



ACQUISITION RESEARCH

HANDBOOK SERIES

Effective Tables, Figures & Frequently Used Terms

1 April 2015

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ACQUISITION RESEARCH PROGRAM
NAVAL POSTGRADUATE SCHOOL

The information presented herein was supported by the Acquisition Research Program of the Graduate School of Business & Public Policy at the Naval Postgraduate School.

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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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Acquisition Research Program Citation Style

The Acquisition Research Program (ARP) follows the citation guidelines in the *Publication Manual of the American Psychological Association* (sixth edition), known as APA. The ARP chose APA as its citation preference when the program began in 2003 because APA is a universally recognized standard among academic journals. The rationale behind this decision was that by citing ARP research in a consistent format, editorial resourcing and adaption for specific journal requirements would be more efficient. This release of the Effective Tables, Figures, & Frequently Used Terms handbook summarizes the guidelines found in APA's sixth edition manual, as well as some minor adaptations for ARP-sponsored reports, and provides examples of effective tables and figures. This handbook also includes an updated list of the ARP's frequently used terms.

For more detailed information on creating and formatting effective tables and figures, including numerous examples, see pages 125–167 of the APA *Publication Manual*.

A. Introduction to Tables and Figures

The purpose of tables and figures is to allow researchers to present a large amount of information in an efficient way and to provide data that is clearer and more understandable than is possible in the text alone. Tables typically display numerical values or textual information organized into columns and rows. The category of *figures* includes charts, graphs, photographs, and any kind of illustrations or graphics that are not tables.

Keep in mind that some information is better communicated in text than in tables or figures. Too many tables and figures can be overwhelming to readers and may break up the flow of the text.

1. General Guidelines for Tables and Figures

- Label tables and figures correctly: If data is arranged in columns and rows, label as a table.

If the presentation does not include columns and rows, label as a figure.

- Tables and figures should be integral to the text, but they should be designed so that they can be understood in isolation.
- Check tables and figures carefully for grammar, spelling, and capitalization errors because editors may not be able to modify tables and figures that have been created using software other than Microsoft Word.
- Each table and figure should be referenced in the text. Insert references to tables and figures before their placement in the paper (e.g., “see Figure 3”).
- Do not use the words *above* and *below* to refer to tables or figures in the text (e.g., “The table below shows that...” or “The information above provides ...”). Use table or figure numbers in place of such references.
- When referencing tables or figures in the text, write out *table* or *figure*, capitalized, and include the number. No capitalization is necessary if referring to tables or figures in general.

Correct:

(see Figure 1)

Table 2 provides a comparison.

The researchers’ data was presented in a table.

Incorrect:

(see Fig. 1)

Figure 3b

As shown in table 2, ...

- Use notes placed beneath the table or figure to define abbreviations or to provide other information that is too lengthy to include in the title or in the table or figure.

2. Citations for Tables and Figures¹

- Tables and figures taken from other sources must include citations with corresponding entries in the reference list. The format of the citation is the same as an in-text citation.

(Author, Year, p. #)

- If you modify a table or figure from another source, you must still cite the source. Indicate that you have modified the table or figure by inserting a citation like this:

(Adapted from Author, Year, p. #)

Another option is to use a note to explain that you modified the table or figure (see Figure 3). A note allows you to include further details regarding the modifications, if necessary.

- If you create a table or figure yourself, no citation is necessary unless it was included in a previously published work.

3. Guidelines for Effective Titles

- Titles of tables and figures should be brief but specific.

Too general:

Analysis

¹ The guidelines listed in this section for citing sources for tables and figures are specific to the ARP. The Thesis Processing Office has a slightly different approach for formatting table and figure citations.

Too detailed:

Analysis of Experiment 1 Results Collected in 2002, 2003, 2004 (Similar to Results of Experiment 2)

Good title:

Analysis of Experiment 1 Results

- Avoid abbreviations in the titles of tables and figures unless they are very common ones that will be familiar to readers (e.g., DoD, 3-D, CEO). Write out a full term in the title if its abbreviation is not very common.
- The lowercase abbreviation *vs.* may be used in a table or figure title or heading, or in the table or figure itself.
- Table/figure titles should be in title case (capitalize all proper nouns, pronouns, and verbs and all words of four letters or more).
- Extra information that is relevant to the table or figure should be formatted as a note that is placed below the table or figure (not a footnote at the bottom of the page). Avoid lengthy titles and parentheses in the titles by moving some information to a note. See Table 1, Figure 1, and Figure 3 in this handbook for examples of notes.

4. Tables and Figures in an Appendix

- In a report with just one appendix, the appendix is simply labeled *Appendix*, followed by a title. In a report with more than one appendix, the appendices are labeled with letters (i.e., Appendix A, Appendix B, etc.), followed by titles.
- If an appendix contains only one table or figure and no body text, the table or figure does not

need to be labeled because the appendix title serves as the label.

- If multiple tables/figures are included in an appendix, or if body text is used to introduce and describe a table/figure within the appendix, label each table/figure in the appendix. The table or figure number is preceded by the letter of the appendix in which it appears. For example, the following labels could be assigned to the tables and figures in a report's appendix: Table A1, Table A2, Figure A1, Figure A2, Table B1, Table B2, Figure B1, Figure B2, Table C1, Table C2, etc.

B. Tables

1. Things to Remember

- Limit the content of your tables to essential information.
- Tables should be integral to the text, but should be designed so that they can be understood in isolation.
- Table layout should be logical and easily grasped by the reader.

2. Tips for Creating Effective Tables

- Use Word to create tables because this will reduce the chance of formatting problems later.
- Make tables that present the same type of data look the same throughout the report.
- Label tables with brief but informative titles.
- Place items in a table that you want to compare next to each other.
- Make sure that all labels in a table are clearly placed next to whatever they are labeling.

- Every column should have a brief heading.
- Organize the layout of a table so that the most important data has the most prominent location.
- Use standard table formats so that a reader doesn't have to work to understand how the information in your table is organized.
- A table should augment the text but not duplicate it.
- Only use a table when a visual presentation of the information would more clearly communicate it to the reader than writing it out would.
- Items within the same columns should be parallel to each other.

<u><i>Nonparallel:</i></u>	<u><i>Parallel:</i></u>
Stages	Stages
Project design	Project design
Identifying the requirement	Requirement identification
Completes evaluation	Evaluation

- Do not clutter tables with extra information. Keep them concise.

Table 1 is an example of an effective table. The shaded boxes provide explanations pointing to the important elements of

column spanner:
heading that identifies data in two or more columns beneath it

table title: brief, descriptive title written in title case (i.e., capitalize all major words, verbs, pronouns, words of four letters or more, and words following hyphens in compound words)

table citation:
includes author, year of publication, and page number for source of table (no citation needed if you created the table yourself)

the table.

**Table 1. Government Spending by Sector, 1977 and 2010
(In Millions US\$)**
(International Budget Organization [IBO], 2011, p. 214)

Nation	Defense		Education		Health	
	1977	2010	1977	2010	1977	2010
Nation A	16.4	22.2	9.7	13.6	6.2	4.8
Nation B	5.6	38.8	15.6	15.8	7.4	11.1
Nation C	48.1	32.1		8.1	15.8	24.5
Nation D		19.9	38.2	50.1	36.4	52.8
Nation E	27.4	15.4	17.3	4.8	82.1	134.9

Note. Blank cells indicate that data was not available. The source named in this citation is fictitious.

table note: note beneath the table that provides additional information such as definitions of abbreviations, probability notes, explanations for unusual or missing data, etc.

column head: heading that identifies data in the single column beneath it

C. Figures

1. Types of Figures

The following are the most common types of figures included in reports:

- Graphs: display relationships (think x & y)
- Charts: display nonquantitative information
- Maps: display spatial information
- Drawings: show information pictorially
- Photographs: provide direct visual representation

2. Things to Remember

- Figures should be simple and clear and should add value to the information presented in the paper.
- Figures should have lines that are smooth and sharp as well as typeface that is simple and legible.
- Axes and elements within figures should be labeled and units of measurement should be provided.
- Figure legends should give sufficient information to understand the figure's content.

3. Tips for Creating Effective Figures

- A figure should augment the text, not duplicate it.
- Only include relevant information and graphics in a figure. Don't clutter the paper with figures that look nice but don't provide useful information.

- Make sure all elements of a figure are easy to read (use a legible font size) and that none of the elements are blurry (use a high resolution).
- The purpose and message of a figure should be quickly identifiable.
- All comparable figures in the document should have a consistent presentation.
- Clearly label all elements of a figure.
- Make your capitalization of terms consistent throughout the figure.

Inconsistently capitalized terms:

- Materiel Solution Analysis
- Technology development
- Pre-systems Acquisition

Consistently capitalized terms:

- Materiel solution analysis
 - Technology development
 - Pre-systems acquisition
- The figure title should be descriptive of the content of the figure.
 - Do not overuse figures in the paper (apply the rule of less is more).

Figures 1–3 are examples of effective figures.

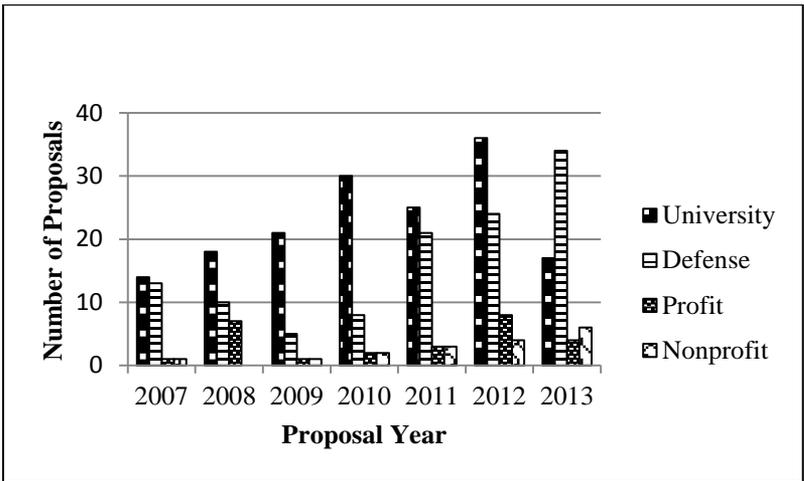


Figure 1. Annual Distribution of Research Proposals by Institution Type, 2007–2013
(Shaffer & Snider, 2014)

Note. Defense universities include NPS, Air Force Institute of Technology, Air Force Academy, DAU, Defense Academy of Cranfield University, and Bundeswehr University Munich.

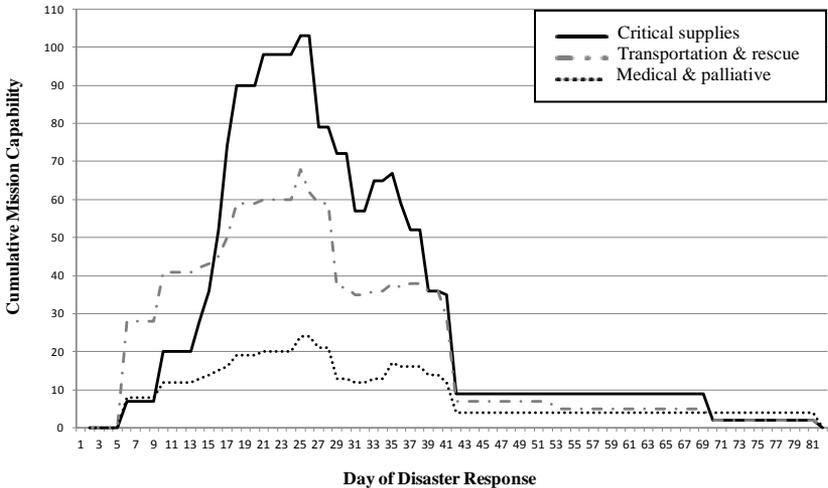


Figure 2. Cumulative Mission Capability for the Indian Ocean Tsunami
(Yoho, Greenfield, & Ingram, 2013)

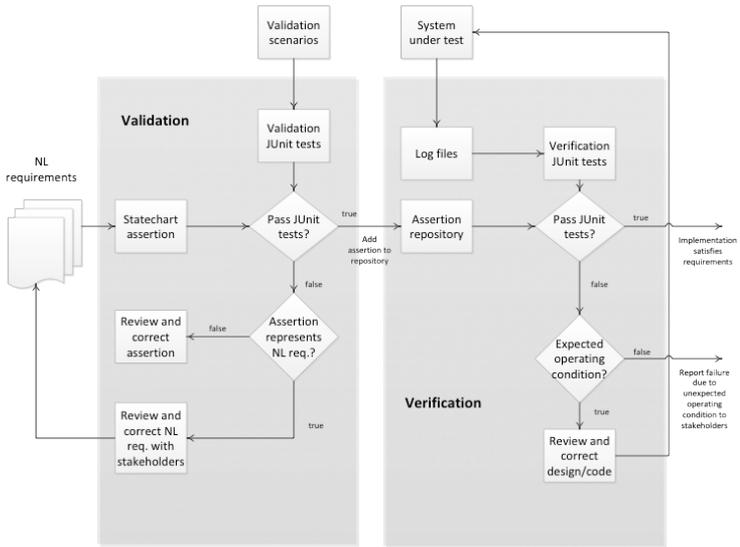


Figure 3. An End-to-End Validation & Verification Process

Note. We created this chart by modifying the original from Bonine, Shing, and Otani (2013).

D. Frequently Used Terms in the ARP

This list is a guide for spelling words and terms that commonly appear in Acquisition Research Program (ARP) publications, including specific business and military terms. This list is not intended to be exhaustive. For a more comprehensive list, see the *DAU Glossary: Defense Acquisition Acronyms and Terms* (14th edition), which can be accessed from the DAU's website (<https://dap.dau.mil/glossary/Pages/Default.aspx>). For non-military terms, consult the Merriam-Webster online dictionary (<http://www.merriam-webster.com/>).

Numbers

21st century

9/11 (for September 11, 2001)

A

administration (e.g., the Obama administration)

air defense missile system

armed forces (lowercase when used generally, but capitalize U.S. Armed Forces)

B

baseline

benchmark [n, v]

best practice [adj] (don't hyphenate as a modifier)

best value (don't hyphenate as a modifier)

best-in-class

Better Buying Power memorandums or Better Buying Power initiatives (used generally)

Better Buying Power 2.0 (title of a specific memo)

boardroom

bottom line

business case

business-sensitive [adj]

buy [n]

buy-in [n]

C

capability maturity (don't hyphenate as a modifier)

CD-ROM

cell phone

CEO (chief executive officer; does not need to be spelled out)

Certified Professional in Supply Management (CPSM)

CFO (chief financial officer; does not need to be spelled out)

C.F.R. (but *Code of Federal Regulations* when written out)

chair (not -man/-woman/-person)

chat room

civil servants

class (Virginia class of submarines, not Virginia Class of submarines; hyphenate as an adj.)

color-coded

command and control

commercial

commercial off-the-shelf (COTS)

conflict of interest

Contract Administration (capitalize only when used to name the process in the CMMM)

contract award (don't hyphenate as a modifier)

Contract Closeout (capitalize only when used to name the process in the CMMM)

contract management (don't hyphenate as a modifier)

contracted out (contracting out)

contracted support

corporate-level [adj]

cost–benefit (use an en dash, not a hyphen)

cost effective

cost-effective [adj]

cost estimate

cost-estimate [adj]

cost-estimating

cost growth

cost saving [n]

cost-saving [adj]

coworker

CPO (chief purchasing officer; does not need to be spelled out)

cycle-time

D

database

DAU (Defense Acquisition University)

decision-makers; decision-making

DFARS (Defense Federal Acquisition Regulation Supplement)

DOD (Department of Defense)

DoN (Department of the Navy)

downtime

E

e-auction, e-mail, e-commerce, e-procurement, e-tool, etc.

earned value management

economies of scale

end-to-end

end user [n, adj]

ERP (enterprise resource planning)

F

FAR (Federal Acquisition Regulation)
Fed. Reg. (but *Federal Register* when written out)
fiscal year (FY)
fishbone chart
fixed-price contract
flow path
follow-up [n]
Fortune 500 and *Fortune 1,000*
forward deployed (not hyphenated as an adj.)
forward operating base
F test

G

Gansler Commission report, Gansler report (official title of report is *Urgent Reform Required: Army Expeditionary Contracting*)
GAO (General Accounting Office—before July 7, 2004)
GAO (Government Accountability Office—after July 7, 2004)
Global War on Terror (also War on Terror, Global War on Terrorism)

H

handheld [n, adj]
hard copy
hazmat
health care
High-Risk List (title of an official list)
High-Risk Series (document title)
homepage (generic—use *website* instead)
hotspot

HR (human resources; does not need to be spelled out)

I

industry

industrywide (also nationwide, companywide, etc.)

Internet

intranet

IT (information technology; don't hyphenate as a modifier)

J

Joint (capitalize as a proper noun, but lowercase when used generally; e.g., "the Joint Staff determined" but "the operation will require joint forces")

just-in-time (JIT)

K

keynote

key performance indicator (KPI)

key performance parameter (KPP)

key process area

key system attribute (KSA)

keyword (technology)

knowledge management (KM; don't hyphenate as a modifier)

knowledge value-added

L

lead time

leading-edge [adj]

lean (can be used alone as a noun; also lean management, lean purchasing, lean practices, etc.)

Lean Six Sigma

Level I, II, III, etc. (when used in reference to Defense Acquisition Workforce Improvement Act [DAWIA] certification; do not capitalize unless used with a specific level number)

life cycle
life-cycle costing
life-cycle procurement
log in [v]
login [n]
long term [n]
long-term [adj]
low risk [n]
low-risk [adj]
lower priority

M

major defense acquisition program (MDAP)
material (matter from which something is made)
materiel (equipment or supplies)
mergers & acquisitions (M&A)
mission-essential [adj]
modeling & simulation (M&S)
multicultural

N

national security strategy (when used generally)
National Security Strategy (when referring to the title of a document)
naval
Naval Postgraduate School (NPS)
nearshore; nearshoring
Net-centric system (Network-centric system)
non-mission-capable (when used as a modifier)
non-value-added

O

Office of Management and Budget (OMB)

Office of Personnel Management (OPM)

offline

offshore; offshoring

off-site [adj, adv]

onboard

online

on-site [adj, adv]

open architecture

open system

Operation Desert Storm

Operation Enduring Freedom (OEF)

Operation Iraqi Freedom (OIF)

operating level

original equipment manufacturer (OEM)

P

performance-based

policy-maker

pretest

private sector [n]

private-sector [adj]

proactive

process capability maturity models

process improvement (don't hyphenate as a modifier)

process integrity

Procurement Planning (capitalize only when used to name the process in the CMMM)

procurement process (don't hyphenate as a modifier)

procurement-sensitive [adj]
Program Executive Office (PEO)
program management
project management
public sector [n]
public-sector [adj]
purchase order (PO)
p value

Q

Quadrennial Defense Review (QDR)

R

radio frequency identification (RFID)
real GDP
real-time
request for information (RFX)
request for proposal (RFP)
request for quote (RFQ)
research and development (R&D)
retake
return on investment (ROI)
risk analysis (don't hyphenate as a modifier)
road map
roll-out [n]
run-time

S

service, services (in reference to branches of military)
set covering (don't hyphenate as a modifier)
shortcut

single sourcing

Six Sigma

skill set

sole-source contract

Solicitation (capitalize only when used to name the process in the CMMM)

Solicitation Planning (capitalize only when used to name the process in the CMMM)

source evaluation

source selection [n] (capitalize when used to name the process in the CMMM)

source selection process

spend [n] (the company's annual spend, business spend)

statement of work (SOW)

strategic sourcing (don't hyphenate as a modifier)

stock out [v]

stockout [n]

subsystem

supply chain management (SCM)

system of systems (hyphenate as a modifier)

T

takeaway [adj]

third-party logistics (3PL)

third-party network (services, etc.)

time frame

time line

time-to-market

title (used generally, in reference to sections of U.S.C.)

Title (used specifically, e.g., Title 10)

toolkit

top line

Total Quality Management (TQM)

trade-off

Ts & Cs (for terms and conditions; ampersand required)

t test

U

under secretary of defense (under secretary is two words; capitalize only when the title immediately precedes a name)

United States (when used as a noun, e.g., stationed in the United States)

U.S. (when used as modifier, e.g., U.S. policies)

U.S.C. (but *U.S. Code* and *United States Code* when written out)

username

V

value-added

W

War on Terror (also known as Global War on Terror, Global War on Terrorism)

warfighter

waybill

web

webcast

website (preferred over home page)

widescale

workday

workflow

worklife

worldwide

X Y Z

Notes

Notes



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