ACQUISITION RESEARCH

HANDBOOK SERIES

Analysis Planning Methodology:

For Thesis, Joint Applied Project,

& MBA Research Reports

Brad R. Naegle, Senior Lecturer

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Preface

This handbook is one of a series of four produced for the Acquisition Research Program (ARP) at the Naval Postgraduate School. The purpose of the ARP Handbook Series is to provide helpful information in a user-friendly format to assist graduate students and others in improving their research and writing skills.

The ARP Handbook Series includes the following:

- *Analysis Planning Methodology: For Theses, Joint Applied Projects, & MBA Research Reports*

- *Writing Style & English Usage*

- *APA Citation Style (6th edition)*

- *Effective Tables, Figures, & Frequently Used Terms*

For additional copies, please visit the Acquisition Research Program Office at the Graduate School of Business & Public Policy in Ingersoll 372. The handbook series can also be downloaded from our website (www.acquisitionresearch.net).

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A. Purpose

This guide provides the graduate student researcher—you—with techniques and advice on creating an effective analysis plan, and it provides methods for focusing the data-collection effort based on that analysis plan. As a side benefit, this analysis planning methodology will help you to properly scope the research effort and will provide you with insight for changes in that effort.

B. Background

If you are like most novice researchers, you probably have some experience with single-issue topics of limited scope—such as class projects, point papers, decision briefs, and so forth. While all of these exercises are valuable and help in developing critical thinking skills, the research techniques for these smaller scope efforts usually are less applicable to larger scale efforts.

With small-scale, single-issue research efforts, the researcher typically searches for any and all data that pertain, even remotely, to the research topic. Because of the limited size of such projects, it is fairly easy to sift through all of the data collected, keeping the most useful to the effort and discarding the rest. The data retained is then analyzed and may actually drive the analysis effort. This method is known to most novice researchers and is the approach I see the most employed by graduate student researchers (and is the methodology I used in researching my own thesis!). Based on my experience, this method creates several problems for larger scale research efforts, including the following:

1. Inefficient use of time. Using this method, you waste significant time and effort in collecting data that you will not analyze as well as in sifting through the volumes of data that you collected in order to glean the small amount of relevant data.

2. Improper analysis technique. This method requires you to shape your analysis to fit the data you've collected rather than to collect data that supports an accurate analysis of the material.

3. Poorly estimated research scope. The result of this

method is usually a discovery after you've spent hours of effort collecting data that your research scope is too broad and that your data are unmanageable.

4. Incorrect research organization. Using this method, you organize the research product around the data you've collected, making it difficult for the reader to follow the intended analytical logic.

It is important to remember that each piece of data you collected was composed by a different writer with a specific subject, purpose, and audience in mind. Rarely—if ever—will another researcher's subject, purpose, and audience be exactly parallel with yours.

Because you have your own particular subject, purpose, and audience for your project, you must choose your data for its applicability to your topic—not your topic for its applicability to your data.

C. Planning for Analysis and Analysis-Centered Research

The purpose of the graduate-level thesis, MBA project, or joint applied project is to demonstrate critical thinking through analysis, not through data collection. Data collection supports the analysis plan, not the other way around.

Of course, effective analysis is dependent on accurate, unbiased data to be sufficient and persuasive to the intended reader; don't underestimate its importance to the effort. Just remember that the data itself is useless without the synthesis of the data as it relates to your specific research effort. In fact, the synthesis of quality data into a logical sequence is the heart and soul of the analysis plan.

1. Research Topic

Your research topic is always a good place to start your analysis plan. For illustrative purposes, I will use a notional research topic: an analysis of the U.S. Army's use of chemical agent resistant coating (CARC) on tactical wheeled vehicles.

As you probably noticed, this topic has several elements that limit the scope of the effort. In most cases, you won't start out with a limited topic. It will usually take you several iterations before your topic reaches its final configuration. You may start with a topic such as an analysis of the use of chemical agent resistant coating (CARC). Then, you will narrow this down by adding the specific service, the U.S. Army, and further refine it by limiting the effort to tactical wheeled vehicles. This refining process is a typical part of the research planning process. Do not be afraid to change the scope and focus of your topic as you gain insight into the time and effort needed to effectively research it. Of course, your advisors must agree with your scope and will likely help you in your effort to limit it.

2. Research Questions

Next, you will need to develop primary and secondary research questions to guide the research process. These research questions are key to designing your research analysis plan, and I will show you how they play a controlling role in the effort.

For our notional research project, the primary research question would be something like the following: Is the U.S. Army gaining the desired advantages by implementing its policy requiring CARC on all tactical wheeled vehicles? The secondary questions are usually major subcomponents that need to be answered to address the primary research question. Think about what major elements your readers need to understand—and you, as the researcher need to present—before the primary question can be adequately answered. The following are the secondary research questions for our notional research project:

- What are desired Army goals for tactical wheeled vehicle coatings?

- How does CARC help facilitate Army chemical

agent decontamination efforts on tactical wheeled vehicles?

- What alternative coatings would be viable for the Army's tactical wheeled vehicles?

- What are the relative advantages and disadvantages of CARC and the viable alternatives?

Again, your primary and secondary research questions will likely go through several refinements and iterations before settling in their final form. You may eliminate some; you may add to others to more fully support your analysis and address the primary research question. This is a normal and expected process.

3. Analysis Planning Matrix

The research questions are the beginning point for constructing your analysis planning matrix. While sounding a bit daunting, planning the analysis is a further subdivision of the research questions—with a focus on determining how you will draw your reader through the elements necessary to fully answer the questions. Place yourself in your reader's shoes and ask, "what are those elements or pieces of information that my readers would expect to see to have confidence that the question has been fully addressed?"

Remember that to be successful, this planning matrix should be constructed and filled in before data is collected. You must organize your analysis before you collect data to support it. I have prepared a matrix for our notional research project in Table 1.

Matrix elements. The matrix consists of three major elements: the secondary research questions, analysis elements needed, and supporting data needed.

Table 1. Research Matrix

Research Question	Analysis Needed	Data Needed
What are the desired Army goals for tactical wheeled vehicle (TWV) coatings?	• Substrate protection • Chemical agent resistance • Camouflage • Maintainability • Cost effectiveness	• Corrosion & environment protection performance spec & test/operational perf data • Absorption rates, decon performance, & post-decon performance requirements & test/operational data • Detectability performance spec & degradation testing/performance • Req maint actions frequency, costs, & safety implications data • Initial coating & maintenance TOC
How does CARC help facilitate the Army's decontamination efforts on TWVs?	• Decon operational scenarios • Specified absorption resistance & decon effectiveness (unprotected soldier-exposure guidelines) • Decon procedure scenarios • Non-CARC component decon (tires, seats, plastics, etc.)	• Decon TWV test/operational data • Pre-decontamination absorption rate data & post-decontamination (off-gassing) exposure performance data • CARC operational decon procedure data • Non-CARC TWV item chemical resistance & decon effectiveness data

Research Question	Analysis Needed	Data Needed
What alternative coatings would be viable for Army TWVs?	- Commonly used automotive coatings - Alternate coating viability for substrate protection, chem agent resistance, camouflage, maintainability, & cost effectiveness	- Automotive coatings data - Perf data addressing Army goals for TWV coatings (as in block two above)
What are the relative advantages & disadvantages of CARC and the viable alternatives?	- SWOT analysis - Sensitivity analysis to Army goal prioritization	- Data collected above - Army-perceived or Army-specified coatings' performance priorities (may be derived)

Obviously, the development of the analysis matrix will be evolutionary; in other words, the scope and need for analytical elements will become clearer as the matrix matures. Remember that this is an analytic plan (a living, breathing document) and will likely need to be changed and adjusted as the research process continues.

Matrix impact on the research effort. The matrix provides an overview of the architectural framework for your analytical research effort. The scope of the research effort is much easier to estimate, and the need to limit or modify the focus of the research typically happens much earlier in the effort (saving precious time and effort later) if you construct such a framework.

The use of the matrix approach ensures that there is data traceability to your research questions via intermediate analytical steps. The focus of the research is directed to the analysis—with the data-collection effort clearly supporting the analytical plan. Instead of collecting myriad data loosely connected to the topic, you specifically identify the data elements needed.

Thus, data collection becomes much more purposeful and focused. This approach could potentially save you dozens of

hours in data collection and sifting and could deliver much more payback for the data-collection effort. It is much easier to organize the research around the analysis plan than around a pile of unrelated data; such a plan should vastly improve the logic pattern and readability of the research product. As the data that support specific portions of the analytical plan are collected, they are arrayed in a manner supporting analysis—again, adding to the logic and readability of the research product.

In addition, your subject-matter expertise has the potential to estrange your readers. In other words, by performing the research, you become more expert in the subject area. Your newly gained expertise will likely enable you to mentally fill in the blanks that may exist in your research effort. Often, since the logic appears perfectly complete and obvious to you, you will neglect to explain it adequately to your readers, making it so that your readers are unable to understand or follow your path of reasoning. If you map out your logic before you begin writing your project, you will be better able to clearly explain your findings to your reader.

Flexibility. As your research matures and as you collect your data, there will be opportunities (sometimes disguised as challenges) to improve the analysis by adjusting the plan or the focus of some part of the research. Don't hesitate to adjust when needed. This is part of the critical-thinking skill set that your graduate educators are trying to help you develop.

D. Summary

If you neglect to plan and map out your analysis, your writing will likely lose its logic, become lost in minutia, or require the readers to make a leap of faith in order to accept your conclusions and recommendations.

If you plan your analysis before conducting the data collection and research, you make it is less likely that there will be significant gaps in the logic and more likely that your conclusions and recommendations will be reasonable to your readers. A focused analysis plan also helps prevent unnecessary or trivial data from sneaking into the effort or from diluting or obstructing the main purpose of the research.

E. Thesis Organization

Cover

Report Documentation Page

Signature Page

Abstract

Table of Contents

List of Figures (only required if paper has figures)

List of Tables (only required if paper has tables)

List of Abbreviations, Acronyms, and Symbols (if used)

Executive Summary (optional unless your department requests one)

Acknowledgments (optional)

Body of Paper

Chapter I (Introduction/Background/Purpose/Research Questions/Scope and Organization/Methodology, etc.)

Chapter II (Literature Review)

Chapter III (Topic Introduction/Analysis)

Chapter IV (Findings/Results/Recommendations)

Chapter V (Summary/Conclusion and Recommendations/Recommendations for Further Research)

List of References

Appendices (if necessary)

Initial Distribution List

Note. All major sections and chapters will begin on an odd page number. If they don't fall on an odd number, a blank page should be added on the even-numbered page.

F. Suggestions to Improve Research Quality

- Read aloud. This helps to identify sentences a reader may find awkward.

- Include complete information on your reference list; capture all details associated with each source's publication. This will save time later.

- Review for term consistency.

- Check figure and table titles to ensure they are consistent with program guidelines.

- Check lists and series for parallel sentence structure.

- Verify that verb tense remains consistent throughout the document.

- Avoid using second person (you) pronouns or point of view.

- Avoid passive voice whenever possible.

- Review the overall organization to ensure sentences and sections are cohesive and structured appropriately.

- Spell out and define unfamiliar terms at least once before using abbreviations or acronyms.

- Ensure the central research topic is the focus throughout the document.

- Review citations. Make sure they are appropriately introduced and summed up. (For instance, use transition sentences to introduce and conclude a quote, and explain the applicability of a reference.)

- Introduce all sources by the last name of the author or editor.

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