and ground school) should all be used together to determine whether their combinations increase the predictive efficiency. If the value of the Multiple R is larger than the separate correlation with the exam scores, solve the multiple regression equation.

## **SIMULATION O**

A firearms manufacturer hired a researcher to establish whether a new handgun increases accuracy. A group of law enforcement agents was randomly selected and brought to the firing range. First, all subjects used the same traditional service revolver, and their error scores (in inches from the bull's-eye) were determined. Then they all fired again, using the new weapon, and their error scores were again determined.

## **ANALYZING THE METHODOLOGY**

This is experimental research, the independent variable (type of weapon) was manipulated by the experimenter. Since the same subjects are used in both treatment conditions, the design is before-after. This is not the best design for the study, because it is possible that scores might improve the second time as a result of practice. This could act to confound the independent variable. It would have been better to set up a separate group that used the old weapon twice, another group that used the new weapon first and then the old weapon, and another group that used the new weapon twice.

1. Scale of measurement? The dependent variable (error measured on the basis of inches from the bull's-eye) provides at least interval data. The researcher claimed a normal distribution for these error scores. Had the distribution not been normal, a different statistical test should have been used,
2. Hypothesis? As in all experimental research, the hypothesis of difference (between error scores) was tested.

3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The groups are correlated; the same group is used as its own control.
4. How many sets of measurement? There are two sets, one for each treatment condition.

## **SOLUTION**

Use the paired t-ratio, probably as a one-tail test since the manufacturer undoubtedly has some reason for believing in the superiority of the new weapon. (If the results had gone the other way, they possibly would have been filed away in the back of the drawer.) Had the distribution of error scores been skewed (many officers hitting the bull's-eye, but a few missing the target altogether), then the scores should have been rank ordered and the Wilcoxon T test performed.

## **SIMULATION P**

An investigator wished to establish whether a dependable relationship exists between height at age 3 and height at age 21. A random sample of 3-year-olds was selected, and height measures were taken on each. The researcher then patiently waited 18 years and measured the subjects again.

## **ANALYZING THE METHODOLOGY**

This is post facto research, the independent variable (height at age 3) is a subject variable, not manipulated. This is also called longitudinal research, since the same subjects are followed through the years and are used again. (A less patient researcher could have obtained adult heights and then checked personal records for the infant heights.)

1. Scale of measurement? The data are in at least interval form, and the distributions for each age level are probably normal.
2. Hypothesis? This is strictly the hypothesis of association. (Testing the hypothesis of difference in this situation – that is, that 21-year-olds are significantly taller than 3-year-olds – would hardly add much to the book of knowledge.)
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? not applicable; the hypothesis of association is being tested.
4. How many sets of measurements? There are two sets of measurements, one taken at age 3 and the other at age 21.

## **SOLUTION**

Use the Pearson r. If it is significant, set up the regression equation of Y on X. Thus predictions of adult height can be made from height at age 3.

**SIMULATION Q**

Some researchers have suspected that, because of academic and other frustrations, adolescents labeled as LD (learning disabled) would have more symptoms of depression and even possibly higher levels of suicidal ideation than would non-LD adolescents. Two groups of 16-year-old students, one labeled LD and the other non-LD (50 male adolescents in each group), were selected on the basis of a certain school district's records. All students were then given the SIQ-JR (Reynolds Suicide Ideational Questionnaire), and the results were as follows:

LD			Non-LD		
Range (0 to 90)			Range (0 to 90)		
M	=	15.21	M	=	12.33
SD	=	17.32	SD	=	16.28
Mdn	=	7.92	Mdn	=	6.34
Sk	=	+2.40	Sk	=	+2.45

**ANALYZING THE METHODOLOGY**

This is post facto research, as the IV in this study, LD versus non-LD, is clearly a subject variable. If the results prove to be significant, predictions, but not direct cause-and-effect, become more viable.

**ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISIONS**

1. Scale of measurement? The measurements are in interval form, but since the mean is so much higher than the median and the standard deviation is large, relative to the mean, the distributions are significantly skewed to the right. Notice that with means of only 15 and] 2 no negative scores ( the ranges were 0 to 90) the distribution must be skewed to the high side. If these distribution were to approach normality, the range of scores would have been from about -37 to +61 for the non-LD and -37 to +67 for the LD. With severe skews of this sort, reported as +2.40 and +2.45, respectively, the interval data should be converted to ordinal.
2. Hypothesis? The researcher is testing for differences in suicidal ideation between the two groups.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The groups are independent.
4. How many sets of measurements? The researcher was comparing two sets of measurements.

**SOLUTION**

Use. the Mann Whitney U test for detecting differences between two sets of ordinal scores.

## **SIMULATION R**

A cultural anthropologist became interested in discovering whether differences in the age of menarche (the age when young woman have their first menstrual cycle) are a function of climate. Two groups of young women were selected – one from a northern climate (Norway) and one from a southern climate (Italy). The subjects were matched according to both height and weight, and their ages at menarche were compared. The age distribution was found to be skewed.

### **ANALYZING THE METHODOLOGY**

This is a post facto research; the independent variable (climate) was a subject variable, not manipulated. Thus, even if significance is established? no positive causal statement can be made. The subjects obviously differ on a host of variables (diet, genetic background, medical care, etc.) other than climate.

1. Scale of Measurements? Although age is at least an interval measure, the lack of normality in the underlying distribution forces a conversion of the age into ordinal data.
2. Hypothesis? The researcher is testing the hypothesis of difference – that age at menarche differs as a function of climate.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The groups are correlated, having been matched on both height and weight.
4. How many sets of measurements? There are two sets of measurements, one taken in Norway and the other in Italy.

### **SOLUTION**

Use the Wilcoxon T test.

## **SIMULATION S**

A researcher wanted to find out whether IQ is a function of family size. The speculation was that among families with fewer children, each children receives more parental attention and intellectual stimulation and should therefore have a higher IQ than would a child reared in a larger family. A large random sample of two-child families was selected as well as a similar sample of six-child families. The IQ of all children were measured, and the two sample groups were compared.

### **ANALYZING THE METHODOLOGY**

This is post facto research. The independent variable (family size) was a subject variable, not manipulated. (natural forces or their own decision, not the decision of the experimenter, determined which families had small or large numbers of children.) Thus, even if significance is established, the causal factor remains in the realm of speculation. Could it be, instead, that lower-IQ parents have more children.

1. Scale of Measurements? IQ scores are considered to be interval measures, and the underlying distribution to be fairly normal.
2. Hypothesis? The researcher is looking for IQ differences among children from small and large families.
3. If the hypothesis of difference is tested? Are the groups independent or correlated samples? The groups are independent. The selection of a given family depended on its size, not on whether or not some other family had been selected.
4. How many sets of measurements? There are two sets of IQ scores, one taken from large families and one taken from small families.

## **SOLUTION**

Use the independent t. If the score for each child is to be used separately, use the equation for unequal values of N (there are three times as many IQ scores in the six-child families). If the children's IQ scores are to be averaged within each family, then equal values of N can be maintained.

## **SIMULATION T**

A rat study was conducted to find out whether environmental inputs could affect brain growth. A group of 16 laboratory rat twins was selected at birth and randomly assigned to the two groups. The rats were thus paired off on the basis of genetic inputs, one rat from each twin-pair in the experimental group and the other twin in the control group. The experimental group was then raised in a stimulating environment, in a cage equipped with ladders, running wheels, and other "rat toys". These animals were also let out of their cages for 30 minutes each day and allowed to explore new territory. They were also trained on a number of learning tasks and in general received a rich and varied array of stimulus homogeneity. These rats lived alone in dimly lit cages, were rarely handled, and were never allowed to explore areas outside their cages. All animals received exactly the same diet. After 90 days, all the animals were sacrificed and their brains analyzed morphologically and chemically. The weight of each rat cortex was then recorded in milligrams, and the two groups were compared on the basis of cortical weight.

## **ANALYZING THE METHODOLOGY**

This is experimental research, with the independent variable, environmental inputs, manipulated by the researcher. If the results prove to be significant, cause and effect statements become possible.

## **ANSWERING THE CHECKLIST QUESTIONS: THE CRITICAL DECISIONS**

1. Scale of measurement? The data are in at least interval form.
2. Hypothesis? The researcher is testing the hypothesis of difference.
3. If the hypothesis of difference is tested, are the groups independent or correlated samples? The groups were deliberately correlated by the researcher, since all the rats were paired off on the basis of twin-ship.



4. How many sets of measurements? There were two sets of measurements, one set from each group.

## SOLUTION

Use the paired  $t$ .

## 2. Research Situations and Solutions by: Levin, J. *Elementary Statistics for Social Sciences, 2nd Edition, 1990*

Each statistical procedure has a set of assumptions for its appropriate application. In selecting among procedures, any researcher must therefore consider a number of factors such as:

1. Whether the researcher seeks to test for statistically significant differences, degree of association, or both;
2. Whether the researcher had achieved the nominal, ordinal or interval level of measurement of the variables being studied;
3. Whether the variables being studied are normally distributed in the population from which they were drawn; and
4. Whether the researcher is investigating independent samples or the same sample measured more than once.

**Table 1.** locates each statistical procedure with respect to some important assumptions that must be considered for its appropriate application. Looking at the columns of the table, we face the first major decision related to the selection of a statistical procedure: Do we wish to determine whether or not a relationship exists? The test of significance is designed to determine whether an obtained sample difference reflects a true population difference. Or, do we seek instead to establish the strength of the relationship between two variables. This is a question of correlation, which can be addressed by means of the statistical procedures. A researcher who decides to employ a test of significance rather than a correlation procedure must also be aware of whether he is studying independent samples or the same sample measured more than once.

The rows in Table 1 directs our attention to the level at which variables are measured. If we have achieved the interval of measurement, we may well consider employing a parametric procedure such as  $t$ ,  $F$ , or  $r$ . If however, we have achieved either the nominal or ordinal level of measurement, the choice is limited to several non parametric alternatives.

## RESEARCH SITUATION NO. 1

A researcher conducted an experiment to determine the effect of a lecturer's age on student preferences to hear him lecture. In a regular classroom situation, 20 students were told that the administration wished to know their preferences regarding a forthcoming visiting lecturer series. In particular, they were asked to evaluate a professor who might be visiting the campus. The professor was described to all students in the same way with one exception: One-half of the students were told the professor was 65 years old; one half were told the professor was 25 years old. All

students were then asked to indicate their willingness to attend the professor's lecture (higher scores indicate greater willingness). The following results were obtained:

X1 (Scores of students told professor was 25 years old)	X2 (Scores of students told professor was 65 years old)
65	78
38	42
52	77
71	50
69	65
72	70
55	55
78	51
56	33
80	59

**Which statistical procedure would you apply to determine whether there is a significant difference between these groups of students with respect to their willingness to attend the lecture?**

**RESEARCH SOLUTION NO.1**

Research situation 1 represents a comparison between the scores of two independent samples of students. The *t ratio* is employed in order to make comparisons between two means when interval data have been obtained. The *median test* is a non parametric alternative, which can be applied when we suspect that the scores are not normally distributed in the population or that the interval level of measurement has not been achieved.

**RESEARCH SITUATION NO.2.**

A researcher conducted an experiment to determine the effect of a lecturer's age on student preferences to hear him lecture. In a regular classroom situation, 30 students were told that the administration wished to know their preferences regarding a forthcoming visiting lecturer series. In particular, they were asked to evaluate a professor who might be visiting the campus. The professor was described to all students in the same way with one exception: one third of the students were told that the professor was 75 years old; one third were told the professor was 50 years old; and one third were told the professor was 25 years old. All students were then asked to indicate their willingness to attend the professor's lecture (higher scores indicate greater willingness). The following results were obtained.



X1	X2	X3
(Scores of students told professor –25 yrs)	(Scores of students told professor –25 yrs)	(Scores of students told professor –25 yrs)
65	63	67
38	42	42
52	60	77
71	55	32
69	43	52
72	36	34
55	69	45
78	57	38
56	67	39
80	79	46

Which statistical procedure would you apply to determine whether there is a significant difference between these groups of students with respect to their willingness to attend the lecture?

## RESEARCH SOLUTION 2

Research situation 2 represents a comparison of the scores of three independent samples of students. *The F ratio* (analysis of variance) is employed in order to make comparisons between three or more independent means when interval data have been obtained.

**Kruskal-Wallis one-way analysis of variance** is a non parametric alternative, which can be applied when we have reason to suspect that the scores are not normally distributed in the population or when the interval level of measurement has not been achieved.

## RESEARCH SITUATION NO. 3

To investigate the relationship between spelling and reading ability, a researcher gave spelling and reading examinations to a group of 20 students who had been selected at random from a large population of undergraduates, the following results were obtained (higher scores indicate greater ability):

Student	X (Spelling Scores)	Y (Reading Scores)
A	52	56
B	90	81
C	63	75
D	81	72
E	93	50
F	51	45
G	48	39
H	99	87

I	85	59
J	57	56
K	60	69
L	77	78
M	96	69
N	62	57
O	28	35
P	43	47
Q	88	73
R	72	76
S	75	63
T	69	79

**Which statistical procedure would you apply to determine the degree of association between spelling and reading ability?**

### RESEARCH SOLUTION NO. 3

Research situation is a correlation problem, since it asks for the degree of association between X (spelling ability) and Y (reading ability). *Pearson  $r$*  can be employed to detect a straight-line correlation between X and Y variables when both of these variables have been measured at the interval level. If X (spelling ability) and Y (reading ability) are not normally distributed in the population, we should consider applying a non parametric alternative such as **Spearman's rank-order correlation coefficient**.

### RESEARCH SITUATION NO. 4

To investigate the validity of a particular reading test, researchers gave the reading test to a sample of 20 students whose ability to read had been previously ranked by their teacher. The test score and teacher's rank for each student are listed below:

Student	X (Reading Scores)	Y (Teacher's Rank)
A	28	18
B	50	17
C	92	1
D	85	6
E	76	5
F	69	10
G	42	11
H	53	12
I	80	3
J	91	2
K	73	4
L	74	9
M	14	20
N	29	19
O	86	7

P	73	8
Q	39	16
R	80	13
S	91	15
T	72	14

Which statistical procedure would you apply to determine the degree of association between reading scores and teacher's ranking?

RESEARCH SOLUTION NO.4

Research situation 4 is a correlation problem, asking for the degree of association between X (reading scores) and Y(teacher's evaluation of reading ability). **Spearman's rank-order correlation coefficient** can be employed to detect a straight-line relationship between X and Y variables, when both of these variables have been ordered or ranked. Pearson *r* cannot be employed, since it requires interval level measurement of X and Y. In the present case, reading scores (X) must be ranked from 1 to 20 before rank-order is applied.

RESEARCH SITUATION NO. 5

To investigate regional differences in helpfulness towards strangers, a researcher dropped 400 keys (all of which had been stamped and tagged with a return address) around mailboxes in the northeastern, southern, mid western and western regions of the United States. The number of keys returned by region (as an indicator of helpfulness) is indicated below:

	Region			
	Northeast	South	Midwest	West
	f	f	f	f
Returned	55	69	82	61
Not returned	45	31	18	39
Total	100	100	100	100

Which statistical procedure would you apply to determine whether these regional differences are statistically significant?

RESEARCH SOLUTION NO. 5

Research Situation 5 represents a comparison between the frequencies (returned versus not returned) found in four groups (northeast, south, mid west and west) The **chi-square test of significance** is used to make comparisons between two or more samples. Only nominal data are required. Present results can be cast in the form of a 2x4 table, representing 2 rows and 4 columns. Notice that the degree of association between returns rate (x) and region (y) can be measured by means of the Contingency coefficient (C) or Cramer's V.

RESEARCH SITUATION NO. 6

To examine the relationship between authoritarianism and prejudice, a researcher administered measures of authoritarianism (the F Scale) and prejudice (a checklist of negative adjectives to be assigned to black Americans) to a national sample of 950 adult Americans. The following results were obtained: Among 500 authoritarian respondents, 350 were prejudiced and 150 were tolerant. Among 450 non authoritarian respondents, 125 were prejudiced and 325 were tolerant.

**Which statistical procedure would you apply to study the degrees of association between authoritarianism and prejudice?**

### RESEARCH SOLUTION NO. 6

Research situation 6 is a correlation problem, which asks for the degree of association between X (authoritarianism) and y (prejudice). The **phi coefficient** is a measure of association, which can be employed when frequency or nominal data can be cast in the form of a 2x2 table (2 rows by 2 columns)

Example:

Level of Prejudice	Level of Authoritarian		
	Authoritarian	Non-authoritarian	
Prejudiced	350	120	N = 950
Tolerant	150	325	

### RESEARCH SITUATION NO. 7

To investigate the relationship between year in school and grade point average, researchers examined the academic records of 186 college students who were selected on a random basis from the undergraduate population of a certain university. The researchers obtained the following results:

Grade Point Average	Year in School			
	1st f	2nd f	3rd f	4th f
A- or better	6	5	7	10
B- to B+	10	16	19	18
C- to C+	23	20	15	7
C or worse	15	7	6	2
Total	54	48	47	37

**Which statistical procedure would you apply to determine the degrees of association between grade point average and year in school?**

### RESEARCH SOLUTION NO. 7

Research situation 7 is a correlation problem, which asks for the degree of association between X (grade-point average) and Y (year in school). **Goodman's and Kruskal's gamma coefficient** is employed to detect a straight line relationship between X and Y, when both variables have been ranked and a large number of ties have occurred. In the present problem, a grade-point average has been ranked from A to D or worse and year in school has been ranked from 1st to 4th. Both of these crude ordinal measures

have generated numerous tied ranks (for example, 54 students were in their first year of school; 48 students were in their second year, and so on.) **The contingency coefficient (C) or Cramer's V** represents an alternative to gamma, which assumes only nominal-level data.

RESEARCH SITUATION NO. 8

To investigate the influence of frustration on prejudice, 10 subjects were asked to assign negative adjectives such as lazy, dirty and immoral to describe the members of a minority group (a measure of prejudice). All subjects described the minority group both before and after they had taken a series of lengthy and difficult examinations (the frustrating situation). The following results were obtained (higher scores represent greater prejudice).

Subject	X1	X2
	Prejudice Scores Before Taking the Frustrating Exam	Prejudice Scores After Taking the Frustrating Exam
A	22	26
B	39	45
C	25	24
D	40	43
E	36	36
F	27	29
G	44	47
H	31	30
I	52	52
J	48	59

Which statistical procedure would you apply to determine whether there is a statistically significant difference in prejudice before and after the administration of the frustrating examinations?

RESEARCH SOLUTION NO. 8

Research situation 8 represents a before-after comparison of a single sample measured at two different points in time. **The t ratio** can be employed to compare two means from a single sample arranged in a before-after panel design. **Friedman's two-way analysis of variance** is a non parametric alternative, which can be applied to the before-after situation when we have reason to suspect that the scores are not normally distributed in the population or when we have not achieved the interval level of measurement.

RESEARCH SITUATION NO. 9

To investigate the relationship between a respondent's actual occupational status and his subjective social class (that is a respondent's own social class identification). A total of 677 individuals were asked to indicate their occupation and the social class in

which they belonged. Among 190 respondents with upper status occupations (professional-technical-managerial), 56 identified themselves as upper class, 122 as middle class and 12 as lower class; among 221 respondents with middle-status occupations (sales-clerical skilled labor), 42 identified themselves as upper class, 163 as middle class and 16 as lower class, among 266 with lower-status occupations (semi-and unskilled labor), 15 identified themselves as upper class, 202 as middle class and 49 as lower class.

**Which statistical procedure would you apply to determine the degree of association between occupational status and subjective social class?**

### RESEARCH SOLUTION NO. 9

Research situation 9 is a correlation problem, which asks for the degree of association between X (occupational status) and Y (subjective social class). Gamma is especially well suited to the problem of detecting a straight-line relationship between X and Y, when both variables can be ranked andllarge number of ties have occurred. In the present situation, occupational status and subjective social class have been ordered from "upper to middle to lower" generating a very large number of tied ranks (for example, 221 respondents had middle -status occupations). In order to obtain the gamma coefficient, the data must be rearranged in the form of a frequency table as follows:

Subjective Class (Y)	Social	Occupational Status (X)		
		Upper f	Middle f	Lower f
Upper		56	42	15
Middle		122	163	202
Lower		12	16	49
Total		190	221	266

The contingency coefficient (C) and Cramer's V are alternatives to gamma which assume only nominal data.

### RESEARCH SITUATION NO. 10

To investigate the influence of college major on the starting salary of college graduates, researchers interviewed recent college graduates on their first jobs who had majored in engineering, liberal arts, or business administration. The results obtained for these 21 respondents are as follows:

Example:

Starting Salaries (in Dollars)		
Engineering	Liberal Arts	Business Administration
10,500	7,000	7,500
12,300	9,500	9,000
14,000	10,000	8,000



9,500	11,000	9,300
9,000	8,500	10,500
8,500	7,500	10,000
7,500	7,000	7,000

Which statistical procedure would you apply to determine whether there is a significant difference between these groups of respondents with respect to their starting salaries?

### RESEARCH SOLUTION NO. 10

Research situation 10 represents a comparison of the scores of three independent samples of respondents. The **F ratio** is used to make comparisons between three or more independent means when interval data have been obtained. **Kruskal-Wallis one-way analysis of variance** is a non-parametric alternative, which can be employed when we suspect that the scores may not be normally distributed in the population or when the interval level of measurement has not been achieved.

### RESEARCH SITUATION NO. 11

To investigate the influence of college major on the starting salary of college graduates, researchers interviewed recent college graduates on their first jobs who had majored in either liberal arts or business. The results obtained for these 16 respondents are the following:

Starting Salaries (in Dollars)	
Liberal Arts	Business
7,000	7,500
9,500	9,000
10,000	8,000
11,000	9,300
8,500	10,500
7,500	10,000
7,000	7,000
	8,000
	9,300

Which statistical procedure would you apply to determine whether there is a significant difference between liberal arts majors and business majors with respect to starting salaries?

### RESEARCH SOLUTION NO. 11

Research situation 11 represents a comparison between scores of two independent samples of respondents. The **t ratio** is employed in order to compare two means when interval data have been obtained. The **median test** is a nonparametric alternative, which can be applied when we cannot assume that the scores are normally distributed in the population or when the interval level of measurement has not been achieved.

RESEARCH SITUATION NO. 12

A researcher conducted an experiment to determine the effect of a lecturer's age on student willingness to hear him lecture. In a regular classroom situation, 130 students were told that the administration wished to know their preferences regarding a forthcoming visiting lecturer series. In particular, they were asked to evaluate a professor who might be visiting the campus. The professor was described to all students in the same way with one exception: One half of the students were told the professor was 65 years old; one half were told the professor was 25 years old. All students were then asked to indicate their willingness to attend the professor's lecture with the following results: Among those students told that the professor was 65, 22 expressed their willingness to attend his lecture and 43 expressed their unwillingness; among the students told that the professor was 25, 38 expressed their willingness to attend his lecture and 27 expressed their unwillingness. Which statistical procedure would you apply to determine whether there is a significant difference between these groups of students with respect to their willingness to attend the professor's lecture

RESEARCH SOLUTION NO. 12

Research situation 12 represents a comparison of the frequencies (willingness versus unwillingness) in two groups of students (those told by the professor was 25). **The chi-square test of significance** is used to make comparisons between two or more samples, when nominal or frequency data have been obtained. Present results can be cast in the form of the following 2x2 table, representing 2 rows and 2 columns:

Willingness attend	Experimental Condition	
	Students told professor was 65 f	Students told professor was 25 f
Willing	22	38
Unwilling	43	27

N = 130

STATISTICAL REQUIREMENTS

1. Chi-Square

- 1. A comparison between 2 or more independent samples. We have at least 2 x 2 table. At least two samples of respondent must be obtained.
- 2. Nominal data- only frequencies are required.
- 3. Random sampling- done on samples at random from a particular population.
- 4. The expected cell frequencies should not be too small-exactly how large *fe* must depend on the nature of the problem (from 2 x 2 problem- no expected frequency should be smaller than 10).

2. Phi Coefficient

- 1. Nominal data - only frequency data are required.
- 2. A 2x2 table - the data must be capable of being cast in the form of a 2x2 table (2 rows by 2 columns). It is inappropriate to use tables larger than 2x2 in which several groups or categories are being compared.

3. Random Sampling - in order to test the significance of the phi-coefficient, sample numbers must have been drawn on a random basis from a larger population.

### **3. Contingency Coefficients**

1. Nominal data- only frequency data are required. These data may be cast in the form of  $2 \times 2$  table or larger.
2. Random Sampling- for purpose of testing the significance, all sample numbers must have been taken from a larger population.

### **4. Median Test**

1. A comparison between two or more independent medians- the median test is employed to make comparisons between 2 or more medians for independent samples.
2. Ordinal data - perform a median test, we assume at least the ordinal level of measurements. Nominal data cannot be used.
3. Random sampling - we should have drawn on samples on a random basis from a given population.

### **5. Kruskal-Wallis One-way ANOVA**

1. A comparison of 3 or more independent samples one-way ANOVA cannot be applied to test differences within a single sample of respondents measured more than once.
2. Ordinal data - only data capable of being ranked are required.
3. Each sample must contain at least 6 cases where there are more than 5 respondents in each group, the significance of H can be determine by means of the appropriate chi-square value.

### **6. Friedman's Two-way ANOVA**

1. A comparison of a single sample measured under 2 or more conditions. It cannot be applied to test differences between independent samples but assumes that the same sample of respondents has been measured at least twice (or that the numbers of 2 or more samples have been matched on relevant variables).
2. Ordinal data - only data capable of being ranked are required.
3. The number of respondents must not be too small. The exact minimum requirement for N depends on the number of conditions (K) to which respondents are to be exposed. Example: N must equal or exceed 10 when  $K = 3$  whereas N must equal or exceed 5 when  $K = 4$

### **7. Spearman's Rank-Order Correlation Coefficient**

1. A straight-line correlation - the rank order coefficient denotes a straight – line relationship between x and y.
2. Ordinal data - both x and y variables must be ranked or ordered.
3. Random sampling - sample numbers must have been taken at random from a larger population.

### **8. Goodman's and Kruskal's Gamma**

1. A straight-line correlation - gamma denotes straight-line relationship between x and y.

2. Ordinal data - both x and y variables must be ranked or ordered.
3. Random sampling - to test the null hypothesis ( $G = 0$ ), sample numbers must have been taken on a random basis for some specified population.

#### **9. Z Score - t Ratio**

1. A comparison between two means - the z scores or t ratio are employed in order to make comparison between two means from independent samples or from a single sample arranged in a before-after panel design.
2. Interval data - the assumption is that we have scores at the interval level of measurement. Therefore, we cannot use the z score or t-ratio for ranked data or data that can only be categorized at the nominal level of measurement.
3. Random sampling- we should have drawn our samples at a random basis from a population of scores.
4. A nominal data - the t ratio for small sample requires that the sample characteristics we have measured be normally distributed in the underlying population.

#### **10. F-Ratio**

1. A comparison between 3 or more independent means - the F-ratio is usually employed to make comparisons between 3 or more means for independent samples.
2. Interval data. to conduct an analysis of variance, we assume that we have achieved the interval level of measurement.
3. Random sampling - we should have taken our samples at random from a given population of scores.
4. A normal distribution - we assume the single characteristics we measure to be normally distributed in the underlying population.

#### **11. Pearson R**

1. A straight-line relationship - it is only useful for detecting a straight-line correlation between x and y.
2. Interval data - both x and y variables must be measured at the interval level so that scores may be assigned to the respondents.
3. Random sampling - sample numbers must have been drawn at random from a specified population otherwise a test of significance cannot be applied.
4. Normally distributed characteristics - testing the significance requires both x and y variables to be normally distributed in the population. In small samples, failure to meet the requirements of normally distributed characteristics may someday impair the validity of Pearson r. However, the requirement is of minimum importance where the sample size equals or exceeds 30 cases.

## LEVEL OF MEASUREMENTS

### 1. The Nominal Level

It simply involves the process of naming or labeling, that is of placing cases of categories and counting their frequency of occurrence.

Example:

Attitude Towards Puerto Ricans	Frequency
1 = prejudiced	5
2 = unprejudiced	5
<b>Total</b>	<b>10</b>

Other nominal-level measures in social research are sex (male vs. female), welfare status (recipient vs. non-recipient), political party (Republican, Democratic, Independent and Socialist); social character (inner-directed, other-directed and tradition-directed); mode of adaptation (conformity, innovation, ritualism, retreatism and rebellion); time orientation (present, past and future); and urbanization (urban, rural and suburban), to mention a few.

In dealing with nominal data, we must keep in mind that every case must be placed in one, and only one category. The reader should note that nominal data are not graded, ranked or scaled for qualities such as better or worse, higher or lower, more or less. Nominal data are merely labeled, sometimes by name (male vs. female) but always for the purpose of grouping the cases into separate categories to indicate sameness or differences with respect to a given quality or characteristics.

### 2. The Ordinal Level

When the researcher goes beyond this level of measurement and seeks to order his cases in terms of the degree they have any given characteristic, he is working at the original/level of measurement.

Example:

To classify individuals with respect to socio-economic status as lower class, middle class or upper class. He might rank them according to their degree of prejudice against Puerto Ricans.

Student	Rank
Joyce	1 - most prejudiced
Mary	2 - second
Bill	3 - third
Jill	4 - fourth
Kathy	5 - fifth
Jack	6 - sixth
Phillip	7 - seventh
Steve	8 - eighth
Patricia	9 - ninth
Pete	10 - tenth

The ordinal level of measurement yields information about the ordering of categories, but does not indicate the "magnitude of the differences between numbers. It is not possible to determine how much more prejudiced Joyce is than Mary or how much less prejudiced Roberta is than Patricia or Steve. This is because the intervals between the points or ranks on an ordinal scale are not known or meaningful. Therefore it is not possible to assign scores to cases located at points along the scale.

3. The Interval Level

By contrast, it tells us about the ordering of categories and also indicates the exact distance them. Interval measures use constant units of measurement. Example: (dollars or cents, Fahrenheit or centigrade, yards or feet, minutes or seconds), yields equal intervals between points on the scale.

Example:

Student	Score*
Joyce	98
Mary	96
Bill	95
Jill	94
Kathy	22
Jack	21
Phillip	20
Steve	15
Patricia	11
Roberta	6

\* higher scores indicate greater prejudice against Puerto Ricans. It indicates distances separating one from another. Depending on the purpose for which the study is designed, such information might be important to determine, but is not available at the ordinal level of measurement. .

Characteristics of Choosing the Correct Statistical Test

Characteristics	Statistics
1. Nominal data, hypothesis of difference and independent selection (two or more measures)	Chi-Square
2. Nominal data, hypothesis of difference and correlated selection (two measures)	McNemar Test
3. Nominal data, hypothesis of association and any number or cell	Coefficient of Contingency
4. Ordinal data, hypothesis of difference, independent selection and two measures	Mann-Whitney U Test
5. Ordinal data, hypothesis of difference, independent selection and more than two measures	Kruskal-Wallis H Test
6. Ordinal data, hypothesis of difference, correlated selection, and two measures	Wilcoxon T Test
7. Ordinal data, hypothesis of difference, correlated selection and more than two measures	Friedman ANOVA by ranks
8. Ordinal data, hypothesis of association	Spearman r s



9. Interval data, hypothesis of difference, independent selection, and two measures	Independent t Test
10. Interval data, hypothesis of difference, independent selection, two or more measures more than one independent variable	One-Way ANOVA F Ratio Factorial ANOVA
11. Interval data, hypothesis of difference, correlated selection, two or more measures	Paired t Ratio
12. Interval data, hypothesis of difference, correlated selection, two or more measures	Within Subjects F Ratio
13. Interval data, hypothesis of association, two measures with prediction	Pearson r Regression of Y on X
14. Interval data, hypothesis of association, more than two measures with prediction holding one or more factors out	Multiple R Multiple Regression Partial Correlation

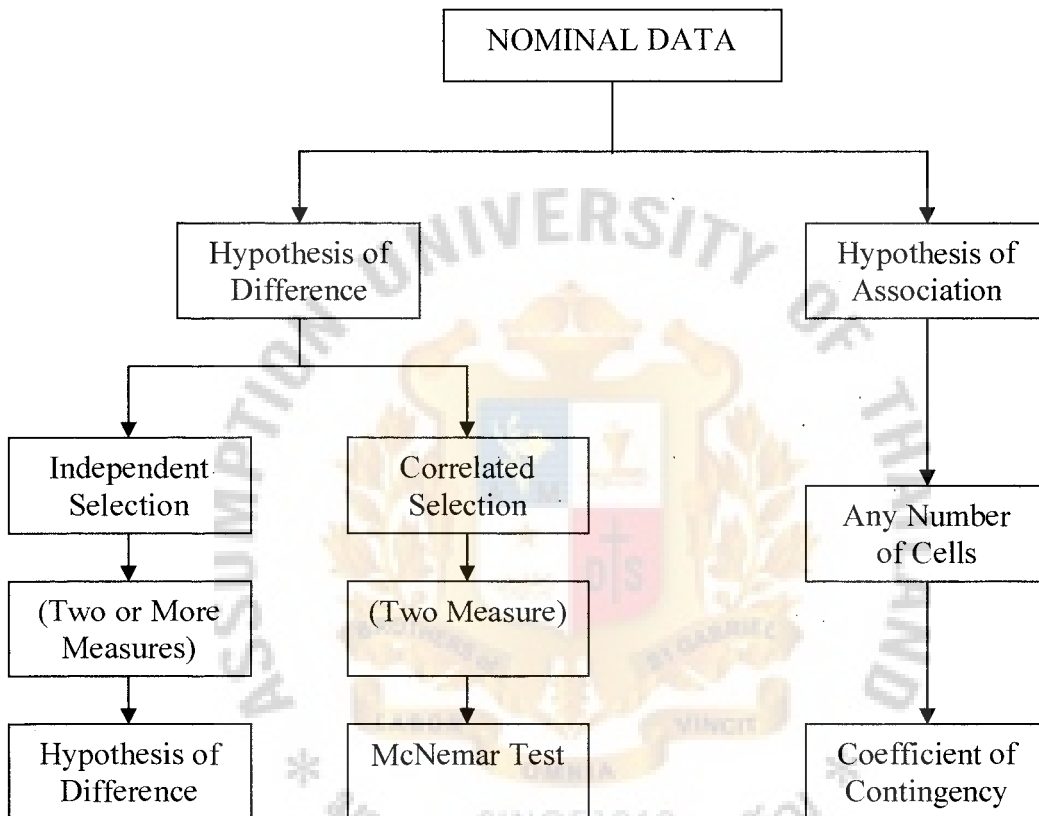
### Definitions of Terms in Statistics

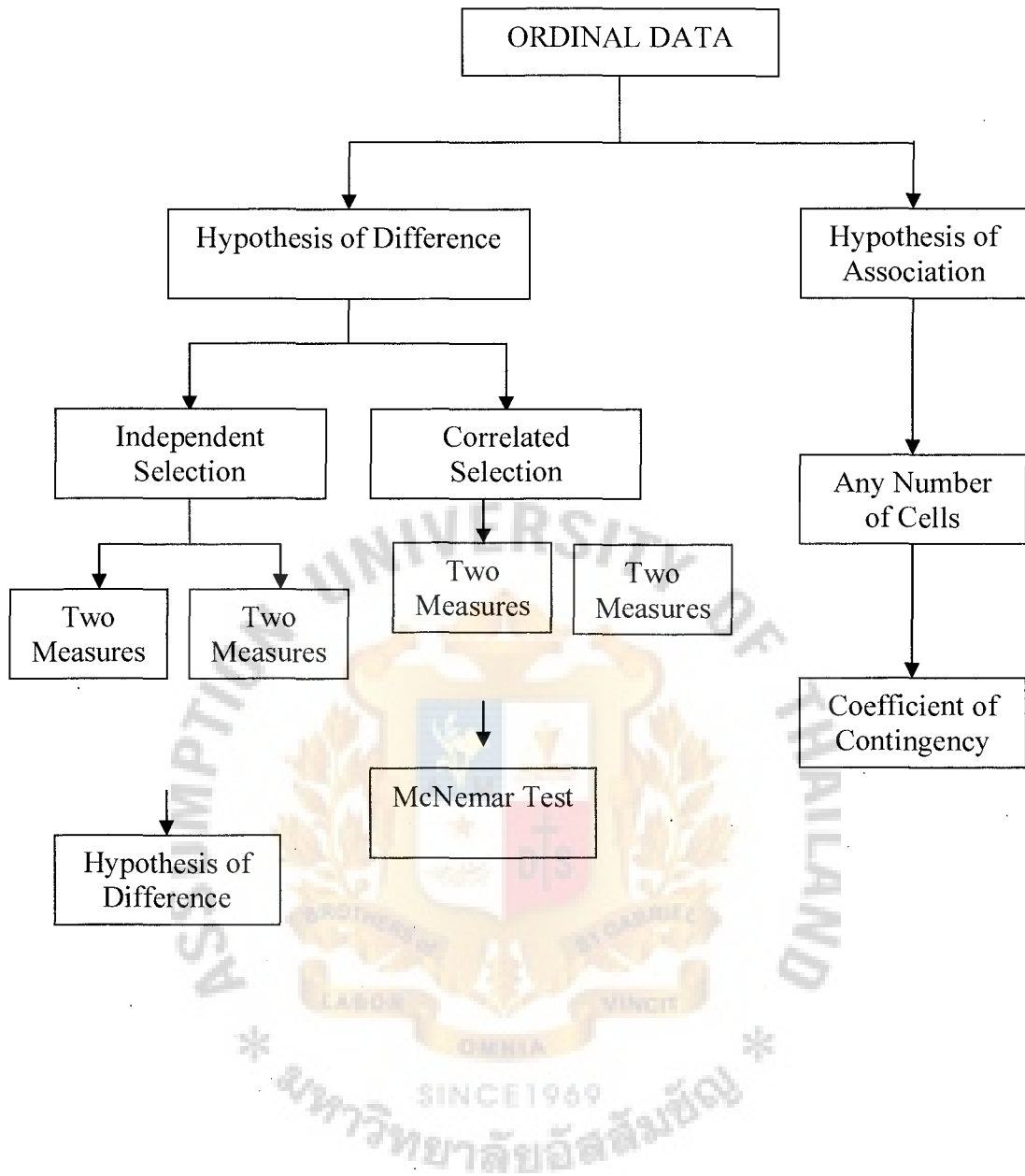
1. Chi-Square - a statistical test of significance used to determine whether or not frequency differences have occurred on the basis of chance. It requires that the data be in nominal form, or the actual number of cases that fall into two or more discrete categories. It is a non parametric test.
2. McNemar Test - a technique developed by the statistician Quinn McNemar, that uses chi-square for the analysis of nominal data from correlated samples.
3. Coefficient of Contingency - a test of correlation on nominal data sorted into any number of independent cells.
4. Mann Whitney U Test - A test on ordinal data of the hypothesis of difference between two independently selected random samples. The U test is the ordinal counterpart of the independent t-test.
5. Kruskal-Wallis H Test - a test of the hypothesis of difference on ordinal data among at least three independently selected random samples. The H test is the ordinal counterpart of the one-way ANOVA.
6. Wilcoxon T - Test-a test on ordinal data of the hypothesis of difference between two sample groups when the selection are correlated (as in the matched-subjects design). The Wilcoxon T is the ordinal counter part of the paired t.
7. Friedman ANOVA by Ranks - a test of the hypothesis of difference on ordinal data when either the sample group have been matched or a single sample has been repeatedly measured. The Friedman ANOVA is the ordinal counterpart of the within-subjects F.
8. Spearman rs - correlation coefficient-devised by Charles E. Spearman for use with rank-ordered (ordinal) data. sometimes called the Spearman p (rho).
9. Independent t- Test-it assumes that the two samples are of equal size.

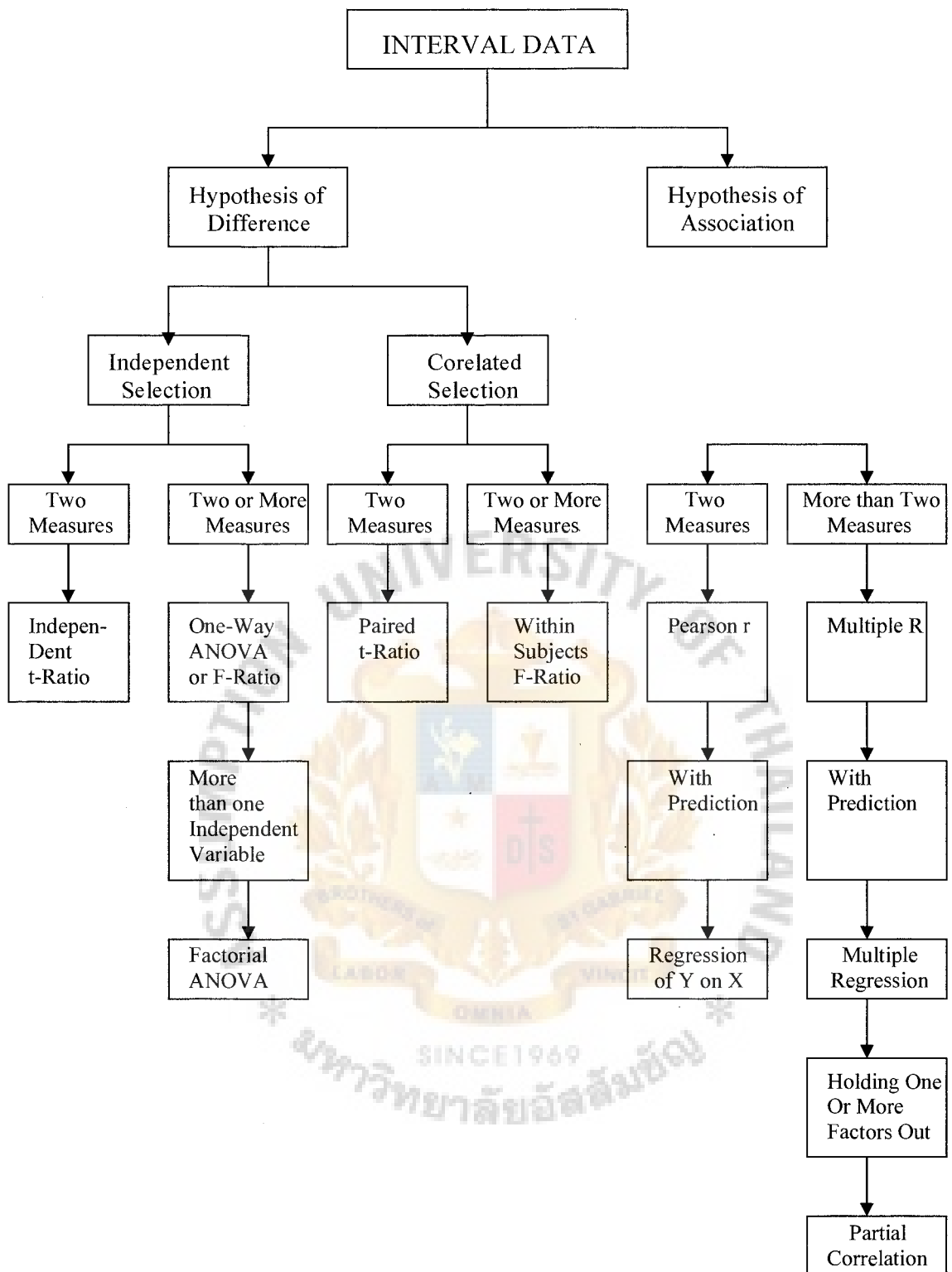
10. One Way ANOVA or F-Ratio - statistical test of significance developed by Sir Ronald Fisher. It is also called the F-ratio, or ANOV A for analysis of variance. The test is designed to established whether a significant (nonchance) difference exists among several sample means. Statistically, it is the ratio of the variance occurring between the sample means to the variance occurring within sample groups. A large F ratio – that is when the variance between is larger than the variance within-usually indicates a nonchance or significant difference.
11. Factorial ANOVA-as opposed to a one-way ANOV A, it allows for the analysis of data when more than one independent variable is involved. Results can be analyzed In the basis of the main effects of each independent variable or on the basis of the possible interaction among the independent variables. Data to be analyzed should be in at least interval form.
12. Paired t-Ratio-statistical test of the hypothesis of difference between two sample means where the sample selection is not independent. The paired t (also called correlated t) requires interval data and is typically used when the design has been before-after or matched-subjects.
13. Within-subjects F-Ratio - statistical test of the hypothesis of difference among several sample means, where sample selection is not independent. It is used when samples are correlated, as in repeated-measure designs and the data are in at least interval form.
14. Pearson r - statistical technique introduced by Karl Pearson for showing the degree of linear relationship between two variables. Also called the product-moment correlation coefficient, it is used to test the hypothesis of association, that is whether there is a relationship between two sets of measurements.
15. Regression of Y on X-the point where the regression line crosses the Y axis. The regression crosses the ordinate, that is we must establish the value of Y when X is equal to zero. this is called the point of intercept or the Y intercept.
16. Multiple R-a single numerical value that quantifies the correlation among three or more variables. the equation for a three variable multiple R.
17. Multiple Regression - technique using the Multiple R for making predictions of one variable given measures on two or more others. It requires the calculation of the intercept (a) and also at least two slopes (b1 and b2). For the three-variable situation.
18. Partial Correlation-correlation technique that allows for the ruling out of the possible effects of one or more variables on the relationship among the remaining variables. In the three-variable situation, the partial correlation rules out the influence of the third variable on the correlation between the remaining two variables. The equation for partialing out the influence of the third variables.
19. Nominal Data - data (measurements) in which numbers are used to label discrete, mutually exclusive categories, nose-counting data, which focuses on the frequency of occurrence within independent categories.

20. Ordinal Data - ranked ordered data, that is derived only from the order of the numbers, not the differences between them. It provides information regarding less than or greater than status, but how much greater or less.
21. Interval Data - data (measurements) in which values are assigned such that both the order of the numbers and the intervals between numbers are known. It provides information how much greater than or less than.

### RESEARCH SIMULATIONS: CHOOSING THE CORRECT STATISTICAL TEST

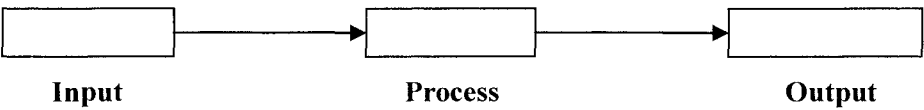




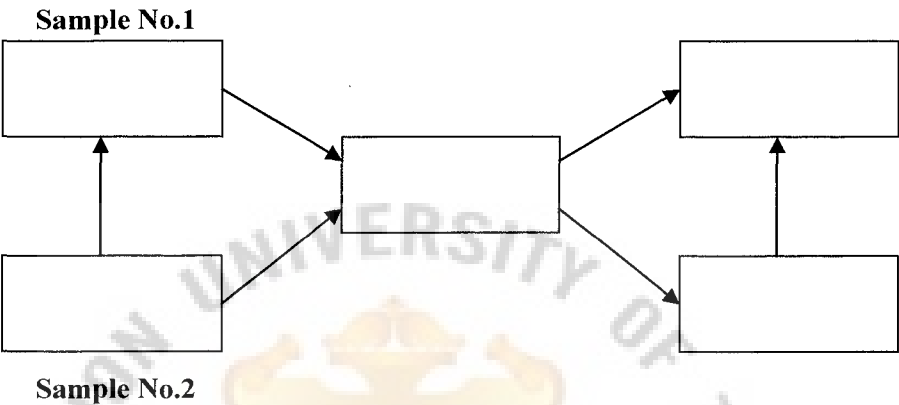


**KINDS OF CONCEPTUAL FRAMEWORKS**

**1.One – Dimensional Frameworks: One sample of respondents**



**2.Two – Dimensional Framework: Two samples of respondents**

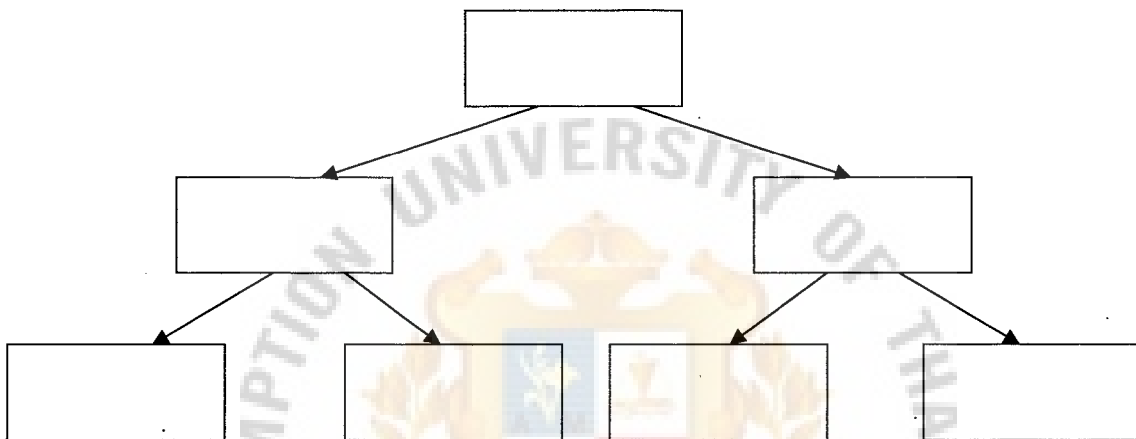


**3.Logical Framework Analysis – American Style: 16 cells relationships.**

	Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Program Goals				
Project Purpose				
Outputs				
Inputs				



#### 4. Logical Framework Analysis - German Style: similar to “Decision Trees”



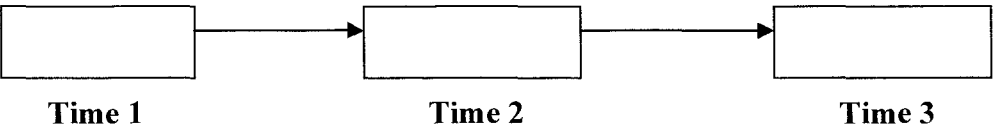
**Hierarchy of Ideas**

**First Level – Main Problem/ Main Variable**

**Second Level – Sub-Problem/ Sub-Variable**

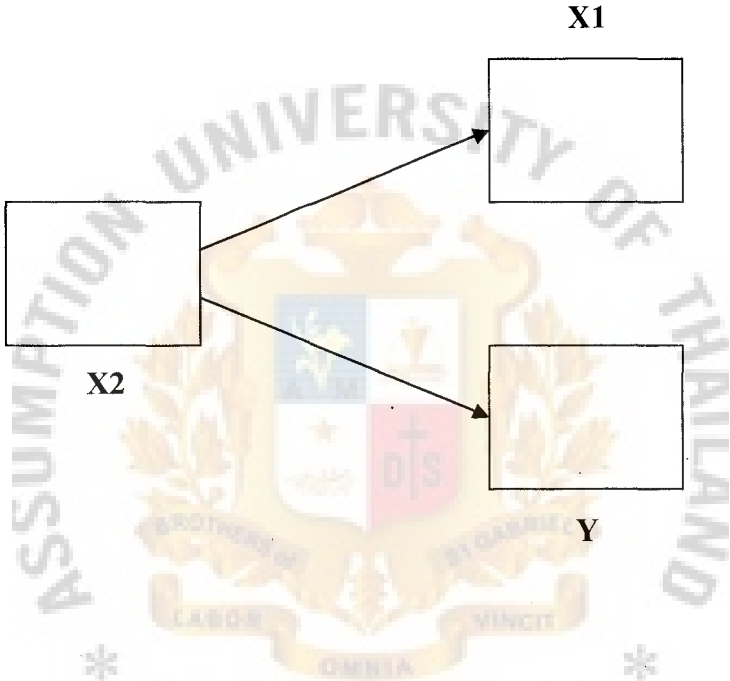
**Third Level – Sub- sub Problem/ Sub- sub- Variable**

5. Path Analysis: time series

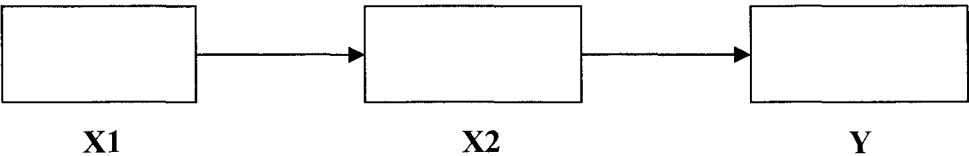


6. Three – some Variable Relationships Frameworks

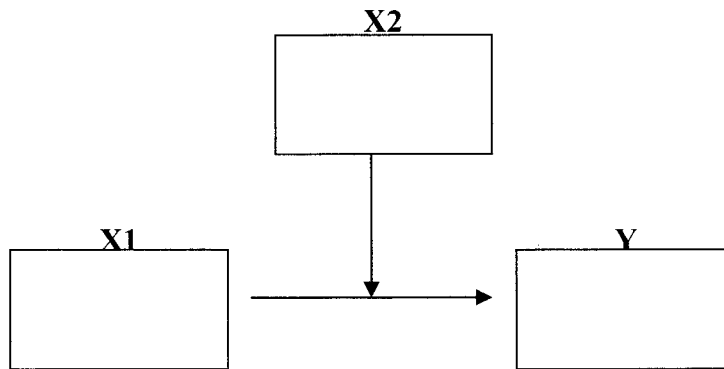
1. Spurious Association of X1 – Y: association between X1 and Y Disappears



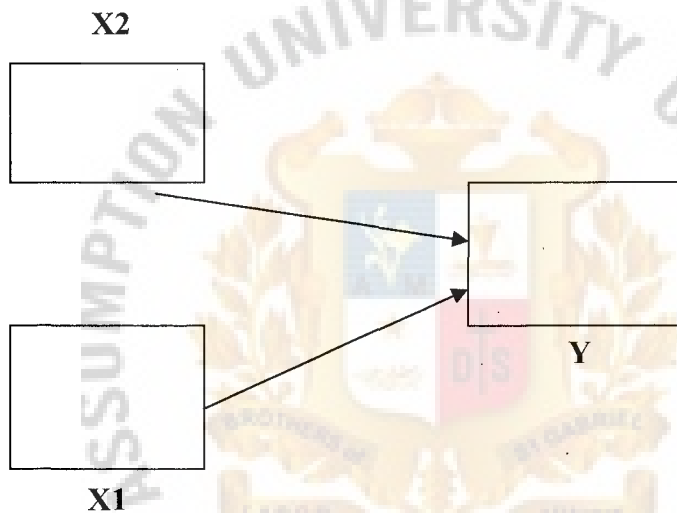
2. Chain Relationship, X2 intervenes, X1 indirectly causes Y: Association between X1 and Y disappears



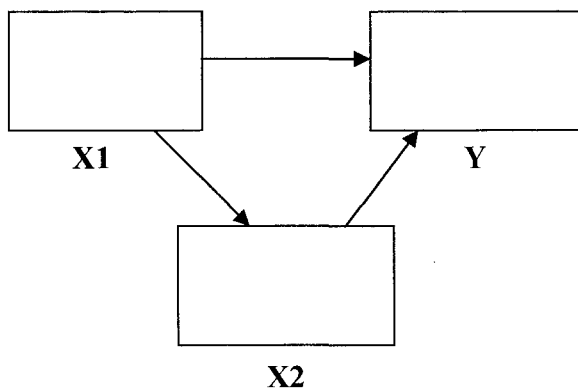
3. Interaction: Association between X1 and Y varies according to level of X2



4. Multiple Causes: Association between X1 and Y does not change.



5. Both Direct and Indirect Effects of X1 on Y: Association between X1 and Y changes, but does not disappear.



## APPENDIXES



## **APPENDIX A**

### **PHYSICAL SPECIFICATIONS**

#### **A.1 Paper**

Plain bond paper, typical for photocopying and printer needs, is acceptable for the thesis. It is required that tables and figures be arranged consistently in uniform font and layout, in the format check copy and in the final copies.

The two final copies of the thesis presented to the GSB Office must be of a uniform format and typed, error-free, on high-quality paper of durability.

Requirements are that the paper be:

- white
- 8.5 inches x 11 inches
- unlined
- of at least 25 percent rag or cotton content, and
- of at least twenty-pound weight.

The use of erasable or recycled paper is not acceptable.

#### **A.2 Copies**

The term “original” refers to the typed thesis prepared with a word processor or typewriter and printed on paper in the format required by the GSB. The term “photocopy” refers to exact duplicates of the original that is prepared by photographic or photocopy means.

#### **A.3 Corrections**

There are to be no errors in the thesis, that is, errors must be corrected so as to be undetectable. Erasure and ink-removal may be acceptable means of correction, however, correction tape, correction fluids, and correction strips are not acceptable means of correction. When extensive corrections are detectable to the thesis examination committee members before the defense, the student may be required to present re-typed pages before the Right-to-Defend is issued. After the defense, pages containing errors must be corrected and replaced prior to when the final thesis is to be submitted.

#### **A.4 Fonts**

The font used should be a common size such as Pice, Elite, Times or Helvetica and not of an unusual style such as Cursive, Script, Gothic or Italic. The entire thesis is to be typed in the same typeface, although exceptions can be made, when necessary, for tables, charts, figures, appended materials and computer-generated data. The font recommended by the GSB is Times New Roman 12.

**A.5 Spacing**

Headings or titles on opening pages (first pages of acknowledgement contents, tables listing, chapters, etc.) must begin approximately 2 inches from the top of the paper. The design and spacing of prefatory pages should follow the format given in the “Sample” pages of this handbook in the Appendix. The 2 inches mark should typically fall somewhere on the line of type, i.e., from the top of the uppercase letter to the bottom of the letters with “tails”.

Text throughout the document is to be 1.5 inches. Judicious use of single, triple, and quadruple spacing to “set off” headings, tables and illustrative materials is sometimes allowed within the Graduate School guidelines

**A.6 Margins**

Because these are ultimately filed as bound volumes in the University’s Library, students must maintain margins, which allow ease of binding and reading of the bound work. Binding pages at the left requires 1.5 inches of the paper to be reserved for the binder’s convenience. Thus, text must be typed on the 6 inches space between the 1.5 inch left and 1 inch right margins. The top and bottom of each page will also maintain a 1-inch right margin. In setting up any centered headings, titles or numbers, centering should take place within the 6.0 inch-long typing line. Text on full pages should fill the space allowed. Some specific fonts lose readability with right and left margin justification. The student may want to prepare a template to indicate the acceptable margins for the finished work.

**A.7 Numbering**

Every page of the thesis is numbered except for the annotation, abstract, title and approval pages. Do not add periods, hyphens, or any other decorative punctuation to page numbers.

Correct	Incorrect
1	1.
2	-2-
3	.3.

For ease in typing the number, consider it part of the actual text, appearing as the first on the last line of the text allowed on each full page.

Chapters and the title of the chapters must be placed in the middle of the page on separate lines. The page numbers of the chapters need not be shown but they must be counted. The main title must be placed at the far-left end of the page with bigger letters. The sub-title must be 8 alphabets from the left end.

After the copyright page will be the first page with a printed number and the numbers will be in Roman Numerals." i ii iii iv... " Roman numerals will be used up to the Abstract page. Begin using cardinal numbers on the first page of the text



of the thesis (from Chapter I till the last page of the thesis). The numbers must be placed at the right hand side of the page.

#### **A.8 Photographs and Illustrative Materials**

Mounting of photographs, drawings, pockets or other illustrative materials onto the thesis pages must be accomplished to assure permanent adherence. Adhesive tape and glue are not acceptable as these materials become unsightly and are impermanent. Materials should be mounted with heat fixed adhesive paper or with permanent-bonding spray adhesive.

Computerized laser equipment, which produces acceptable photographic images, is now available. To ensure that the required level of reproduction and final product is maintained, contact the GSB Office with sample for approval. **Please note that photographic material in theses must be black and white. Color illustrations will not be allowed**

#### **A.9 Lettering and Drawing**

Lettering and drawing for charts, figures, tables, and exhibits must be done neatly in black, permanent ink. Computer-generated text from graphic packages and software is preferred for lettering and drawing. Hand-lettering or drawing must be of professional quality. Every effort must be made to prevent potential smudging and/or 'bleeding' in final library copies.

#### **A.10 Footnotes and bibliography**

**There are several styles of writing footnotes and bibliography but the Graduate School of Business has set only one style (APA Style) to make it easier for the students.**

#### **A.11 Proofreading the Thesis**

It is highly recommended that the final work is professionally and clearly edited, proof-read for errors in grammar, spelling, misused words, sentence construction, etc. This is so for all candidates but particularly so for anyone using English as a second language. The GSB has a form that needs to be attached attesting that the thesis has been proofread (The English Dept. has a list of recognized thesis proof readers). The thesis may also benefit from being academically proof-read by someone other than the supervisors (or potential examiners).

**APPENDIX B:       SAMPLES**  
**B.1     Thesis Title Page (Cover)**

The Influence of Information Search, Involvement and Loyalty on  
Switching Behavior: A Case Study of DTAC's Mobile Phone  
Users in Bangkok Area

By  
Ms. Usanee Kasemkiatsanti

Submitted in Partial Fulfillment of the Requirements for the Degree  
of Master of Business Administration  
Assumption University

Examination Committee:

1. Prof. Dr. Navin Mathur       (Advisor) .....

2. Dr. Ismail Ali Siad       (Member) .....

3. Dr. Chittipa Ngamkroeckjoti (Member) .....

4. Dr. Theerachote Pongtaveewould (Member).....

Examined on:

Approved for Graduation on:

Graduate School of Business  
Assumption University  
Bangkok Thailand

March, 2005.

## B.2: Sample of an Abstract

### Abstract

Owing to the rapidly changing environment and intense competition in Thailand's mobile phone industry, an issue of concern is customer switching behavior among mobile phone service providers. Identification of movement in and out of mobile phone users in the marketplace leads to the requirement for the mobile phone service providers, such as DTAC, to develop appropriate customer retention, loyalty-building efforts and acquisition programs.

The aim of this research was to study the influence of sources of information search, involvement and loyalty on switching behavior of DTAC mobile phone users. In addition, the objectives also were to determine the most influential factors of sources of information search, involvement and customer loyalty that have relationships with switching behavior. The data was collected from 400 DTAC mobile phone users whose age was over 18 years old residing in the Bangkok area only. The chi-square test was employed to test the hypotheses.

The results of the research showed that there was a difference in switching behavior of DTAC mobile phone users when determined by sources of information search. On the contrary, there were no differences in switching behaviors when determined by involvement and customer loyalty.

The findings provide important implications for DTAC to understand the relationship between switching behavior and the predicting factors composing sources of information search, involvement and customer loyalty, which can serve as a guideline for the company to appropriately develop its marketing strategies, such as advertising campaigns, brand cognition and pricing strategies.

### B.3: Sample of a Table of Contents

#### TABLE OF CONTENTS

	Page No.
Committee's Approval Sheet	i
Abstract	ii
Acknowledgements	iii
Table of Contents	iv
List of Tables	v
List of Figures	vi
<b>Chapter 1 – Generalities of the Study</b>	
1.1 Background of the Study	1
1.2 Statement of the Problem	2
1.3 Research Objectives	3
1.4 Scope of the Research	4
1.5 Limitations of the Research	5
1.6 Significance of the Study	
1.7 Definition of Terms	
<b>Chapter II – Review of Related Literature and Studies</b>	
<i>Brief introduction of the chapter</i>	
2.1 Definition and Features of the Independent Variable	
2.2 Theories and Studies Related to the Independent Variable	
2.3 Critical Analysis/Discussion of the Theories Related to the Independent Variable and the Selection of a Generic Set of Sub-Variables	
2.4 Discussion of each of the selected Sub-Variables	
2.5 Relationship of the Independent Variable to the Dependent Variable	
2.6 Definition and Features of the Dependent Variable	
2.7 Theories and Studies Related to the Dependent Variable	
2.8 Critical Analysis/Discussion of the Theories	
2.9 Studies Previous	
<b>Chapter III – Research Frameworks</b>	
3.1 Theoretical Framework	
3.2 Conceptual Framework	
3.3 Research Hypothesis	
3.4 Operationalization of the Independent and Dependent Variables	
<b>Chapter IV – Research Methodology</b>	
4.1 Methods of Research Used	
4.2 Respondents and Sampling Procedures	
4.3 Research Instruments/Questionnaire	
4.4 Collection of Data/Gathering Procedures	
4.5 Statistical Treatment of Data	

## **Chapter V – Presentation and Critical Discussion of Results**

### **5.1 Presentation, Analysis and Interpretation of Data**

## **Chapter VI – Summary, Conclusions and Recommendations**

### **6.1 Summary of Findings**

### **6.2 Conclusions**

### **6.3 Recommendations**

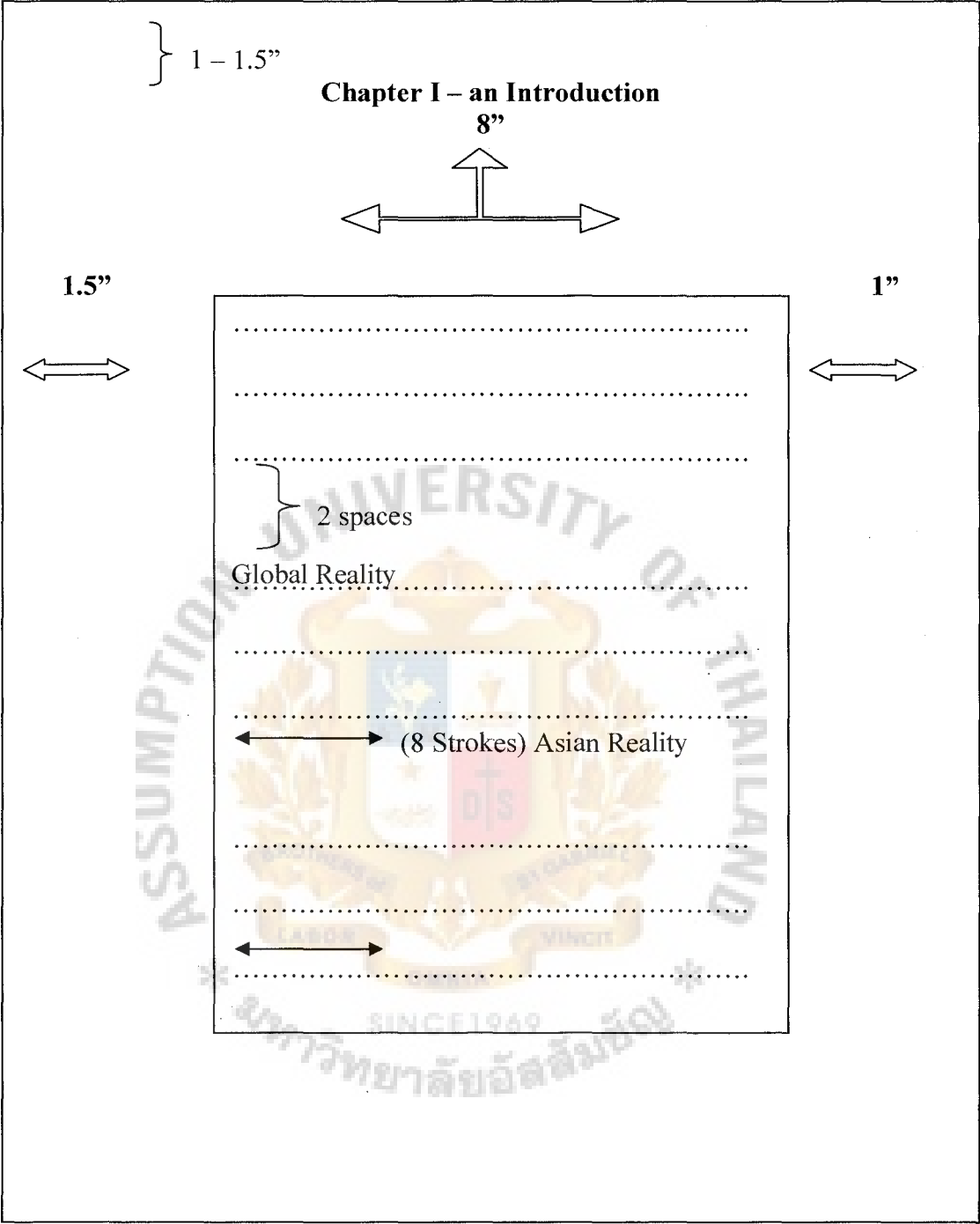
### **6.4 Future Study**

## **Bibliography**

## **Appendixes**



**B.4 : Sample of Chapter, Topics and Pagination**





**APPENDIX C: FORMS AND LETTERS**  
**C.1 Invitation Letter Issued to Advisors**

Thesis Committee  
Graduate School of Business;  
Assumption University  
Ramkhamhaeng Soi 24, HauMak,  
Bangkok 10240, Thailand  
Tel: 662-300-4543-62

Date .....

Dr. ....

Dear Dr. ....,

**Mr. Joseph Sebastian # 483-9019** has requested that you serve as his thesis advisor, and on behalf of the Thesis Committee of the Graduate School of Business, Assumption University, I take great pleasure in inviting you to do so. I am confident that your qualifications, expertise and experience will be beneficial to the student in guiding his toward the successful completion of the thesis.

I hope that you will accept this invitation. If there are queries that you need to clarify in this regard, I will be more than happy to assist.

Thanking you,

Sincerely,

Dr. Ismail Ali Siad  
Chairperson,  
Thesis Committee  
Tel no: 02-3004553-62 ext. 1341  
Email: isiad@au.edu

☐ Accepted

☐ Not accepted

Dr. ....

Contact number .....

## C.2 MBA Thesis Proposal Approval Form

Mr./ Ms. \_\_\_\_\_ Last name \_\_\_\_\_ I.D. No. \_\_\_\_\_

☐ MBA (DAY) ☐ MBA (EVE)

Contact No. \_\_\_\_\_ E-mail address \_\_\_\_\_

Title: \_\_\_\_\_

### 1. Introduction

- 1.1 Statement of the Problems
- 1.2 Brief Review of Literature
- 1.3 Statement of Hypothesis/ Propositions

### 2. Methodology

- 2.1 Population (Subject)/ Sample
- 2.2 Instruments
- 2.3 Design
- 2.4 Procedures

### 3. Data Analysis

### 4. Time Schedule

5. Proposed Advisor's Name: \_\_\_\_\_

Advisor's approved \_\_\_\_\_ Date: \_\_\_\_\_

### Note:

Students are required to **submit the framework** to the chairperson of thesis (number 1-4)

Students are required to **submit the Thesis Proposal Approval Form with an advisor's and chairperson's signatures at OGS**

Approved by Chairperson of Thesis  
Assumption University  
MBA Program

Date: \_\_\_\_\_

Tear

**Return this part to student: (MBA Thesis Proposal Approval Form)**

**Student's name** ..... **I.D. No.** .....

- Each advisor is allowed to have 5 advisees at a given time and not exceeding 15 per academic year.
- **To be eligible for Graduation Commencement for each academic year**
  - Submission for **Proposal Defense**: within 15<sup>th</sup> October, .....
  - Submission for **Final Thesis Defense**: within 15<sup>th</sup> November, .....
  - Submission for **Binding**: within 9<sup>th</sup> December, .....

Received date: \_\_\_\_\_ Received by: \_\_\_\_\_ (OGS Staff)

1. Students need to **collect the MBA Thesis Proposal Approval Form** at Office of Graduate School (OGS) in order to discuss a thesis topic with an advisor for approval before meeting the chairperson for thesis to ask for acceptance.
2. Students need to **submit the MBA Thesis Proposal Approval Form** to OGS ( after getting approval signature from an advisor and chairperson for thesis)
  - ▶ Each advisor is allowed to have 5 advisees at a given time and not exceeding 15 per academic year (May-April)
  - ▶ The results of Approval Form will be successes, when students get the Advisor Invitation Letter from OGS.
3. If the thesis committee approves your topic and advisor, then you should register for thesis 6 credits at the Office of University Registrar and another 6 credits before final thesis defense. **For avoiding the University fees, Internet fees, etc,** students should register another 6 credits within the same term that you had registered for the first 6 credits (within one trimester as Jan.-Apr., (or) May.-Aug., (or) Sept.-Dec.).

**Students with I.D. 473-xxxx onwards, should register thesis only at the beginning of a trimester (January, May, and September).**

**\*\*Please note that thesis must be completed within 3 terms (2 terms for proposal defense and 1 term for final defense. If not finish, students need to extend thesis status: 4,800 bath/term**

4. Students need to submit the following documents for **proposal defense** within deadline--**10<sup>th</sup> of every month**

- ▶ 4 **copies of the proposal** with advisor's signature on every cover page.
- ▶ 1 copy of **Thesis Registration Receipt**
- ▶ Defense Fee: 3,000 baht (Only for students who fail and reapply)
- ▶ 1 **Thesis Evaluation Form (TEF Form)** (Available at OGS)

👉 Thesis Defense Schedule will be informed by e-mail and posted on the stand board, 2 days after deadline.

👉 **Proposal Defense:** In the third week of every month

👉 **Final Defense:** In the last week of every month

**To be eligible for Graduation Commencement of each academic year**

♦ **Submission for Proposal Defense:** should be **within 15<sup>th</sup> October** of every year

Late submission is not allowed.

5. With the approval of the thesis proposal, students need to pay for the remaining 6 credits

👉 If a student does not pass the defense, he/she needs to submit again.

👉 If a student passes the defense, he/she need to have the thesis edited (request a qualified editor- someone who understands your topic and is good at English). **The editor has to sign a Grammar Checking Form**; the form can collect at OGS and print 5 copies for final defense.

6. Students should fulfill the requirement of total 48 credits, and then they can submit the following documents for **final defense** within deadline-- **10<sup>th</sup> of every month**

Continued→

- ▶ 5 copies of final thesis with advisor's signature on every cover page.
- ▶ **Grammar Checking Form** with signature from Grammarian/ Editor (Available at OGS)
- ▶ **Pay for Defense Fee:** 3.000 baht (15,000 baht in case of re-applying)
- ▶ **1 Thesis Evaluation Form (TEF Form)** (Available at OGS)

**To be eligible for Graduation Commencement of each academic year**

- ♦ **Submission for Final Defense:** should be within 15<sup>th</sup> November of every year

Late submission is not allowed.

☞ If student does not pass the defense, please submit again.

☞ If student passes the defense, go to step 7.

## 7. Final corrections and improvement

If there is any change in the thesis cover (Thesis Topic), students need to inform coordinator to re-print. It is a student's responsibility to **follow up to get all committee members' signatures** (except for the MOE Representative's Signature).

## 8. Final Submission to Office of Graduate School

**To be eligible for Graduation Commencement of each academic year**

**Submission for binding:** within 9<sup>th</sup> December of every year

- ▶ At least **3 copies of Thesis** (lose papers) should be submitted.
- ▶ Pay for **Binding Fee: 200 baht per book**
- ▶ Pay for Post Sending Fee: 200 baht per book, if you want the thesis to be sent to you by post (within Thailand only)
- ▶ **Submit 3 CD-ROM**
  - **1<sup>st</sup> CD-ROM should include the whole thesis, starting from the cover page until the last page of the thesis and it must be saved only in one file**
  - **2<sup>nd</sup> CD-ROM should include "abstract" of thesis only**
  - **3<sup>rd</sup> CD-ROM includes article which should be the same as the hard copy**
- ▶ **1 hard copy of article**, on its cover page both the advisor and Dr. Ismail need to sign for their approval
- ▶ Submit **1 acceptance letter** from the publisher or editor of a recognize journal which includes the name of publisher, number of volume (e.g. Volume 9 Number 3), the month which will be published (for student would like to publish his/her work with outside journal not from AU)
- ▶ **1 Student Information Sheet** (Guideline will be available at OGS and Website)

### New Regulation

**Students need to have the thesis published or obtained an acceptance of publications in a recognized journal or academic publications or present the thesis at a conference which has the proceedings.**

**(This regulation will be effective from student I.D.491-xxxx onwards as well as students who made proposal defense from May 2006 onwards)**

**Late submission is not allowed.**

Students need to register for graduation in the last week of November for getting the Master Degree Certificate.

📅 Binding Process will take 2 months after submission.

# Assumption University

## MBA Proposal/ Thesis Submission for Defense

Mr./ Ms. \_\_\_\_\_ Surname \_\_\_\_\_ I.D. No. \_\_\_\_\_ ☐ MBA (DAY) ☐ MBA (EVE)  
 Contact No. \_\_\_\_\_ E-mail address \_\_\_\_\_  
 Advisor \_\_\_\_\_

☐ **Proposal Defense**

Required documents

- 1) 4 copies of **Proposal**  
(With approval signature from advisor on the cover page)
- 2) 1 copy of **Thesis Registration Receipt**
- 3) Pay for **Defense Fee: 3,000 baht**  
(ONLY for the student who failed and reapply)
- 4) 1 **Thesis Evaluation Form (TEF Form)**  
(Available at OGS)

**Topic:** .....  
 .....  
 .....

☐ **Final Thesis Defense**

Required documents

- 1) 5 copies of **Final Thesis**  
(With approval signature from advisor on the cover page)
- 2) 1 **Grammar Checking Report/ Letter**
- 3) Pay for **Defense Fee: 3,000 baht**  
**(15,000 baht in case of re-apply)**
- 4) 1 **Thesis Evaluation Form (TEF Form)**

**Staff Only:**

**Receipt No.** \_\_\_\_\_ **Amount** \_\_\_\_\_ **baht. Received date:** \_\_\_\_\_ **Received by** \_\_\_\_\_

Tear

**Return this part to student: (Submission for Defense)**

**Student's name** ..... **I.D. No.** .....

- **Thesis defense Schedule** will be informed by e-mail and posted on the stand Board.  
 The committees will collect thesis for setting the schedule on **10<sup>th</sup> of every month**  
**Proposal Defense:** In third week of every month  
**Final Defense:** In last week of every month
- **Thesis orientation** will be organized every first month of each trimester
- **To be eligible for Graduation Commencement of each academic year**  
 Submission for **Proposal Defense:** within 15<sup>th</sup> October .....  
 Submission for **Final Thesis Defense:** within 15<sup>th</sup> November .....  
 Submission for **Binding:** within 9<sup>th</sup> December .....
- **Grammar Checking/ Editing** is indispensable prior to submission of the final thesis defense
- Each advisor is allowed to have 5 advisees at a given time and not exceeding 10 per academic year
- **Required Conditions for Graduation:**
  - Complete 48 credits courses and given foundation courses
  - Have submitted thesis paper for binding
  - Have the thesis published or present the thesis at a conference which has the proceedings
  - Pass Internship (for MBA DAY only)
  - Attend at least 6 times Speaker of the Month (for MBA DAY only)

**Have been submitted, Received date:** \_\_\_\_\_ **Received by:** \_\_\_\_\_ (staff signature)

**Thesis Evaluation Form**  
**Graduate School of Business Administration**  
**Assumption University of Thailand**

**Overall Committee Result (decided by chairman):** ( ) A ( ) B ( ) C ( ) D

1.8 others

### 2.3 Discussion/ Critical Analysis of Related Studies



**Examiner's Comments:**

**Chapter 3** Research Frameworks

3.1 Definition of Variables

3.3 Research Hypothesis  
Variables

3.2 Conceptual Framework

3.4 Operation of the Independent and Dependent

**Chapter 4** Research Methodology

4.1 Respondents and Sampling Procedures

4.2 Research Instruments and Questionnaire

4.3 Collection of Data/Gathering Procedures

4.4 Statistical Treatment of Data

**Chapter 5** Presentation of Data & Critical Discussion of Results

5.1 Presentation and Discussion of Data

5.2 Interpretation of Statistical Results

5.3 Analysis and Critical Discussion of Results

5.4 others



- b. Cite/ quote sources of literatures: *wrong/missing references*
- c. Others

7. **English Language:**

- a. Grammar
- b. Spelling, punctuation marks
- c. Words & expression
- d. Others

8. **Content:**

- a. *Unclear* content
- b. *Disjointed* ( difficult to understand how ideas, events etc. follow each other and develop)
- c. *Insufficient/missing* relevant & related theory/ previous studies/ information (data, figures,...)
- d. *Irrelevant* theory/ previous studies/ information
- e. *Insufficient /missing/wrong* framework
- f. *Irrelevant /wrong/missing* methodology
- g. *Insufficient /irrelevant* data presentation
- h. *Irrelevant/ wrong* statistics, statistical results & interpretations

3.9 *Missing/ wrong/ irrelevant implications*

3.10 *Lacking originality & contributions*

3.11 *Irrelevant/ insufficient conclusions & recommendations*

**Process of Evaluation:**

Each evaluator/examiner reads and uses proposed criteria/indicators to evaluate a student's thesis. If **many minor mistakes** or few **serious (major) mistakes** are found out, an evaluator can use them as a basis for giving a **D-grade** which is *unsatisfactory* and major improvement as well as reapplication of a thesis defense are required. Each evaluator's overall result either **A, B, C or D** is submitted to the Chairman who will summarize overall results given by all committee members.

The **Committee Result** is based on the *majority decision*, which is *two-thirds or three-fourths* of the committee members. If the **Committee Result** is **A, B or C-grade**, the student passes the defense with some suggested improvements. However, if a **D-grade** is obtained, which means *unsatisfactory* and *major improvements and some contributions* are required, he/she *could reapply* for a thesis defense *after two weeks*.

C.6

**ASSUMPTION UNIVERSITY  
GRADUATE SCHOOL OF BUSINESS  
Recommendations of the Thesis Examining Committee**

**Student Name :** Ms. Suchitra Champi  
**Student Code :** 453-9057  
**Title of Thesis :** Perceptions and Attitudes of Consumers' towards Extrinsic and Intrinsic Cues of Store Brand Quality: A Case Study of Tesco Brand Beauty Products

- ☐ A. Good
- ☐ B. Satisfactory / minor improvements & contributions
- ☐ C. Acceptable / major improvements & contributions
- ☐ D. Reapply

**Comments :**

---

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**Thesis Examining Committee Members :**

Dr. Sirion Chaipoopirutana  
Advisor

Dr. Theerachote Pongtaveewould  
Committee Member

Dr. Ismail Ali Siad  
Committee Member

Dr. Patricia Arttachariya  
Committee Member

Asst. Prof. Chatpong Tangmanee  
MOE Representative

C.7

**Graduate School of Business  
Assumption University**

**Form signed by Proofreader of the Thesis**

I, -----, have proofread the thesis entitled -----

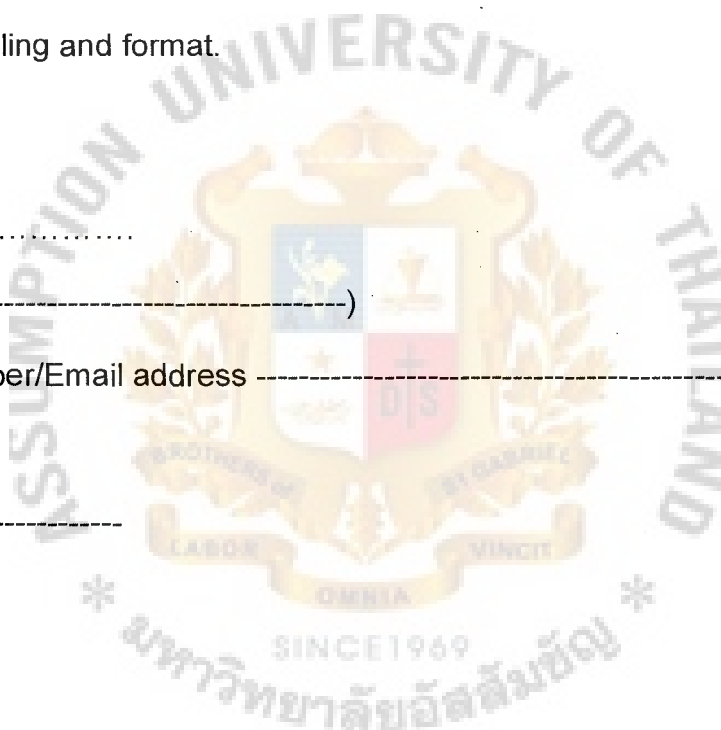
and hereby certify that it conforms to generally acceptable standards for  
verbiage, spelling and format.

Signed.....

(-----)

Contact Number/Email address -----

Date: -----



**C.8 Assumption University of Thailand**  
**Graduate School of Business (MBA Program)**  
**Thesis Evaluation Form (to be completed by the candidate)**

<b>A) Chapter 1:</b>	<b>YES</b>	<b>NO</b>
1. Chapter title: is the title "Introduction" used?	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there an introduction paragraph for the content of the chapter?	<input type="checkbox"/>	<input type="checkbox"/>
3. Background: is background relevant to the topic of study?	<input type="checkbox"/>	<input type="checkbox"/>
4. Statement of Problem: does it include a research question?	<input type="checkbox"/>	<input type="checkbox"/>
5. Research objective: does it include a list of specific objectives?	<input type="checkbox"/>	<input type="checkbox"/>
6. Scope of the study: does it define the focus of the study?	<input type="checkbox"/>	<input type="checkbox"/>
7. Limitation of the study: are the assumptions of the study specified?	<input type="checkbox"/>	<input type="checkbox"/>
8. Definition of terms: are all the variables/concepts defined?	<input type="checkbox"/>	<input type="checkbox"/>
9. Others: industry background? Tables/graphs explained? Font size?	<input type="checkbox"/>	<input type="checkbox"/>
<b>B) Chapter 2:</b>		
1. Is the title "Review of Related Literature and Empirical Studies"?	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there an introduction paragraph for the content of the chapter?	<input type="checkbox"/>	<input type="checkbox"/>
3. Is the underlying theory presented and discussed thoroughly?	<input type="checkbox"/>	<input type="checkbox"/>
4. Is there a discussion of the relationships of relevant variables?	<input type="checkbox"/>	<input type="checkbox"/>
5. Is there a critical analysis of the various relevant theories?	<input type="checkbox"/>	<input type="checkbox"/>
6. Is there a critical analysis of previous related studies?	<input type="checkbox"/>	<input type="checkbox"/>
7. Is there a discussion of methodologies used in previous studies?	<input type="checkbox"/>	<input type="checkbox"/>
8. Is there a summary table of previous related studies?	<input type="checkbox"/>	<input type="checkbox"/>
<b>C) Chapter 3:</b>		
1. Is the title "Theoretical and Conceptual Framework" used?	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there an introduction paragraph for the content of the chapter?	<input type="checkbox"/>	<input type="checkbox"/>
3. Is there a diagram of the conceptual framework?	<input type="checkbox"/>	<input type="checkbox"/>
4. Is the conceptual framework properly labeled?	<input type="checkbox"/>	<input type="checkbox"/>
5. Is the theoretical explanation of the variables and the relationships among these variables presented?	<input type="checkbox"/>	<input type="checkbox"/>
6. Is an operational table of the variables/concepts provided?	<input type="checkbox"/>	<input type="checkbox"/>
7. Are there statements of hypotheses (Ho & Ha)?	<input type="checkbox"/>	<input type="checkbox"/>
8. Are the mathematical expressions of the hypotheses provided?	<input type="checkbox"/>	<input type="checkbox"/>
9. Is the level of significance ( $\alpha$ ) set?	<input type="checkbox"/>	<input type="checkbox"/>
10. Is the "reject-do not reject" Ho criterion specified?	<input type="checkbox"/>	<input type="checkbox"/>
<b>D) Chapter 4:</b>		
1. Is the title "Research Methodology" used?	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there an introduction paragraph for the content of the chapter?	<input type="checkbox"/>	<input type="checkbox"/>
3. Is the research method specified and discussed?	<input type="checkbox"/>	<input type="checkbox"/>
4. Is the unit of analysis and target population well defined?	<input type="checkbox"/>	<input type="checkbox"/>
5. Are the respondents/sample and sampling procedure well defined?	<input type="checkbox"/>	<input type="checkbox"/>
6. Is the questionnaire, if needed, provided?	<input type="checkbox"/>	<input type="checkbox"/>



- |                                                                                                                           |                          |                          |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 7. Is the questionnaire a standard instrument?                                                                            | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Is the questionnaire consistent with the conceptual framework?                                                         | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Is the data analysis method presented and justified?                                                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Are the assumptions of the statistical model discussed and in line with the nature of the data and research question? | <input type="checkbox"/> | <input type="checkbox"/> |

### E) Chapter 5:

- |                                                                                   |                          |                          |
|-----------------------------------------------------------------------------------|--------------------------|--------------------------|
| 1. Is the title “Data Presentation and Critical Discussion of Results” used?      | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Is there an introduction paragraph for the contents of the chapter?            | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Is the descriptive analysis of the data provided and discussed?                | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Is the inferential statistics results presented and discussed?                 | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Is a summary of the results of hypotheses testing provided?                    | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Is there a critical analysis of the statistical results of hypotheses testing? | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Are there managerial interpretations of the results of data analysis?          | <input type="checkbox"/> | <input type="checkbox"/> |

### F) Chapter 6:

- |                                                                       |                          |                          |
|-----------------------------------------------------------------------|--------------------------|--------------------------|
| 1. Is the title “Conclusion and Recommendations” used?                | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Is there an introduction paragraph of the contents of the chapter? | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Are conclusions based on the research problem and objectives?      | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Is there any conclusion based on the hypotheses testing results?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Are the recommendations based on the results of the data analysis? | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Are the recommendations in line with the research objectives?      | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Are the recommendations realistic, given the situation?            | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Are there suggestions for further study?                           | <input type="checkbox"/> | <input type="checkbox"/> |

### G) Abstract and Acknowledgement

- |                                                                    |                          |                          |
|--------------------------------------------------------------------|--------------------------|--------------------------|
| 1. Is there an abstract page right after the cover page?           | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Does the abstract page contain only three or four paragraphs?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Is there an acknowledgement page right after the abstract page? | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Is the acknowledgement page initialed?                          | <input type="checkbox"/> | <input type="checkbox"/> |

### H) Others

- |                                                                         |                          |                          |
|-------------------------------------------------------------------------|--------------------------|--------------------------|
| 1. Is the bibliography in accordance with APA format?                   | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Is the bibliography listed alphabetically based on the surname?      | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Is the questionnaire provided in the appendix?                       | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Are the statistical tables, graphs, etc. provided in the appendix?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Are the raw data provided in the appendix?                           | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Is the cover/title page in accordance with GSB format?               | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Are the tables of content, graphs, charts, etc. in proper font size? | <input type="checkbox"/> | <input type="checkbox"/> |

**I) Personal Declaration:**

I, \_\_\_\_\_, I.D. \_\_\_\_\_, hereby declare that I have completed my thesis proposal/final manuscript with honesty and without plagiarism. I also declare that I have listed in the bibliography, properly cited and given credit to its author(s) any academic material or reference I have used for the purpose of completing my thesis. I take full responsibility and accept the consequence for any act of plagiarism with respect to my thesis entitled

“ \_\_\_\_\_ ”

Signed by thesis writer:

Date Signed: \_\_\_\_\_

( \_\_\_\_\_ )



## **Appendix D: Frequently Asked Questions**

### **D.1 How do I choose an advisor?**

A student is free to approach any full-time GSB Faculty member to ask for permission to be his/her advisor. A student may also approach a full-time or part-time faculty member (who is approved as an advisor) working in another program in Assumption University. The student must make a formal application to the Thesis Chairperson for the choice of the topic as well as the advisor.

### **D.2 How many chapters and copies do I have to submit for the proposal?**

Once your application is approved, you have to work closely with your advisor and submit four (4) chapters for the Thesis Proposal. These are: Chapter I: Generalities of the Study; Chapter II: Review of Literature and Related Studies; Chapter III: Research Frameworks; and Chapter IV: Research Methodology. You will need to submit four copies of the proposal to the GSB.

### **D.3 Do I have to write a thesis in my major?**

No, if you are enrolled in the General MBA. Yes, if you are registered for a specialization in either Marketing or Finance. We encourage you to bring the study of your major field to bear on your thesis work. Often a student will do a thesis that spans more than one discipline, but usually one is her/his major. It is probably not a good time to try to master a new field of study while writing your thesis.

### **D.4 How long should my thesis be?**

How many times have we heard students ask that question? The answer is dependent on many variables including your major or area of concentration, the particular topic your thesis addresses, and the way in which you present your completed thesis. In the humanities and social sciences, theses often are between 120 and 150 pages. Another way of thinking about a thesis and its length is to keep in mind that this is the outcome of four, three-credit courses and your work should reflect that.

### **D.5 When should I start thinking about my topic and advisor for a thesis?**

Since these decisions are so important, we suggest you begin this process in the first semester of your second year. Some advisors have told us that an early start is the crucial factor in producing a successful thesis. The members of the Thesis Committee are very interested in helping you make a thoughtful decision — stop by and see us anytime!

### **D.6 How do I choose a topic for my thesis? How do I choose an advisor for my thesis?**

In almost equal proportions, some students start with the topic and others start with the advisor.

Perhaps you are certain as to the focus of your thesis. In this scenario your next step is to find an advisor. With topic in hand, you might informally chat with lecturers with whom you've had good experiences in the past. One of them might be a good candidate, or they might be able to direct you to others for whom the topic might be more appropriate. This might take some time, but you are bound to learn in the process. Alternatively, perhaps you have a particular lecturer in mind whom you always thought would be a perfect thesis advisor. Your next step is to see if that lecturer has any ideas that might excite your interest. If your first choice doesn't work out, there will certainly be other lecturers who might have an interest in your area of research

**D.7 What is the most important decision I will make during this process?**

Almost certainly it is choosing your thesis advisor. You will have to work very closely with this individual over the course of an entire year. This can be an immensely rewarding situation, but it can also be somewhat problematic if you are not careful. Your choice should be based on the scholarly expertise of the potential advisor as well as the ability of the two of you to communicate and cooperate on your endeavor. The relationship must be one of mutual respect; as you rely on your advisor for help, support, and encouragement, you must demonstrate a serious and scholarly commitment to the undertaking

**D.8 What does my advisor do?**

It is crucial that you understand the responsibilities of the thesis advisor, and equally important that you communicate this to a prospective advisor. Occasionally, it will cause the faculty member to rethink the advisability of taking on the position. However, it is perhaps more important you remember that

**YOU are responsible for the timely and successful completion of your thesis. It is this independence and commitment that separates thesis work from normal coursework.**

**The thesis advisor agrees to**

- work with the student to refine and focus the student's interests into a suitable thesis;
- provide clear expectations for the thesis/project, addressing length, assessment, and other aspects related to scholarship in the particular discipline;
- help the student identify academically appropriate thesis committee members;
- be prepared to meet with the student regularly throughout the duration of the project;
- read and comment on drafts of the thesis as it develops.

**D.9 Does my advisor have to be in the GSB?**

Usually. However, in some situations faculty members in other disciplines or departments may be perfectly qualified to supervise your thesis. You'll have to

check with the chair of the Thesis Committee in your specific case — and you'll need the chair's approval on your Approval Form

**D.10 I have an advisor - what is a thesis examining committee?**

Your thesis examining committee is composed of your advisor, three additional faculty members, and one external MOE representative. These faculty members serve as additional readers for your thesis — providing you with guidance, other perspectives, and balance. This committee also oversees your thesis defense, and in that role it determines how you will be evaluated on your thesis

**D.11 What happens at the final defense?**

Thesis final defenses are designed to last approximately 1.5 - 2 hours. Typically, the first hour is devoted to a discussion of your thesis work. Usually you will be asked to present a summary of your thesis for twenty to thirty minutes, after which the committee will engage you in a discussion for the remaining time. During this discussion, as well as after the defense, suggestions for revisions may be made.

**D.12 What are the examining committee members doing in there when they ask me to leave the room?**

At this time, the committee deliberates as to the grade you will be accorded.

The grades are

A = *Good*

B = *Satisfactory / minor improvements & contributions*

C = *Acceptable / major improvements & contributions*

D = *Reapply*

They will make this recommendation taking into consideration the thesis/project as well as its presentation, the bibliography and its discussion. They will record that recommendation on an Evaluation Form and invite you back into the room for the good news!

**D.13 What about revisions?**

Bad news — a thesis is never done! Almost every thesis requires some amount of work before the final version is accepted. In the vast majority of cases, this is nothing more than minor, word-processing changes. In a very small number of situations, it might entail more serious changes and revisions

**D.14 What is plagiarism?**

Plagiarism is using another person's words or ideas without giving credit to the other person. When you use someone else's words, you must put quotation marks around them and give the writer or speaker credit by revealing the source in a citation. Even if you revise or paraphrase the words of someone else or just use

their ideas, you still must give the author credit in a note. Not giving due credit to the creator of an idea or writing is very much like lying.



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# A HANDBOOK ON THESIS WRITING

## **MBA PROGRAM**

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