Spring 2017

Adapting Critical Chain Project Management to Army Engineer Construction Projects

Eric E. Rohr
Western Kentucky University, rohrdoggy@gmail.com

ADAPTING CRITICAL CHAIN PROJECT MANAGEMENT TO ARMY ENGINEER CONSTRUCTION PROJECTS

A Thesis
Presented to
The Faculty of the Department of Architectural and Manufacturing Sciences
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Master of Science

By
Eric Rohr

May 2017

ADAPTING CRITICAL CHAIN PROJECT MANAGEMENT
TO ARMY ENGINEER CONSTRUCTION PROJECTS

Date Recommended 4/18/17

Dr. Mark Doggett, Thesis Chair

Dr. Daniel Jackson

Dr. Fatemeh Orooji

Dean, Graduate School 4/18/17 Date

This thesis is dedicated to dedicate to my wife, Salina, whose support and sacrifice allowed me to go to Graduate School and further my professional career. This thesis is also dedicated my parents, Michael and Linda Rohr, who never let me doubt myself.

ACKNOWLEDGMENTS

Credit for assisting in the completion of this research is owed to Dr. Doggett, Dr. Jackson, and Dr. Orooji for their knowledge, support, and guidance throughout this project. Particular thanks is owed to Dr. Doggett, whose support and encouragement of student potential allows those from out the MSETM Program to reach for more.

A debt of gratitude is also owed to Major Matthew Burgoon, Captains Career Course Instructor for Engineer Officers at the Maneuver Support Center of Excellence at Fort Leonard Wood, MO, for his assistance in conducting research and collecting data from a venerable U.S. Army institution.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ADAPTING CRITICAL CHAIN PROJECT MANAGEMENT
TO ARMY ENGINEER CONSTRUCTION PROJECTS

Eric Rohr May 2017 131 Pages

Directed by: Dr. Mark Dogget, Dr. Daniel Jackson, and Dr. Fatemeh Orooji.

Department of Architectural and Manufacturing Sciences Western Kentucky University

For decades, Army Engineers have utilized the systems of the Critical Path Method (CPM) and multi-level Gantt chart planning system for its construction projects. While these methods are well accepted, they are not without their flaws. Research and literature in project management has given weight to several viable alternative options to planning projects. One such option, Critical Chain Project Management (CCPM), was developed to address the flaws of CPM by offering a holistic approach to project management based on strict resource control and the use of time buffers. This method attempts to eliminate multitasking and procrastination that can plague efficiency and offer managers more flexibly on tasks that otherwise had no leeway. CCPM may give project managers more flexibility and control while at the same time shortening the overall length of a project, saving time and money.

The purpose of this thesis was to address the time saving and resource management benefits of utilizing CCPM over CPM and analyze the viability of those benefits being applied to U.S. Army Corps of Engineers construction project planning. Through the use of surveys of Army Engineer project supervisors, several key factors that cause delays because of CPM were identified and rated. The validity of CCPM based solutions to the same issues were also assessed by Army project supervisors in the survey. Analysis of the survey results indicated that CCPM may offer solutions to major issues that Army project supervisors face.

Introduction

The United States Army Corps of Engineers overseas millions of dollars in taxpayer funded public works projects every year. Many of these projects fit under the combination of civilian and military organizations that make up the Corps. However, many projects every year are completed by Active Duty and Reserve Army Engineers for military use exclusively. These projects include improvement to weapons ranges, military access roads to training areas, or runways and landing pads for aircraft.

Similar to civilian construction projects, Army projects are often plagued with the same delays, cost and time overruns, and planning issues affecting equivalent civilian projects within the private sector (Leach, 2014; Yang, 2007). Unlike their civilian counterparts, Army construction projects are funded exclusively by taxpayers. Any inefficiencies or issues with resource waste or inadequate scheduling that result in time delays or cost overruns create a financial burden on tax military spending. Not only are there public finance issues to consider, any change in personnel needed to complete a delayed Army construction project can pull soldiers from other important duties or training, affecting the quality of mission readiness.

Army Engineers have historically relied on the Critical Path Method (CPM) and multi-level Gantt chart-based systems for planning, executing, and refining construction projects. These methods are a well-established and institutionalized component of the Project Management Body of Knowledge (PMBOK). CPM and Gantt chart-based project management tools are the methods most frequently taught in civilian academia and military training schools. Nonetheless, like any established system, these methods are not without their flaws. The inflexibility of critical tasks in CPM and the lack of strict

personnel resource control in Gantt chart-based scheduling often lead to undesirable factors including multitasking, procrastination, and schedule padding, which contribute to project delays (Goldratt, 1997; Leach, 2014; Umble & Umble, 2000).

Research in project management has given weight to several viable alternative options to planning projects. One such option, developed by Dr. Eliyahu Goldratt (1997) in his book Critical Chain, attempted to address the shortfalls of traditional CPM based construction planning. His method, Critical Chain Project Management (CCPM), was adapted from several project management theories, including his own Theory of Constraints (TOC) production methodologies, to offer a holistic approach to project management methods (Trietsch, 2005). CCPM methods address multitasking and procrastination issues that plague efficiency by reducing the padded time scheduled to accomplish individual tasks by up to 50% and collecting it for use as project safety buffers. Use of these methods, combined with strict personnel resource control have demonstrated, in both production and project management, more flexibility and control while at the same time shortening the overall length of a project, saving time and money (Cerveny & Gallup, 2002; Smith, 2012; Yang, 2007). CCPM improvements may offer viable solutions to planning and project delay issues that Army project supervisors face.

Problem Statement

Army construction projects that are subject to delays and planning efficiencies present a burden to military spending and can negatively impact mission readiness. Issues with project overruns are often a result of ineffective planning combined with lack of adaptability and flexibility (Goldratt, 1997). Army construction projects share these issues with their civilian counterparts, while at the same time offering unique scheduling

and personnel management issues of their own. In civilian construction projects, a construction firm's sole focus is the completion of a given construction project and the efficient assignment of key personnel and equipment. The ultimate goal of that focus is to finish a project on or ahead of time and at or below budget to satisfy the needs of the customer while growing the company and maintaining a profit. Army Engineering planners share the same burden to the customer, but are not subject to the constraints and motivations of profit margins. Rather, they suffer from a lack of being able to schedule and focus personnel and equipment due to unique constraints caused by military readiness and training needs. These distractions, combined with inherent planning and flexibility issues in the current system, can result in delays, overruns, and additional personnel burdens hampering project completion (Leach, 2014). Unlike, their civilian counterparts, Army project supervisors are not beholden to company owners or shareholders when project delays affect schedules and budgets. The funding for military project comes from tax revenue generated by the American people. Inefficiencies in Army project management can burden budgets of Army engineering units; budgets directly funded by taxpayers.

Mismanaged personnel resourcing, combined with project overruns, can also lead to an additional issue Army project supervisors must address. The Army Training Manuals (TM) for both project management and labor estimating prescribe some difficult adjustments to personnel schedules in order to regain time lost due to delays. These measures include bringing in additional personnel not originally assigned to the project, taking personnel away from non-critical tasks while forcing multitasking, and eliminating training time and other assigned tasks (Headquarters, Department of the Army, 2014). A

unit's overall mission is to be completely trained, ready, and fully capable to deploy in defense of the nation. Moving soldiers from vital training and other mission essential tasks in order to complete an overdue construction project is counterproductive to the Army's core philosophy of mission readiness.

Significance of Research

Military spending, defense readiness, and lack of government oversight are always controversial issues. The United States Department of Defense (DoD) outspends the next eight most powerful militaries combined and often faces intense scrutiny on issues of waste and inefficiency (Walker, 2014). The immense burden on Army leaders to efficiently utilize time, personnel resources, and unit budgets cannot be understated. The Army's reliance on traditional CPM and Gantt chart-based planning, while established and adequate, is not without significant flaws and opportunities for improvement.

Improving Army construction planning procedures would relieve many of the burdens on engineering unit budgets and personnel management. Just as any construction organization, proper time management throughout a project is necessary for staying at or below a project's budget. Engineering projects that are for exclusive military use, such as training sites and military service routes on bases, are under the control of an active or reserve engineering unit are paid for from tax revenue. Efficient time management from Army project supervisors could allow for more projects to be completed on time and under budget. Controlling projects means more efficient budgets, which allows for better use of taxpayer money.

More efficient use of a unit's budget also allows for more construction projects to be accomplished within a given fiscal year. Army construction projects done in garrison

or within a normal theater of operations are considered training for when that unit must deploy to a more austere or hostile environment in support of an operation. More efficient construction planning leads to more construction projects, which means that unit has more effective training, adding to unit readiness. The benefits of a system that could induce this cyclical improvement, while at the same time not subtracting from other mission essential tasks, could be substantial.

CCPM was designed to have strict personnel controls in place that prevent reactionary scheduling and multitasking (Goldratt, 1997). Being free of these issues would mean that project supervisors would not be forced to sacrifice other essential mission tasks outside of their project in order to overcome delays. It could also help to diminish the negative undesirable effects that often arise from multitasking. Although often deemed necessary in both business and military project management spheres, multitasking in traditional project management systems often contributes to project delays, overruns, and mismanagement (Appelbaum, Fernandez, & Marchionni, 2008). Just like their civilian counterparts, Army project supervisors can ill afford the distraction and delays that arise from multitasking and poor management. Army project supervisors have to contend with issues of stretching labor, requesting additional personnel, cutting resources from other tasks, and being in more than one place at a time on the job site, just as their civilian counterparts do. On top of that, they have to deal with the normal duties of being a Platoon Leader, or Commander required of them as soldiers. It is essential to balance an officer's official duties with any additional assigned tasks (such as project supervisor), in order to maintain military readiness.

There are clear benefits to utilizing a project management system that can improve Army construction methods. Research has given weight to CCPM's time management and personnel efficiencies in civilian construction (Yang, 2007) military logistics, and project planning (Smith, 2012). CCPM may provide Army construction planners with the solutions they need for the problems they face, provided project supervisors find those solutions effective.

Statement of Purpose

The purpose of this study was to determine the core issues that delay Army Engineer construction projects and whether Critical Chain CCPM can resolve those core issues. Research on adapting CCPM solutions to specific issues in Army construction could prove beneficial to improving project completion rates and efficiency. This study focused on the core issues Army project supervisors have with current construction planning methodologies that negatively impact project completion. The study also examined how receptive project supervisors are to adapting CCPM based solutions to the core issues causing delays. Army Commissioned and Warrant Officers with construction supervision experience were surveyed to quantify the major issues and rate the effectiveness of CCPM measures against the core issues causing delays.

Research Questions

In designing CCPM, Goldratt created a package of methods that offers a holistic solution, which can be adapted to existing planning methods or be used as a standalone system (Leach, 2014, Trietsch, 2005). This study gauged the possible benefits of those methods for Army construction project supervisors by addressing the following questions:

1. What are the major scheduling issues negatively impacting on-time Army construction project completions?
2. What are the major personnel management issues in Army construction projects?
3. Can CCPM be adapted for Army construction projects?
4. Do Army project supervisors perceive CPM as a viable and adaptable construction planning and scheduling tool for time and resource management?
5. Do Army project supervisors perceive CCPM as a viable and adaptable construction planning and scheduling tool for time and resource management?
6. Are the responses of younger, less experienced Officers different from older, more experienced Officers?

Variables

The independent variables in the first part of the study were the effectiveness of current CPM based system for scheduling and resource management across three phases; planning, execution, and completion. The dependent variables measured were the responses of the various rank and experience groups. The independent variables for the second part of the survey were the effectiveness of CPM and CCPM based solutions. The

dependent variables measured were the responses of the various rank and experience groups.

Assumptions

This study was conducted under the following assumptions:

1. Answers to questionnaires were given in good faith.
2. Participants had an interest in improving project planning efficiency.
3. Answers given by survey subjects were accurate and representative of their true perceptions.

Delimitations

This study was conducted with the following delimitations:

1. Surveys were limited to Active Duty, National Guard, and Reserve Army personnel with Army construction planning and management experience.
2. Surveys were limited to Commissioned and Warrant Officers still in service.
3. Survey participants were limited to Officer's attending career advancement courses at the Maneuver Support Center of excellence at Ft. Leonard Wood, MO.

Limitations

This study was limited by the following:

1. Sample size was limited by the sizes of respective MSCOE training classes when the survey was conducted.

Officer sample size gathered for the survey represented 2% - 4% of the total population of Commissioned and Warrant Officers. Officer populations in the Corps of Engineers across all components are small than that of other branches (see Table 1, p. 38,

in the Methodology Section). The exact number of Officers fluctuates daily based on retirements, rebranching, and promotions, so all population (N) sizes are estimates.

1. Participation was voluntary and confidential.

Definition of Terms

For the purpose of the study the following definitions and explanation of acronyms are needed:

- 1LT: First Lieutenant. Army rank for Level 1 Commissioned Officers.
- ANOVA: Analysis of Variance. Study conducted between groups of data to analyze the difference the means in those groups (Creswell, 2014).
- CC: Critical Chain. A series of project tasks connected by needed critical resources rather than time completion (Goldratt, 1997).
- CP: Critical Path. The longest series of connected tasks in a project critical to timely project completion (Leach, 2014).
- CCPM: Critical Path Project Method. A system of project management base on resource constrains and the use of time buffers to control project completion rates (Goldratt, 1997).
- Chief: Short hand for Chief Warrant Officer. Honorification given to Level 2 – 5 Warrant Officers
- CPM: Critical Path Method. A system of logistical planning of tasks in project management in which the longest series of tasks becomes critical to completing a project on time (Leach, 2014).
- CPT: Captain. Army Officer rank for Level 3 Commissioned Officers.

- JCMS: Joint Construction Management System. A combination online and locally stored database of both construction schematics and scheduling examples used in all branches of the Department of Defense.
- MSCOE: The Maneuver Support Center of Excellence. U.S. Military school located at Ft. Leonard Wood MO. Responsible for advanced training of Army Officers and enlisted personnel in engineering and construction techniques.
- MD: Man Day. Army unit of measure for work accomplished in construction, equal to eight hours of labor (Headquarters, Department of the Army, 2014).
- NCO: Non-Commissioned Officer. Senior enlisted soldiers in supervisory roles that serve as managers for lower enlisted soldiers and advisors to Officers.
- PERT: Program Evaluation and Review Technique. A project management system for analyzing the efficiency of scheduled tasks using CPM (Cerveny & Gallup, 2002).
- SITREP: Situation Report. A military based formal report detail construction project progress at in a given category at a certain percentage of completion. (Headquarters, Department of the Army, 2014).
- TM: Training Manual. U.S. Army doctrine publications used as instruction manuals by all ranks and branches for various tasks throughout the Army.
- TOC: Theory of Constraints. Developed by Dr. Elyahu Goldratt as a system of production controlling and improving its most constrained point. (Goldratt, 1997).
- WIP: Work in Progress: Designation for ongoing project tasks that have been started but not yet completed (Seider, 2006).
- WO1: Warrant Officer Level 1: Army rank for Level 1 Warrant Officers.

Review of Literature

Traditional Army Construction Planning and Project Management

Directives for the planning, logistics, and control of Army Corps of Engineer construction projects are rooted in traditional production methods developed in the early and mid-20th century. The Critical Path Method, first developed by DuPont in the 1950s, was the basic logic system and core project task planning system utilized in Army Engineer planning construction projects. Army engineers also employed the use of Gantt charts, first developed in 1905 by Henry Gantt, as the principle method of displaying scheduled events in conjunction with resource allocation and providing a tool for Army project managers to monitor project task completion and schedule management. It was the combination of these two tried and true project management techniques that formed the backbone of all Army Engineer construction projects. *Construction Project Management* (Headquarters, Department of the Army, 2014) was the primary Army Training Manual (TM) project managers and supervisors referenced for using CPM in conjunction with Gantt charts to conduct construction project planning and control.

While these two established systems have been at the center of every successful Army construction project for decades they are not without well documented shortfalls when it comes to time management for both individual project tasks as well as overall project schedule integrity (Cerveny & Gallup, 2002; Goldratt, 1997; Leach 1999, 2014; Umble & Umble, 2000). In order to better understand these shortfalls and how they can negatively impact Army construction project completion times, it is essential to review the different aspects of CPM and Gantt chart scheduling. It is important to discuss the alternative project management methods that have been developed to address the issues.

The Critical Path Method. Traditional CPM incorporates specific durations for each task in a project based on pre-determined criteria set by an organization. When these tasks are arranged in the order in which they logically need to be completed, the task sequence with the longest duration of required completion time is designated as the Critical Path (CP). This means that the completion of that particular series of tasks is in fact critical because it represents both the earliest and latest possible completion time of the project. This collection of connected project events is also considered critical because if any task along the CP is delayed, then the entire project's completion will be delayed. Figure 1 is an illustration of a standard Army construction planning model using CPM. The CP in Figure 1 is highlighted with a bold dark line marked with vertical slashes across the line between each project task node.

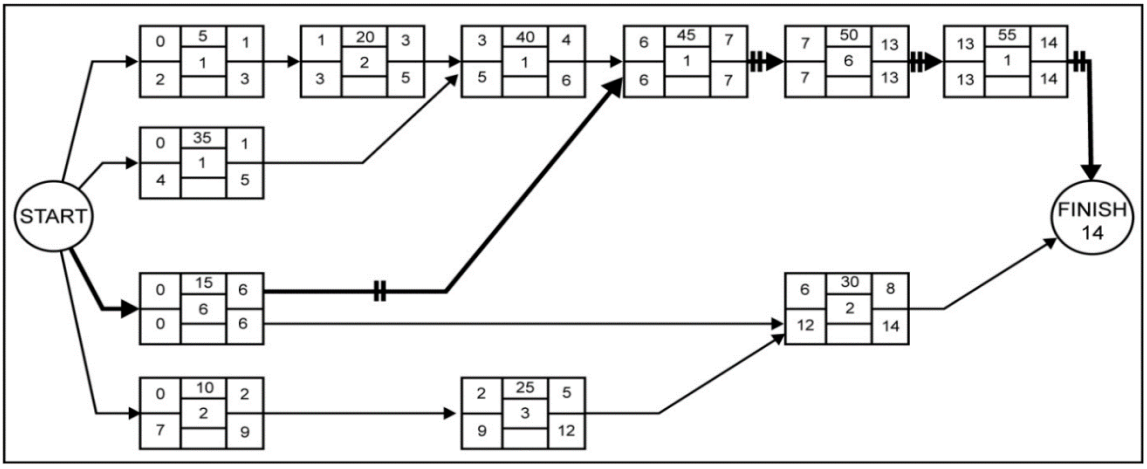


Figure 1. Standard Army Critical Path logic diagram. Reprinted from "Appendix C, Alternate Critical Path Method Procedures," by Headquarters, Department of the Army, 2014, *Construction project management. (Army doctrine publication No. TM 3-34.42),* p. C-7. Copyright 2014 by the U.S. Government Printing Office.

Each project task node in Figure 1 is made up of several boxes with numbers indicating a different aspect of that particular project task's effect on the oval duration of the project. The number at the top center of the node designates the project task's assigned reference number. Below that, in the middle center of the node are the total scheduled days of duration for that particular project task. On either side of each node are four numbers, two on each side. The Early Start time (ES) is listed at the top left. The ES number represents the earliest day at which the project task can start. Below the ES number is the Late Start time (LS), which is the latest day that particular project task can start, according to the scheduled task duration, without negatively effecting the overall length of the entire project. On the right side of the node are numbers representing the project task finish times. The Early Finish date (EF) is on the top right and denotes the earliest date at which the project task can be completed. Below that is the subsequent Late Finish date (LF), which denotes the last day the project task can be finished without effecting the overall scheduled project finish time.

Using this system, it is easy for planners to identify the nodes designated as the CP. Any project node that has ES and LS dates that are the same as well as EF and LF dates will be designated as part of the CP. Because there is no difference in start or finish dates, there is no flexibility in changing that task's scheduled start or completion times without effecting the overall length of the project. This flexibility is what Army planning doctrine referred to as "float". Float is "extra time available to complete an activity beyond the activity's duration" (Headquarters, Department of the Army, 2014, p. 3-10). Any project task along the CP will naturally contain zero days of float. Therefore, staying on schedule for tasks along the CP is critical to project completion. Any project task that

is not on the CP will contain some float and project managers will have flexibility in scheduled start times and resource allocation when completing those tasks. Available days of float within non-critical tasks act as a time and resource buffer. This allows project managers the flexibility to pull resources from non-critical tasks not on the CP and reallocate them to critical tasks that may need additional support in order to be completed on time (Headquarters, Department of the Army, 2014, p. D-1).

Task duration and float. In determining proper task duration during planning phases, Army project supervisors can draw on two separate resources for properly scheduling task length. These publications act as general guidelines for planners in broad based construction scenarios. The first guide, *Construction Estimating* (Headquarters, Department of the Army, 2010), contained estimations for various construction tasks and formula for determining task length. The second guide is the Joint Construction Management System (JCMS), which is a combination of online and locally stored computer databases of both construction schematics and typical task durations. These two scheduling resources offer a wealth of scheduling examples for planners to draw on.

However, even with such a deep well to draw from, project supervisors still are prone to make mistakes when it comes to proper estimating. One of the reasons for this is built into the system itself. *Construction Project Estimating* (Headquarters, Department of the Army, 2010) advised planners that they need to use their own judgement when it comes scheduling task durations. Weather, terrain, cultural considerations, input from experienced Non-Commissioned Officers, (NCOs), and the ever present 'needs of the Army' are all factors that have to be considered when scheduling. These factors, combined with limitations placed on the project by the supervisor's chain of command,

can all contribute to inefficient planning and scheduling conflicts. Just like their civilian counterparts, the outside pressures that Army project supervisors face in estimating a schedule often lead to schedules becoming burdened with safety padding, duration over-estimations, and unneeded safety time (Cerveny & Gallup, 2002; Leach, 2014). When this occurs, the float time in non-critical tasks and extra safety time in critical tasks can actually contribute to procrastination, lack of focus, and multitasking that may lead to delays (Appelbaum, Fernandez & Marchionni, 2008; Goldratt, 1997)

Gantt charts. Once the series of project tasks has been ordered logically using the CPM method, Army construction project supervisors can use that information, in conjunction with planning data given by JMCS software, to construct Gantt charts in order to track project completion projects. As seen in Figure 2, Army Gantt charts have three levels of detail and control.

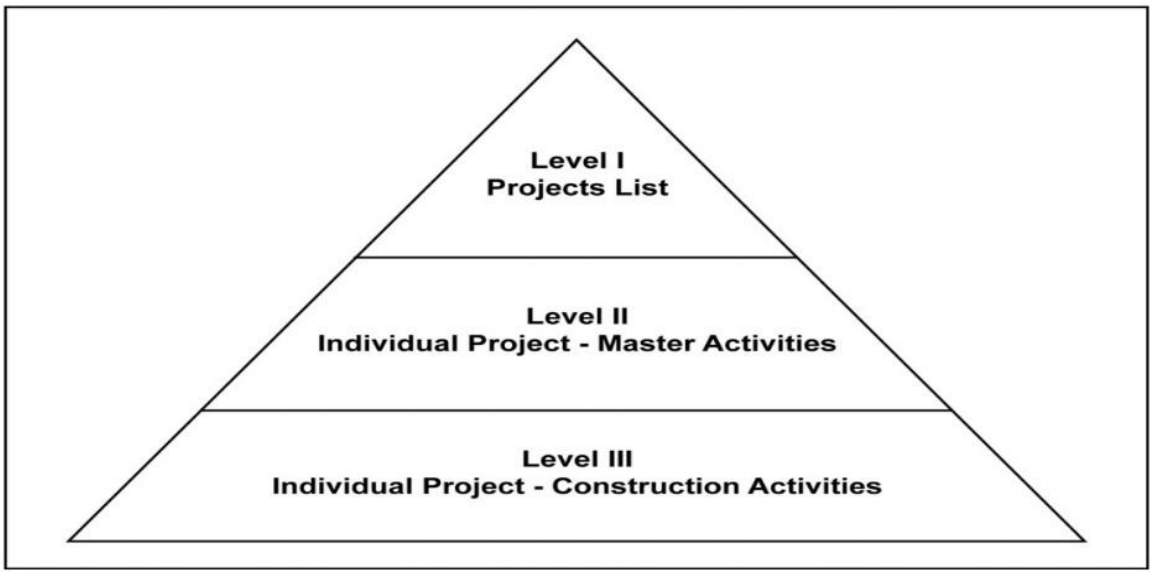


Figure 2. Gantt Chart control levels in Army construction planning. Reprinted from "Section 3-2, Gantt Charts," by Headquarters, Department of the Army, 2014, *Construction project management. (Army doctrine publication No. TM 3-34.42)*, p. 3-2. Copyright 2014 by the U.S. Government Printing Office.

A Level 1 Project List Gantt chart displays resource planning and project tasks in broader strokes on a month-to-month basis. The Level 2 Master Activities List and Level 3 Gantt Construction Activities List charts break down individual tasks further detailing then on a weekly and daily progress respectively. The daily progress observed using a Level 3 Gantt chart is then used to update the Level 2 Gantt chart's weekly tracking, which in turn is used to update a Level 1 Chart month-by-month. Individual task nodes from a CPM diagram are translated into project tasks and listed vertically on the left side of a Level 3 Gantt chart. Time duration for each task is displayed horizontally across the chart. Tasks that are part of the CP are shown with bold black lines and have no available float. Non-CP tasks are displayed with grey lines and available float is expressed using a dotted line shown to the left of the task duration. The resource of the construction personnel needed during a particular task is expressed in red next to the task and total of needed personnel each day is displayed across the bottom. Figure 3 shows a completed Level 3 Gantt chart using this process.

The labor totals in Army Gantt charts are expressed in the military unit of Man-days (MD), which is described as a unit of work that is performed by one person in an eight-hour day. MDs are not the same as work days because work days can change based on the number of hours worked, but a unit of labor is always expressed as one eight-hour MD regardless of the length of the work day (Headquarters, Department of the Army, 2014, pp. 3-2). For example, in order to complete the work needed on the first day (May 17th) of the project outlined in Figure 3, a project leader needs to assign seven personnel to accomplish eight hours of work each during the length of the workday. However, the workday on May 17th may be longer than eight hours, based on the schedule.

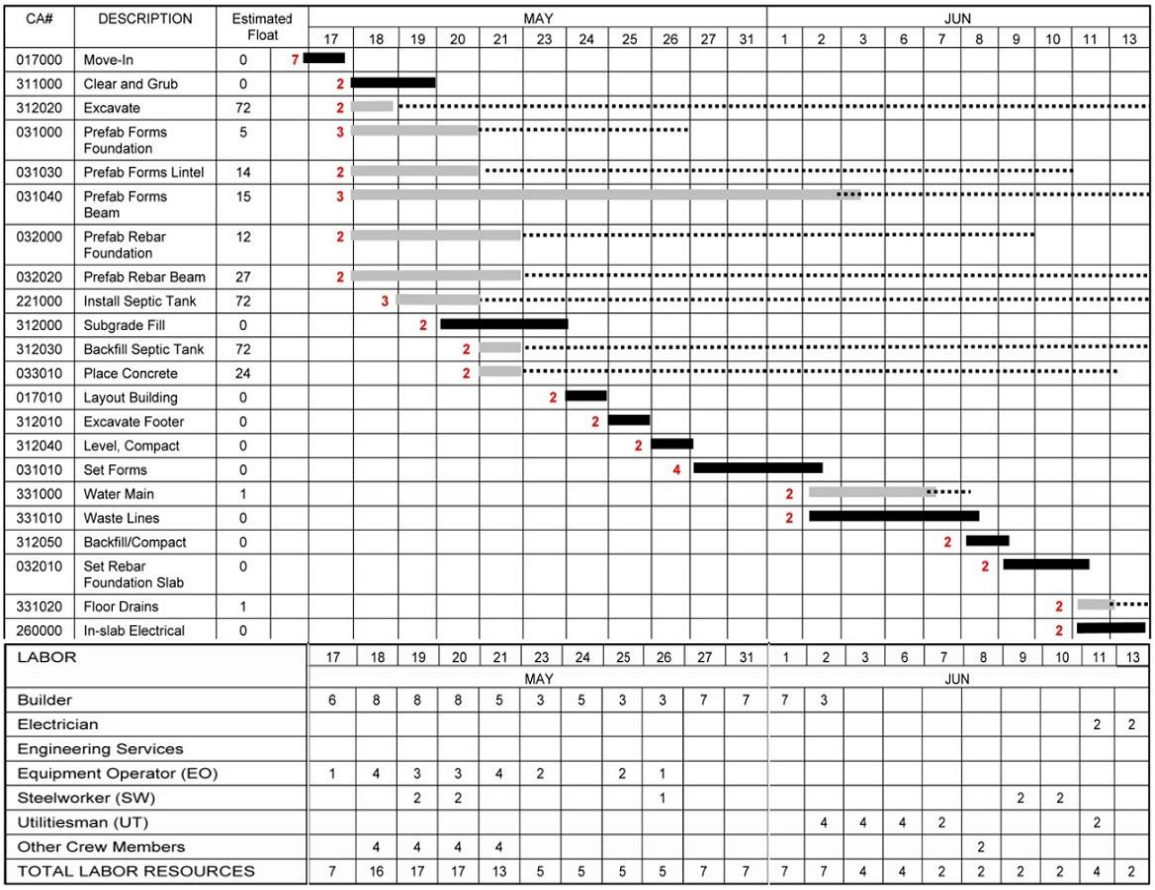
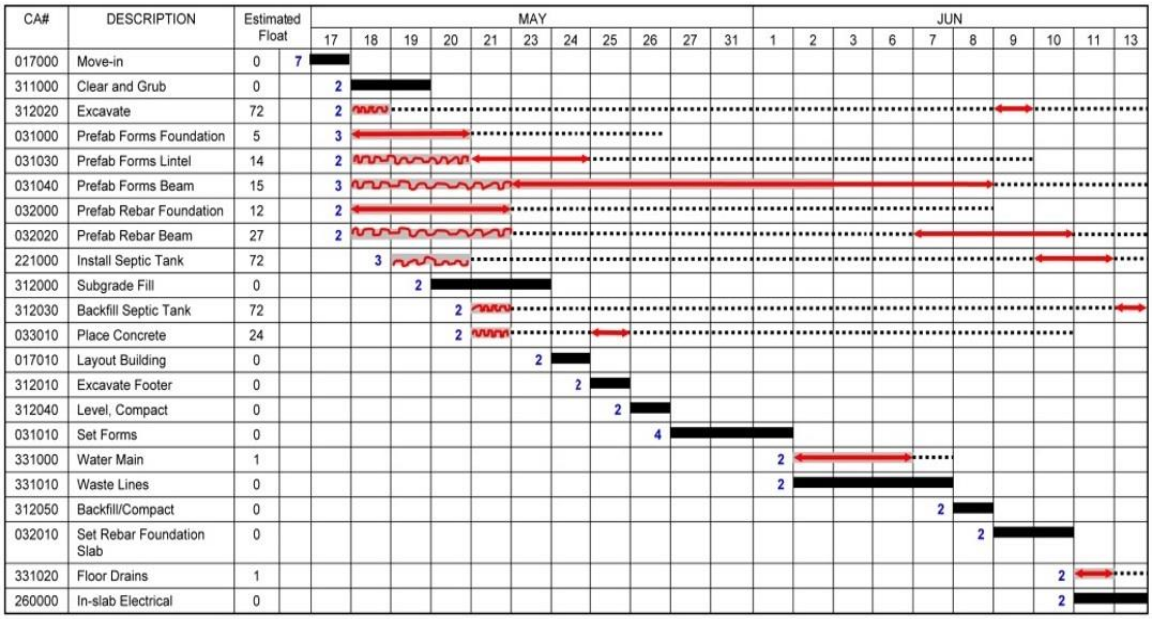


Figure 3. Level 3 Gantt Chart before resource leveling. "Adapted from Figure 3-8: Level III Chart Example 1 (Sheets 1-2)," by Headquarters, Department of the Army, 2014, *Construction project management. (Army doctrine publication No. TM 3-34.42)*, pp. 3-15 - 3-16). Copyright 2014 by the U.S. Government Printing Office.

In the initial labor resource totals listed at the bottom of Figure 3, there exists a large imbalance of required labor between the first few days of the project and the last. It is impractical from a cost and labor standpoint to have more than a dozen personnel engaged for a few short days and only a few working during the last days of a project. Time constrained resource leveling is a key component of proper time management and maintaining a project schedule (Headquarters, Department of the Army, 2014, pp. 3-14, Leach, 2014).

Leveling human resources evenly across the duration of the project, while staying within scheduled tasks durations, is an essential component of the traditional project management methods adhered to by the Army. The inherent flexibility in the non-critical tasks, i.e. the float, allows project managers move those tasks further along in the schedule as long as they do not change the start days of critical tasks. However, by doing this, non-critical tasks lose all their float during the resource leveling process and become critical tasks themselves resulting in no float left to spare if work goes behind schedule. Also, when moving human resources around in order to accommodate daily levels of MDs, also known as resource smoothing, it can become necessary to extend critical task durations when critical human resources become over scheduled (Leach, 2014). When the order of scheduled activities is changed due to resource leveling, a new Critical Path takes precedence over the old one. Project supervisors then have to redraw their CP logic diagrams and task nodes to match the new Gantt chart schedule (Headquarters, Department of the Army, 2014, p. 3-14). *Construction Project Management* (Headquarters, Department of the Army, 2014), outlined the procedures project supervisors should follow to in order to level human resources and maintain the relatively the same number of personnel working each day throughout the duration of the project. Figure 4 is the same Level 3 Gantt chart as in Figure 3; however, the resource leveling procedures in Section 3.8 of *Construction Project Management* have been applied.



LABOR	17	18	19	20	21	23	24	25	26	27	31	1	2	3	6	7	8	9	10	11	13
	MAY											JUN									
Builder	6	8	8	8	5	3	5	3	3	7	7	7	3							2	2
Electrician																					
Engineering Services																					
Equipment Operator	1	4	3	3	4	2		2	1												
Steelworker			2	2					1									2	2		
Utilitiesman													4	4	4	2				2	
Other Crew Members		4	4	4	4												2				
TOTAL LABOR RESOURCES	7	16	17	17	13	5	5	5	5	7	7	7	7	4	4	2	2	2	2	4	2
	~~7~~	~~8~~	~~8~~	~~8~~	~~8~~	~~8~~	~~8~~	~~8~~	~~8~~	~~4~~	~~4~~	~~4~~	~~8~~	~~8~~	~~8~~	~~8~~	~~8~~	~~8~~	~~8~~	~~8~~	~~8~~
		~~5~~	~~5~~	~~5~~	~~4~~	~~4~~	~~4~~	~~4~~	5	7	7	7	~~4~~	~~4~~	~~4~~	~~5~~	~~5~~	~~4~~	~~4~~	~~4~~	~~4~~
		7	7	7	6	7	7	7					7	7	7	7	7	6	7	7	

Figure 4. Level 3 Gantt Chart with resource leveling applied. Adapted from "Figure 3-10: Level III Chart Example 3 (Sheets 1-2)," by Headquarters, Department of the Army, 2014, *Construction project management. (Army doctrine publication No. TM 3-34.42),* pp. 3-20 - 3-21). Copyright 2014 by the U.S. Government Printing Office.

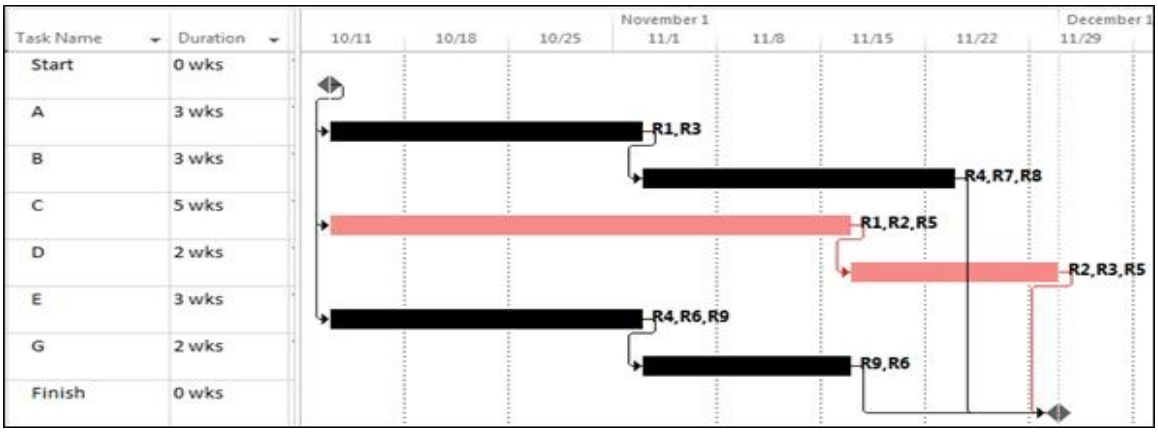
Critical tasks are still displayed with bold black lines across the length of their duration. Non-critical tasks (originally drawn in grey) that can be rescheduled are crossed out using red lines and given new dates, shown with red arrows, allowing for better leveling of personnel. Total personnel needed across the duration of each task are listed in blue next to the task. Finally, new resource leveled totals are listed in red at the bottom in the Total Labor Resources line. This rough version of a leveled Level 3 Gantt chart is then run through project software, such as Microsoft Project, to create the final schedule.

Once the final Level 3 Gantt charts have been resource leveled and daily MD requirements have been calculated, they can be used to create Level 2 and Level 1 Gantt charts. These higher-level charts are used to track cumulative MDs and project completion rate across the duration of the project or multiple projects within a large construction site. Before project completion information is transferred to a Level 2 Chart, the information is first formatted by activity type (masonry, plumbing, carpentry, etc.) and combined with MD totals from other projects of the same designated type (Headquarters, Department of the Army, 2014, p. 3-22). This is designed to make it easier for project supervisors to measure progress and ascribe it to the Level 2 weekly progress, and the master activities list (Figure 2).

In the final phase of planning, project supervisors can use Level 1 Gantt charts, also known as a synchronization matrix, to combine projects and track completion percentages and MD requirements across a complex construction site if needed. Level 1 charts reemphasize the need for supervisors to carefully balance resource leveling across projects as well as reinforce areas of a project that may be falling behind schedule. Specifically, a detailed Level 3 chart becomes the project bedrock standard and rubric that drives the project forward and dictates schedule and resource adjustment. Project supervisors must use it "to resource-level requirements, to match constrained resources, to compress the schedule to match a desired completion date, or to justify additional resources" (Headquarters, Department of the Army, 2014, p. 4-9). When a projects percentage of completion does not line up with where it is supposed to be at a given point on a schedule, project supervisors have to take steps to start project reduction and get the schedule back on track (Headquarters, Department of the Army, 2014).

Limitations of the current method. As discussed in the previous section, time constrained resource leveling can have a negative impact on task durations and often extends schedules. When two tasks are scheduled that require the same resource at the same time, that resource becomes over scheduled (Figure 5, Schedule A). The traditional solution for this dilemma is to extend the duration of one of the tasks This frees up the resource where it was in conflict (Shurrab, 2015). Unfortunately, this method only adds to task and project duration overall (Figure 5, Schedule B) (Leach, 2014).

Schedule A



Schedule B

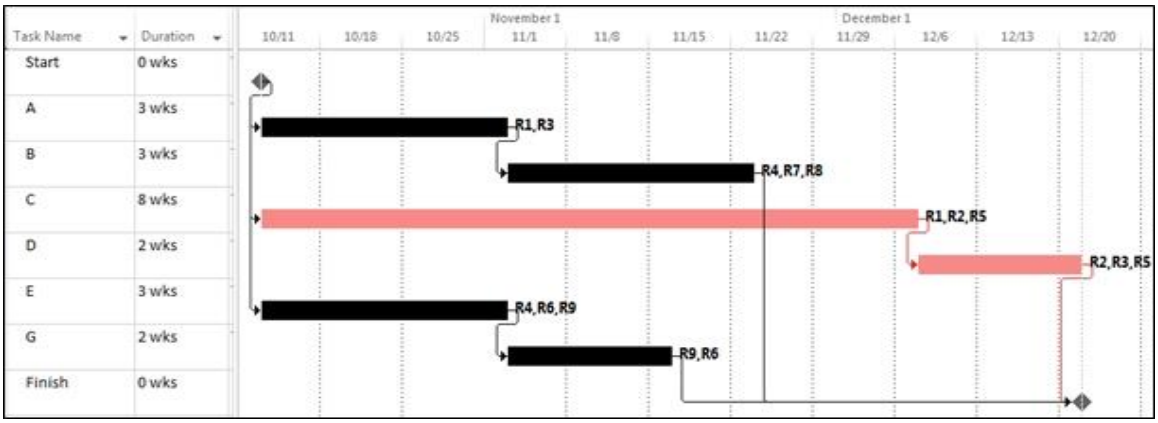


Figure 5. Resolving resource conflicts by extending a project schedule. Adapted from "PMP prep: Resource leveling and resource smoothing," by S. Dash, 2015, *Microsoft Project User Group, Nov. 3, 2015.* Copyright 2015 by MPUG.

Army construction planning can be a very involved and complicated process requiring several rewrites of planning charts and CPM diagrams. This process, designed with thoroughness in mind, can be a lengthy and time consuming. In addition, it may distract project leaders from schedule maintenance and project supervision (Cerveny & Gallup, 2002). The inherent rigidity of critical task duration scheduling, combined with lack of flexibility, needless complexity, and the need to move resources from designated non-critical tasks have all been cited as key contributors to project delays (Goldratt, 1997; Leach 2014; Umble & Umble 2000).

Because delays in these interconnected critical events effect overall project duration, *Construction Project Management* (Headquarters, Department of the Army, 2014) encouraged project supervisors to extend task durations to the longest available allotted time in order to avoid a particular critical task finishing late and negatively effecting the finish time of the project. "In most project environments, people feel good if they complete an activity by the due date, and feel bad if they overrun the due date. This reinforces their attempts to estimate high probability completion times" (Leach, 1999, p. 45). However, a key component to completing a project on time or ahead of schedule, as well as on budget or under budget, is proper time management. Four specific undesirable effects that often plague CPM planning are excessive duration estimating, lack of positive task time variation, failing to pass on positive task time variation, and delays caused by merging paths. These all fall within the category of poor time management (Goldratt, 1997). Army construction planning is also susceptible to these issues and planners often attempt to remedy it by increasing planned duration times for particular project nodes. Subsequently, these increases in schedule time often contribute to other project issues

such as resource contention, working to time instead of project completion, and forcing other tasks to automatically start on their late start times (Walker, 2010). Poor resource scheduling issues can contribute to poor time management. Ineffective resource scheduling can lead to additional undesirable effects of multi-tasking and loss of focus (Appelbaum, Fernandez, & Marchionni, 2008; Leach, 1999). Another important shortcoming in the current system of Army project planning is resource leveling. For Army project supervisors, resource leveling is a way of maintaining a similar number of MDs each day across the entire project. This form of resource leveling does not necessarily take into account the effective scheduling of critical resources; those personnel and equipment essential to task completion. Effective resource scheduling would prevent many of the issues that require project supervisors to draw personnel from non-critical tasks and readjust the schedule (Umble & Umble, 2000).

Regaining the schedule. *Construction Project Management* (Headquarters, Department of the Army, 2014) encouraged project managers not to solely rely on Gantt charts and Situation Reports (SITREPs) for tracking project progress. These systems can point out when a project is falling behind schedule, but fall short in identifying a specific reason. The TM recommended project managers to "get on the job, observe, and interact with the project supervisor and crew to help the project supervisor develop corrective actions" (Headquarters, Department of the Army, 2014, p. 7-13). On-site management is necessary for regaining the schedule because, according to the TM, the most prudent course of action for gaining ground involves requesting additional resource personnel or increasing the availability factor of assigned personnel. This can only be done if a manager has a shared understanding with the project supervisor of specific delays.

Availability factor increases for personnel may include working longer hours (beyond a standard eight-hour MD), canceling any personal leave or passes, or even sacrificing Army standards such as haircuts and site security (Headquarters, Department of the Army, 2014, p. 7-16). Any request for additional personnel to regain lost time must also be done through the chain of command and requires project leaders to draw up a specific and detailed new plan for the temporary use of additional personnel to regain the schedule (Headquarters, Department of the Army, 2014, p. 7-13).

Another option at project leader's discretion is to split crewmembers and work ahead on designated non-critical tasks. One of the perceived conveniences of the Army's form of CPM is that it allows project managers the ability to stretch out project duration in order to decrease the size of a crew. This means these stretched tasks could easily be shortened in emergency situations by bringing in extra personnel, splitting less essential personnel or extending working hours. By doing so, project supervisors "may be able to squeeze a few days out of the schedule by splitting up the crew and having some of them work the next activity," (Headquarters, Department of the Army, 2014, p. 7-13). Essentially, what the TM is recommends for project managers to do is to plan extra time into a project tasks to allow for fewer crew, while at same time encouraging them to split up their crews or bring in additional personnel when behind schedule.

Summary of the Army CPM System

There are a number of issues with the current system of Army construction planning that can be viewed as negative contributors to project completion. *Construction Project Management* (Headquarters, Department of the Army, 2014) encouraged project supervisors to have crews multitask, bring in outside personnel, and extend work hours in

order to regain the schedule of a delayed project. During the planning phase project supervisors are encouraged to extend the schedule or create critical tasks out of what were originally non-critical tasks in order to level resources across a project. All of these issues can have a negative impact on time project completion (Goldratt, 1997; Leach 2014; Shurrab, 2015; Umble & Umble 2000). These issues are not new, nor are they exclusive to the Army. Several methods and approaches have been developed over the years to address the shortfalls of CPM. One such system, Critical Chain Project Management (CCPM), may have solutions Army project supervisors need to succeed.

Critical Chain Project Management

In his book, *Critical Chain*, Dr. Eliyahu Goldratt attempted to apply production management techniques to project management. He adapted separate resource and schedule management systems suggested by other scholars and researchers and combined them with his own Theory of Constraints (TOC) (Trietsch, 2005). This adapted project management tool was dubbed Critical Chain Project Management (CCPM) and provided a more holistic project management solution that could be both used on its own or combined with traditional processes such as CPM (Cerveny & Gallup, 2002).

The Theory of Constraints. CCPM was Goldratt's extension of the TOC manufacturing management principles adapted to a project management system. TOC is based on the subordinating a system to the slowest or weakest point in that system, referred to as the constraint, and then improving that system to reach maximum throughput. Goldratt (1997), created five focusing steps for improving a system:

1. Identify the constraint.
2. Exploit the constraint.

3. Subordinate everything else to the constraint
4. Elevate the constraint
5. If the constraint is broken, return to step one and repeat the process.

In Step One, identifying and exploiting a constraint, managers utilize the weakest link as much as possible without overloading it. Step two, subordinating everything else to the constraint, means that other points in the system are not overproducing, wasting material or time that the constraint cannot utilize. The third step, elevating the constraint, can require investment in improving the throughput of the system at the constraint, such as more personnel or better equipment. If the constraint is elevated to the point that it is no longer the weakest point in the system, the process repeats itself once the new constraint has been identified (Goldratt, 1997). TOC presents a novel approach to system improvement and has seen some success in industrial and production settings (Sonawane, 2004). TOC system improvement allows for smooth system-wide flow, throughput, and helps eliminate waste, all while improving system output (Leach, 2014).

Applying TOC to project management. In creating the Critical Chain system, Goldratt (1997), applied five focusing procedures for identifying system constraints within a manufacturing chain and converted them into procedures that identify resource constraints that affect projects. Goldratt theorized that a limited resource, such as specialized or technically trained personnel or a specific piece of equipment that is needed to complete a project have the same effect on a project as the weak link in a production chain.

Projects, like production lines, can only continue effectively at the pace of their constraint. Any extra production or completion of tasks ahead of what the constraint is capable are viewed as waste in project management (Leach, 2014). In order for a project to have effective throughput, constraints need to be identified and exploited, similar to production management. Figure 6 is an illustration of how the Five Focusing steps for production improvement can be converted to address resource constraints in project management.

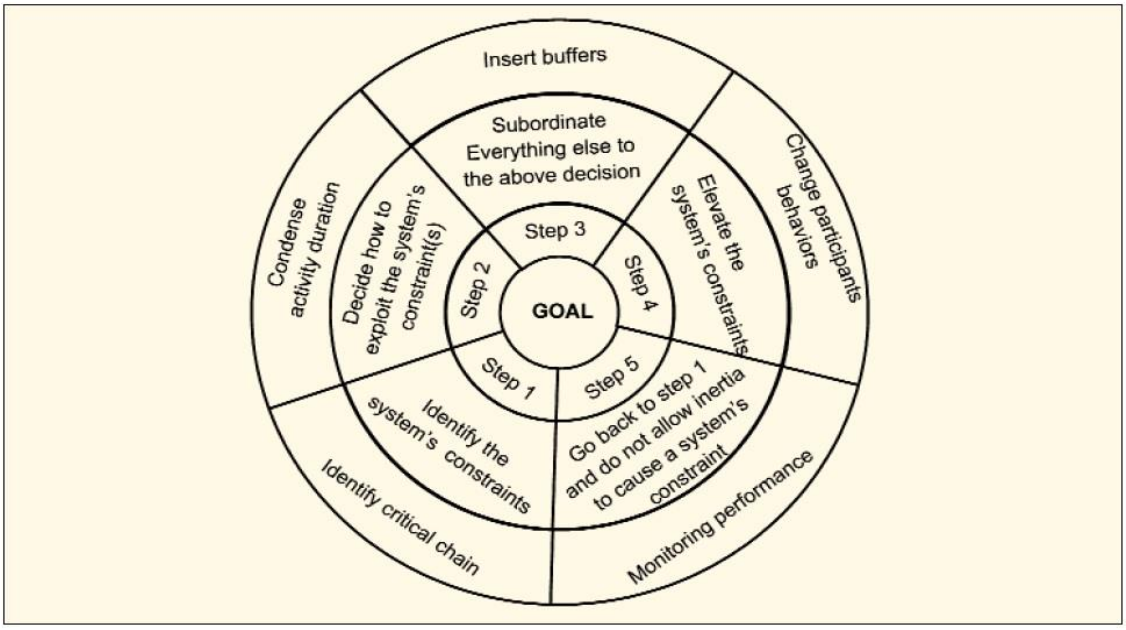


Figure 6. Application of TOC and CCPM. Reprinted from "How the Critical Chain Scheduling Method is Working for Construction," by J. Yang, 2007, *Cost Engineering 49*, (4), p. 26. Copyright 2007 by AACE International.

In CPM, the most critical factor is the longest chain of critical tasks that is needed to complete a project on time. Goldratt (1997) instead argued that the real key to timely project completion is not simply the critical tasks, but the resources attached to those tasks makes them critical. In CCPM, becomes the longest chain of critical resources needed to complete a project on time. Everything in a project is subordinated to these

resources. This is accomplished through improved time management with the use of shortened tasks durations and time buffers as well as strict resource scheduling and control.

CCPM and time management. When discussing project schedule management, project safety (referring to a manager's ability to maintain on time completion rates rather than personnel or job site safety) is a paramount concern. Managers place great emphasis on ensuring they have adequate time for tasks. Naturally, no one working on a project wants to be responsible for their portion of project being late or requiring more resources than scheduled. Subsequently, managers can inadvertently extend a project's length by over scheduling task durations that are unnecessarily long in order to ensure a 100% completion rate for that task or for a project as a whole (Cerveny & Gallup, 2002, Leach, 2014).

Extending tasks durations for the sake of safety and completion rates can often backfire on project schedule planners. The basis of CCPM time management efficiency is its core value of cutting padded duration estimates of tasks by as much as 50% and redistributing those as buffers to the end of a project (Figure 7). The end result is a chain of project tasks that are shorter in duration while retaining schedule contingency because managers can draw from the overall project buffer if tasks cannot be completed as scheduled. This inherently simpler schedule drives employees to start and complete their assigned tasks as fast as possible while allowing managers to retain the contingency time needed to address issues when needed (Barnes, Dvir, & Raz, 2003).

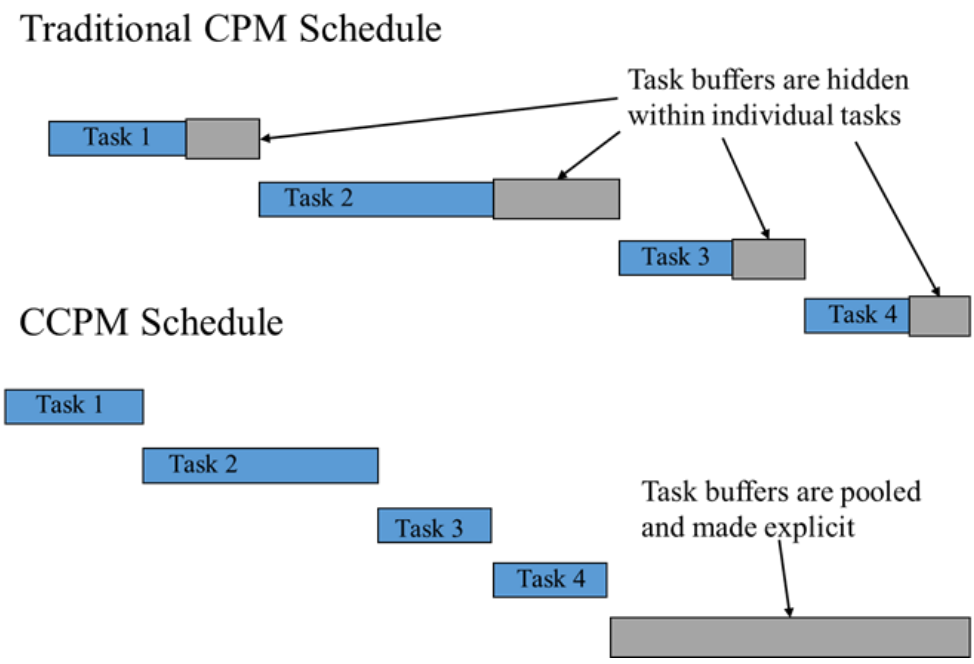


Figure 7. CPM vs. CCPM scheduling. Adapted from "A Critical Look at Critical Chain Project Management," by R. Barnes, T. Raz, & D. Dvir, 2003, *Project Management Journal, 34(4)*, p. 25. Copyright 2003 by the Project Management Journal.

A task with a scheduled completion success rate of 50% means statistically half will be completed at the new compressed rate (Barnes, Dvir, & Raz, 2003, Leach, 1999). A contributing factor to tasks not being completed during normal or extended scheduling is because humans have a tendency to delegate tasks based personal priority or urgency. Often, procrastination leads tasks to be put off to the last minute until they become too urgent to be ignored. This is what was referred to by Goldratt (1997) as student syndrome. Student syndrome creates a propensity to take all of a task's scheduled time, thereby not adding any positive variation time savings to the project. A project with ample or excessive scheduled time (or float in the case of Army projects), combined with its status as a non-critical task means there is no urgency to begin the task. This often means that managers might do as much as 100% of the work on a task during the last

25% - 33% of the scheduled time. If any problems arise during this time, they can lead to the task running long, negating any benefits that padding the project time was supposed to provide (Leach, 1999; Umble & Umble, 2000).

By eliminating individual safety and cutting task durations, CCPM effectively takes issues brought on by procrastination out of the system and pushes managers and project teams to utilize their time more effectively. It also has the added benefit of eliminating the need for having early start and late start times for projects, which often act as means of procrastination, rather than a time safety (Goldratt, 1997; Trietsch, 2005). In traditional CPM, time management issues can also arise when chains of non-critical tasks merge with the CP and these outlying tasks come with delays. These delays will contribute to an overall project delay. In this way, non-critical tasks, such as those designated with available float in Army construction projects, can actually affect project completion. CCPM addresses this flaw by applying specific project chain feeding buffers (Figure 8), which protect the critical chain from delays.

Feeding buffers are created in the same manner as the overall project buffer. Up to 50% of a feeder task's duration is cut and added to the end. In this way, a non-critical tasks or series of non-critical tasks essentially become their own mini project within the greater project itself. This method can also be utilized in large construction projects that have several separate projects with different managers or even construction firms. These separate projects can safely feed into each other without carrying over delays into the overall critical projects due date. Any extra slack time, padding, or float is taken out of the critical tasks and stored in a feeding buffer at the end of the feeder chain. Just like the main project buffer, the feeding buffer does not eliminate the safety time, but rather helps

to eliminate the procrastination brought on by having too much time scheduled for each task (Cohen, Mandelbaum, & Shtub, 2004). Managers are encouraged to initiate non-critical tasks at a more expedient rate, cutting down on delays while still maintaining safety.

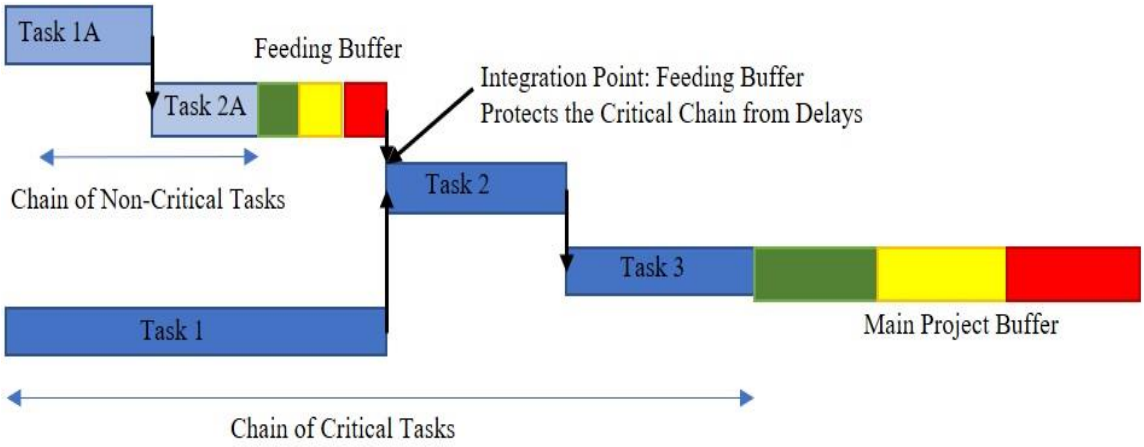


Figure 8. Illustration of non-critical feeding buffer protection. Adapted from "A Critical Look at Critical Chain Project Management," by R. Barnes, T. Raz, & D. Dvir, 2003, *Project Management Journal, 34*(4), p. 26. Copyright 2003 by the Project Management Journal.

CCPM and resource management. By addressing student syndrome, excessive task duration estimates, and challenges with merging paths, CCPM time scheduling attempts to eliminate the four undesirable effects of ineffective scheduling that plague CPM project plans. CCPM also addresses the two undesirable effects of ineffective resource management. It eliminates multitasking and lack of focus by making sure that resources are properly scheduled, balanced, and allotted by adding dedicated resource-critical scheduling to the critical chain schedule. CCPM utilizes a resource-critical approach that focuses not on a projects task's connections based on order completion sequence, but rather on how those tasks are tied together based on resource utilization.

Project tasks often have to utilize the same resources (time, people, equipment, and work spaces). CCPM highlights the critical chain of resource utilization and shows the most critical path of resource and task dependencies. By identifying those relationships, CCPM allows planners to develop a project plan based on leveling resource management across the project. Figure 9 illustrates a construction project schedule in which a resource has been leveled and properly scheduled prevents its use in multiple places at once.

By taking a resource-critical approach when it comes to scheduling and leveling, CCPM attempts to address the undesirable effects of CPM. CCPM urges planners to consider the constraint of over scheduling resources before laying out task order and duration. By doing so, planners can avoid the pitfall of having to extend tasks when resources come into conflict because they are never in conflict (Shurrab, 2015). However, in order to avoid these conflicts before they occur, both critical and non-critical project tasks often need to be 'pushed to the right', which can extend project duration just as CPM. Conversely, this negative increase in project time is offset through CCPM's 50% task times (Leach, 2014).

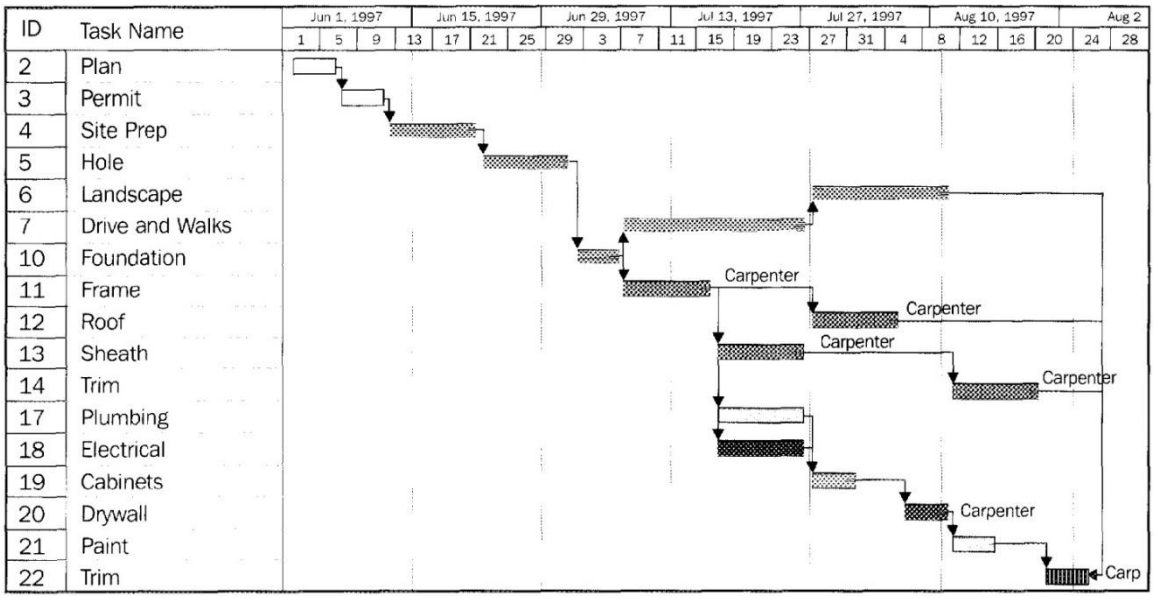


Figure 9. CCPM resource critical leveling and scheduling. Reprinted from "Critical Cain Project Management Improves Project Performance," by Larry P. Leach, 1999, *Project Management Journal, 39*(2), p. 46. Copyright 1999 by Project Management Journal.

By focusing resources (time, people and equipment) in a detailed schedule, CCPM ensures that those resources are not spread too thinly or pulled away for another task or side project. Multi-tasking, along with maintaining an abundance of work-in-progress (WIP), is often sought after by some managers who feel the need to keep workers busy. However, this approach has disadvantages when it comes to efficient use of resources. Keeping workers busy often does more harm than good when it comes to maintaining schedule control and proper use of resources (Herroelen & Leus, 2005). Workers who are multitasking with lots of WIP will stretch managers to their limit. Managers that are dealing with too many issues at once are more likely to lose focus on what is most critical on a project at any given time. In CCPM "it is advisable to reduce, or even eliminate concurrent activities, focusing the project participants on the critical chain" (Yang, 2007, p. 27). Focused workers and managers can concentrate on one

critical task and are better able to complete tasks on or ahead of schedule. They also maintain the quality of work because of fewer distractions (Gill, 2008).

Summary of Literature Review

As stated earlier, Army Engineer construction projects adhere to the traditional CPM standards of arranging tasks in logical order of completion. Engineering projects focus on tasks deadlines set by the standards outlined in the 3-34 series of U.S. Army Corp of Engineers Training Manuals. Detailed tables in these manuals outline how long a given construction task is projected to take based on several factors including weather, terrain, equipment capabilities and capacities, and labor. These established numbers are factored into scheduling the duration of various tasks within a construction project. A key measure of success for any project is completing it on time. A core issue is exceeding the time schedule. The Army's solution to this problem is to (1) extend the duration of a given task in order to protect schedule overruns, and (2) regain the schedule through the use of extra labor, overtime, or outside help (Headquarters, Department of the Army, 2014).

Protecting a construction project's completion date and making sure that it is completed on time or ahead of schedule by inflating individual tasks with too much safety time extends the length of the overall project is counterintuitive (Gill, 2008). By adopting the task reduction and time buffering techniques used in CCPM (namely, the method of cutting each padded task by 50% and adding the safety to the overall project buffer), Army construction project planners could avoid the project time overruns that occur because of task duration overestimation. Adopting this approach could also have the benefit of advancing early time completion to be passed on to the next task. Team

leaders on an Army construction project are just as likely to be subject to the pitfalls of student syndrome and personally prioritizing their particular task over another. Task duration inflation only compounds this issue. "With inflated duration, a project manager cannot control the schedule because project participants are reserving their safety time." (Yang, 2007, p. 25). By eliminating an individual task's safety time and adding it to an overall project buffer instead, the tendency for team leaders to take all of their scheduled task time may be reduced. This causes a positive time savings effect. Also, time management and control of schedule overruns is limited to the control of the project manager instead of every individual team leader. This would allow the project manager to focus time saving actions and personnel on individual critical tasks that run long, rather than rushing to fight multiple issues.

Perhaps the largest issue facing completion of Army construction projects is the tendency for project site leadership to want to keep soldiers busy at all times. Army construction projects are subject to the same determination that drives soldiers and leaders through the dangers on the battlefield and keeps units focused and moving. While admirable and necessary in combat, these virtues often manifest in negative ways on a construction site such as being in conflict with the planned scheduling on the Gantt chart. Unscheduled or hyper-scheduled tasks can often do more harm than good. "Untimely, availability of an upstream resource can cause exponential degradation of a project, especially if critical path tasks are forced to spin their wheels" (Seider, 2006, p. 44). While it can be successful in keeping soldiers working, multitasking can negatively impact a project's completion time by tying up valuable resources. The result the start times of critical tasks are delayed, or their duration is extended, because personnel are

sidetracked with a non-critical or non-project task that was harmless at one point, but eventually gets out of hand (Appelbaum, Fernandez, & Marchionni, 2008; Gill, 2008).

The Army has adopted the traditional method of resource smoothing when it comes to assigning personnel and maintaining schedule control. This practice can produce the negative effects of increased project duration and critical resource conflicts (Shurrab, 2015). CCPM addresses these issues through strict resource-critical scheduling, eliminating much of the wasteful multitasking and misallocation of critical personnel resources. If personnel and equipment resources are recognized as the most critical part of an Army construction project, rather than the task itself, then issues of multitasking, and procrastination could be kept in check (Leach, 2014).

CCPM specifically addresses the possible undesirable effects of the more task oriented CPM by using several time and resource scheduling techniques that can provide a more stable and focused alternative to project plan. Goldratt designed CCPM to be simplistic in nature and holistic in design. Its benefits could be utilized either as a complete alternative to CPM and Gantt based planning, or in an ad hoc fashion and using the time management methods best suited for Army construction. There are questions that have to be considered in using CCPM solutions for Army construction. Namely, what specific time management and resource issues do Army project supervisors face? In addition, does CCPM offer viable solutions to those issues that Army construction planners can utilize?

Methodology

Participants and Procedure

The intent of the research was to conduct a study of Army Officers who have served as project supervisors and managers and have experience in construction project planning and execution. The study was conducted at the Captain's Career Course and Warrant Officer Schools at the Engineer branch of MSCOE at Ft. Leonard Wood, Missouri. The schools at MSCOE train all Army Engineer Officer's and Non-Commissioned Officers in basic and advanced construction management methods. In order to survey the largest number of classes, with the largest possible sample size, the survey was administered in person by the lead researcher and proctored by class Small Group Leaders (SGLs).

Four classes of Army Officers, two Commissioned and two Warrant, were surveyed on site at MSCOE during the 16th-19th of March, 2017. Classes surveyed consisted of Commissioned and Warrant officers at different stages of experience. This sample provided 2% - 4% representation of the total number of Engineer Officers in the Army. The Army Corps of Engineers is relatively small compared to other Army branches (Table 1).

Instruments and Materials

The survey was administered on classes using a multipage paper format. The survey instrument (Appendix A) was designed to protect confidentiality and comply with university IRB guidelines and Army regulations. The survey was split into four sections. The first survey section gathered demographic data. The next three survey sections consisted of 83 statements on project planning, execution, and completion issues related

Table 1

Officer sample and population sizes

Sample Size - n	Estimated Population Size - N
34 1LTs	1500
47 CPTs	1200
16 WO1s	250
22 Chief Warrant Officers	250

Note. Source: MSCOE Commissioned and Warrant Assignment Officers classroom enrollment figures for Fiscal Year, 2016.

to the existing CPM system. Statements in sections 2 through 5 were numbered 1 to 84. During the editing process, survey question 20 was deemed irrelevant and pulled from section 2. The survey instrument was not renumbered and question number 20 does not exist in the final survey.

The participants were asked to respond to each statement based on their perceived level of impact. Each question was given a five-point scale of 1 – 5; with 1 representing little to no impact and 5 being very impactful. The last section of the survey presented participants with 20 statements and questions on CPM or CCPM based solutions. Participants were asked to respond to each statement based on their level of agreement on a scale of 1- 5, with 1 meaning they strongly disagreed with the statement, and 5 meaning they strongly agree with the statement. The survey statements were based on categories of project leadership including procrastination, multitasking, scheduling, resource leveling, and project safety time.

Threats to Validity

The potential threats to the validity of this study were determined as follows:

1. Not all participants had an equal level of experience as an Army construction project supervisor. To account for this, an ANOVA was conducted based on experience responses in the demographic questionnaire section of the survey instrument.
2. Feedback was based on project management education level and bias. To account for this, an ANOVA was conducted based on education responses in the demographic questionnaire section of the survey instrument.
3. 3.Because of the classroom setting and unique situation of having a captive audience in a military school, respondents may have felt obligated to take the survey. This could negatively impact the results. To account for this, all participants were reminded that the survey was 100% voluntary. All surveys with obvious quick responses (i.e. an entire section of 1s or answers circled in a zig zag pattern, etc.), or substantial amounts of incomplete data were removed and not recorded during the analysis phase.
4. Not all Commissioned Officers at the Captains Career Course (CCC) were originally Engineers Officers. Some may have come from other branches and had no previous Army or civilian engineering experience. To account for this, all participants were reminded that the survey was 100% voluntary and dealt exclusively with Army and Corps of Engineer projects. Officers from other branches with no experience in engineering were advised not to participate.

5. Project management issues may not have been adequately covered in the survey statements. To account for this, participants were encouraged to leave comments on their surveys, highlighting any concerns. These comments are discussed in the findings section.

Analysis

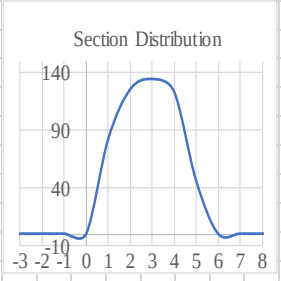
A total of 132 surveys were administered to classes at MSCOE from March 16th to the 19th, 2017. Thirteen surveys were removed from the analysis because of issues 3 and 4 stated in the Threats to Validity Section. Of the remaining 119 participants, their answers to the survey instrument were divided into four groups based on rank and five sections based on the sections in the survey, and entered into an Excel spreadsheet (Appendix B). The participants were assigned a respondent number in the order processed. The four initial groups based on rank consisted of 34 1LTs, 47 CPTs, 16 WO1s, and 22 Chief Warrant Officers; of which 20 were Level 2 (CW2) and two were Level 3 (CW3).

The first part of the survey was designed capture what participants perceived to be the greatest issues when it came to successful completion of Army construction projects. The independent variables in the first part of the study were the effectiveness of current CPM based system for scheduling and resource management across three phases; planning, execution, and completion. The dependent variables were the responses of the various rank and experience groups. The independent variables for the second part of the survey were the effectiveness of CPM and CCPM based solutions. The dependent variables were the responses of the various rank and experience groups.

The methodology of the study was that of a quantitative analysis of the results of the survey (Creswell, 2014). By analyzing the number of negative responses to issues that affect CPM projects between the two groups of officers, it was possible to quantify the issues perceived that negatively impact project completion under the current system. Subsequently, analysis of data from the second part of the survey demonstrated the perceived benefit of CCPM to CPM.

To conduct the quantitative analysis, the sections were further divided into two sub-categories, one for resource issues and one for scheduling issues. The average answer for each of these statements was derived using Excel, along with the standard deviation for each set of question answers. A distribution analysis was conducted of all answers within a sub section. This was done in order to have a visual representation of the how the data in each section was distributed based on a normal curve and to have a visual representation of each sample group's relative homogeneity (Figure 10).

					Resource Issues														Scheduling Issues								
	Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Respondent	Rank																									
1	1LT	2	5	3	3	1	2	2	3	4	3	2	1	1	2	2		4	4	3	3	3	1	1	2	1
2	1LT	4	5	4	4	2	3	2	2	4	5	2	3	2	4	3		4	2	2	2	2	4	4	5	4
3	1LT	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1		1	2	1	1	1	2	2	1	1
4	1LT	1	4	1	2	3	1	5	2	4	2	1	3	1	1	1		2	1	1	2	2	1	1	1	1
5	1LT	3	3	5	5	1	3	3	4	4	3	2	2	3	3	5		4	5	4	4	4	1	1	2	2
6	1LT	5	4	3	4	3	4	3	4	2	4	3	1	4	3	4		3	4	3	3	2	4	4	2	4
7	1LT	3	4	2	4	4	5	4	2	5	5	1	4	4	4	3		3	3	3	4	2	3	2	2	3
8	1LT	4	5	4	5	1	2	3	3	5	3	2	2	2	1	2		3	3	4	3	2	2	2	1	2
9	1LT	4	4	2	2	5	2	3	2	2	1	1	2	4	4	3		3	4	2	2	2	2	3	3	4
10	1LT	4	4	3	4	3	4	3	4	5	4	2	2	3	4	2		3	3	3	4	4	2	2	2	3
11	1LT	4	3	2	4	2	5	2	4	4	4	3	5	4	3	2		3	5	3	4	4	2	3	1	5
12	1LT	2	2	2	4	1	1	1	1	1	4	2	1	1	1	4		3	2	2	1	4	1	3	2	1
13	1LT	3	3	2	5	2	3	4	3	3	4	5	4	2	4	4		4	4	4	3	4	2	4	2	2
14	1LT	3	2	2	4	2	3	3	1	2	3	1	5	2	4	2		1	1	1	1	4	2	3	1	1
15	1LT	3	3	3	4	2	3	3	3	4	4	3	3	3	2	1		3	3	3	3	2	4	1	3	2
16	1LT	1	2	2	1	2	3	4	2	3	3	2	1	1	1	1		4	5	2	5	2	4	4	3	1
17	1LT	5	4	5	5	2	3	5	4	1	4	4	2	4	4	4		5	5	5	3	5	1	4	2	4
18	1LT	3	3	3	3	3	4	4	3	4	4	2	2	2	3	4		2	3	4	2	4	3	2	3	3
19	1LT	4	4	4	4	1	4	4	3	4	4	2	2	3	2	2		3	4	3	3	4	2	2	3	2
20	1LT	3	3	1	5	1	2	5	1	4	1	1	1	1	3	1		1	3	4	5	4	1	3	1	1
21	1LT	2	3	1	3	4	3	4	3	4	1	1	1	2	1	1		2	2	1	1	4	2	2	3	3
22	1LT	4	3	3	4	2	2	3	3	3	3	5	2	2	2	2		3	4	3	3	2	2	2	3	3
23	1LT	3	3	3	4	2	4	4	4	5	3	3	4	2	2	3		3	3	4	2	4	2	3	2	4
24	1LT	2	4	1	3	3	2	3	3	5	5	2	1	1	1	1		3	4	3	1	3	1	1	1	1
25	1LT	2	3	4	5	3	4	5	4	4	5	3	3	3	3	3		3	2	4	5	4	4	3	3	3
26	1LT	2	2	3	2	1	2	2	2	2	2	2	2	2	1	1		2	2	2	3	2	1	2	3	1
27	1LT	3	5	2	1	1	3	4	4	2	3	1	1	5	2	4		4	5	2	2	2	1	3	2	2
28	1LT	3	4	4	4	2	4	4	4	4	4	3	3	3	5	4		2	3	3	4	4	2	1	2	2
29	1LT	2	3	4	4	3	4	3	3	3	3	3	2	3	2	2		3	3	4	3	2	2	2	3	3
30	1LT	5	3	3	4	1	1	5	5	5	5	2	4	2	1	1		3	4	2	1	4	1	1	1	1
31	1LT	4	3	2	3	2	2	3	2	3	3	3	2	3	3	2		2	3	1	2	4	2	2	2	2
32	1LT	3	4	5	5	1	2	3	4	4	4	3	3	2	1	2		5	4	3	4	5	1	2	3	4
33	1LT	5	2	1	4	1	2	3	5	3	2	2	2	2	2	2		2	4	1	1	5	2	1	3	5
34	1LT	4	3	4	4	2	3	3	2	4	3	4	3	4	4	3		3	3	3	4	4	2	4	4	3
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34	34	34
	Question Average	3.1	3.4	2.8	3.6	2.1	2.8	3.3	2.9	3.4	3.3	2.3	2.4	2.5	2.5	2.4		2.9	3.3	3.6	2.8	3.2	2.0	2.4	2.3	2.5
	Standard Deviation	1.1	0.9	1.1	1.2	1.0	1.1	1.1	1.1	1.2	1.1	1.1	1.2	1.1	1.2	1.2		1.0	1.1	1.2	1.3	1.1	1.0	1.0	1.0	1.3
							Section Average				2.9												Section Average				
							Standard Deviation				0.5												Standard Deviation				



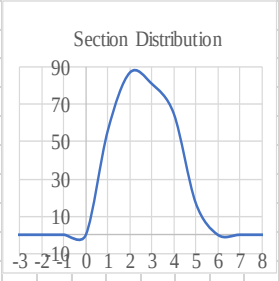


Figure 10. Example from Appendix B of initial data entry, analysis, and distribution spreadsheet for 1LTs.

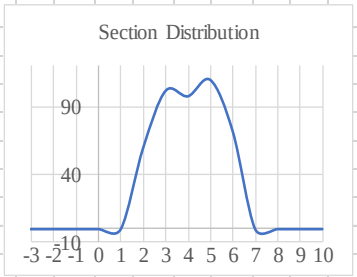
Statement response outliers were then identified from the average answers for each section and rank group. Average question responses of 2.5 or less were highlighted in green and averages of 3.5 or higher were highlighted in orange (Figure 10). This was done in order to identify statement answers across all the sections and ranks distinctly different from the average (a mean of 3).

Three additional groups were also compiled to be analyzed against each other (Appendix D). The first group consisted of those respondents that indicated they had at least some education (expressed by circling a 2 or higher) in both CPM and CCPM. The second consisted of those respondents that indicated that they had experience in at least two construction projects as both a supervisor and in a support role. The third group consisted of a control group of all officers not included in the other groups. The groups were analyzed with the same spreadsheet used for initial data (Figure 11).

The responses of the two larger groups of Army officers (1LTs, CPTs, WO1s, Chiefs and Control, Education, Experience), were then submitted to a quantitative analysis of variance (ANOVA, Appendices C and E) using Excel's Single Factor Measurement Tool. The reason for this was to analyze the variance in responses based on each of the groups to see if there was a difference across the various groups.

Commissioned and Warrant Engineer officers have very different levels of experience. Warrant Officers are former Enlisted NCOs that have experience not just in supervisory positions, but also as lower enlisted crewmembers and equipment operators. Warrant Officers are typically older, have less college education, but have more job experience, technical expertise, and certification as Army Engineers.

							CPM												CCPM				
	Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83		66	67	68	76	79	81	84
Respondent	Rank																					
7	1LT	4	4	1	5	3	5	3	4	3	3	5	4	1		4	3	2	4	2	3	1
8	1LT	5	2	1	3	1	3	4	3	4	3	3	3	1		3	5	3	4	3	1	1
9	1LT	4	4	3	3	3	4	3	4	3	4	3	3	3		3	3	2	4	2	3	2
13	1LT	3	2	2	4	1	2	4	2	4	2	4	5	4		2	4	4	4	4	2	1
15	1LT	2	2	3	2	2	2	4	2	2	4	2	4	4		4	2	3	2	3	2	5
17	1LT	5	3	1	4	4	4	2	4	2	4	4	2	4		4	5	2	4	4	5	5
22	1LT	5	4	1	5	1	5	3	4	3	3	3	4	4		1	3	1	3	3	1	2
24	1LT	5	5	3	5	2	5	1	5	1	1	5	4	1		1	5	1	4	1	2	1
26	1LT	2	1	2	3	2	1	1	3	3	4	4	2	1		2	3	5	2	4	3	2
27	1LT	5	5	1	5	2	5	5	4	4	5	5	4	1		4	4	2	2	5	2	1
28	1LT	3	3	1	3	1	3	4	3	2	2	3	3	2		2	4	2	4	4	3	2
29	1LT	3	3	2	3	2	3	2	3	3	2	3	3	2		2	2	2	2	2	2	3
33	1LT	5	1	1	5	1	3	1	3	5	1	1	5	1		2	4	1	2	3	2	4
38	CPT	4	2	1	4	2	3	4	4	4	2	2	4	1		3	3	2	3	2		2
44	CPT	5	5	4	4	2	4	1	1	2	4	5	2	4		1	3	2	1	2	3	1
62	CPT	2	3	3	5	3	5	2	1	3	3	5	5	2		2	3	3	2	3	4	5
66	CPT	5	1	3	5	1	5	1	3	3	2	5	5	1		2	5	5	5	3	3	1
68	CPT	4	4	2	2	2	2	2	4	4	3	4	4	1		3	3	2	3	2	4	2
69	CPT	1	4	1	2	2	2	1	3	1	1	2	3	4		1	5	1	3	2	2	2
71	CPT	5	4	1	3	1	5	5	5	3	3	5	2	3		2	5	1	5	1	4	3
76	CPT	1	5	5	5	5	1	4	2	4	2	4	5	5		4	4	1	4	2	1	1
77	CPT	4	4	2	4	2	2	4	4	3	2	4	4	4		3	4	2	3	4	2	2
78	CPT	4	2	2	4	1	3	4	2	4	4	5	2	3		2	4	4	3	4	3	1
81	CPT	2	2	2	4	1	2	2	1	4	4	3	3	3		3	2	2	5	3	5	1
83	WO1	5	3	3	4	2	4	4	3	5	4	5	2	2		3	5	4	5	3	5	3
90	WO1	2	4	2	3	3	4	2	3	2	1	1	2	2		4	3	3	4	1	2	1
93	WO1	4	2	2	2	2	2	2	2	2	2	2	2	2		1	4	2	2	2	2	2
96	WO1	4	5	2	4	2	4	3	3	3	4	4	5	2		2	5	4	4	2	3	1
98	CW2	5	3	4	4	4	3	4	5	5	3	3	2	2		4	4	1	3	1	4	2
100	CW2	3	3	2	5	1	4	4	5	4	4	4	5	5		2	5	5	4	1	4	1
110	CW2	5	4	3	5	3	4	4	4	4	3	4	3	5		3	4	3	5	4	2	5
111	CW2	5	3	1	4	2	2	3	5	3	4	2	5	3		2	4	1	3	1	3	4
113	CW2	5	3	1	1	1	3	5	4	5	1	3	1	1		4	4	2	4	2	3	1
114	CW2	2	2	4	3	5	3	2	2	3	4	2	4	3		4	1	5	2	4	2	4
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34
	Average	3.8	3.1	2.1	3.7	2.1	3.3	2.9	3.2	3.2	2.9	3.5	3.4	2.6		2.6	3.7	2.5	3.4	2.6	2.8	2.2
	Standard Deviation	1.3	1.2	1.1	1.1	1.1	1.2	1.3	1.2	1.1	1.1	1.2	1.2	1.4		1.0	1.1	1.3	1.1	1.1	1.1	1.4
				Section Average					3.1									Section Average			2.8	
				Standard Deviation					0.5									Standard Deviation			0.5	



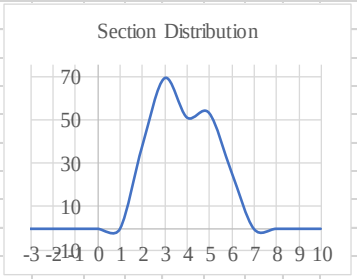


Figure 11. Example from Appendix D of initial data entry, analysis, and distribution spreadsheet for Education Group.

Conversely, Commissioned Officers that are project supervisors are much younger and less experienced. They are typically 1st or 2nd Lieutenants with one to five years of leadership experience in the Army. They all have college educations by default, though not necessarily engineering degrees. Subsequently, they also have less job experience and technical expertise compared to Army Engineers.

Analyzing these groups based on experience level and education was important in quantifying the validity of their responses. A p-value analysis of the ANOVA results was conducted to determine if there was any considerable variance between the groups.

Findings

Section 1 - Demographic Data of the 7 Groups Studied

Table 2 is a breakdown of the average responses for the demographic data from each of the respondents. The first four groups are broken down by rank. The next three represent the average demographic responses of the education, experience, and control groups. The education group was selected by choosing officers across all ranks that answered a two or higher for both CPM and CCPM knowledge in Section 1. The experience group was chosen from officers across all ranks that have participated in at least two construction projects for the Corps of Engineers, both as a supervisor and in a supporting role.

Table 2

Demographics - Average responses

	Years of Military Experience	CoE Projects as Supervisor	CoE Projects in Support	Years of Civilian Experience	Six Sigma	Lean	TOC	EVM	CCPM	CPM
1LTs	5-7	3	2	3-5	2	2	1	2	2	4
CPTs	7-9	2	2	0-3	2	1	1	1	1	3
WO1s	11-13	3	6	5-7	2	2	3	2	2	3
Chiefs	15	6	7	9-11	2	2	1	2	2	4
Control Group										
Less Education and Experience	7-9	1	1	3-5	1	1	1	1	1	3
Experience	11-13	6	7	5-7	2	2	2	2	2	4
Education	9-11	4	4	5-7	2	2	2	3	3	4

Note. Years of experience are expressed as ranges, as they were on the survey instrument.

Statement Response Results: Survey Sections 2-5

Statement responses were divided into two subgroups, resource issues and scheduling issues, and entered into the Excel spreadsheet. In Section 5, statement responses were divided into CPM and CCPM based solution subgroups. The average response for each statement, and corresponding standard deviation was compiled by Army rank using the software. A section average and corresponding standard deviation, was also calculated using the average answers in that section.

Data was further divided into the education, experience, and control groups. Excel was used to compile section answers and calculate averages and standard deviations. Once calculations were completed, outliers in the data were identified. Answers that represented average responses at 2.5 or below were highlighted in green. Average answers of 3.5 or above were highlighted in orange. This was done to easily identify average question responses that were distinctly above or below the mean response of three by a factor of 0.5. The average responses in each group were then put through two separate ANOVAs using Excel's single factor ANOVA function. First, an ANOVA was conducted between each of the four rank groups surveyed. Next, an ANOVA was conducted between the education, experience, and control groups. The results of this analysis, corresponding questions, notes, and ANOVA findings can be found by survey section under the next four subheadings.

Section 2 - Project Planning Issues Results

Table 3

Survey Section 2: Statements by Group

Resource Issues

1. The scope of a project changed significantly during planning.
2. The design of a project changed significantly during planning.
6. Too many tasks are assigned to too few people.
8. Planners assume the job is smaller than it really is.
9. Planners assume the job is larger than it really is.
10. Available resources are not used effectively.
13. There is a lack of communication between project planners.
14. There is a shortage of people needed to complete a schedule on time.
15. There is a shortage of equipment needed to complete a schedule on time.
16. Rules, procedures, or policies hold the project back rather than help.
17. It is difficult to plan things that have not been done before.
21. It is difficult to access historical data that could help with planning projects.
22. Current project planning methods are difficult to change.
24. The current project planning system is good; project planners just don't know how to properly use it.
25. The same project planning issues plague every project and are never addressed.

Scheduling Issues

3. The scheduling of project tasks changed significantly during planning.
4. The scheduling of project completion changed significantly during planning.
5. There are frustrations or disagreements about the priority of tasks during planning.
7. Tasks are poorly prioritized.
11. Project schedules are too optimistic – not enough scheduled time.
12. Project schedules are too pessimistic – too much time scheduled.
18. Project time estimates are padded or extended to be safe.
19. Project workload is either "feast or famine". There is no steady day-to-day work load throughout the project.
23. Project plans and estimates become self-fulfilling prophecies.

Note. There was one written response placed next to Statement 16 by a CPT. They circled 5, but wrote "actually 15 [sic]" next to the statement.

Table 4

Section 2 – Project Planning: Average answers across officer groups

							Project Planning Issues - 1LTs																	
				Resource Issues														Scheduling Issues						
Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34	34	34
Question Average	3.1	3.4	2.8	3.6	2.1	2.8	3.3	2.9	3.4	3.3	2.3	2.4	2.5	2.5	2.4		2.9	3.3	3.6	2.8	3.2	2.0	2.4	2.3	2.5
Standard Deviation	1.1	0.9	1.1	1.2	1.0	1.1	1.1	1.1	1.2	1.1	1.1	1.2	1.1	1.2	1.2		1.0	1.1	1.2	1.3	1.1	1.0	1.0	1.0	1.3
						Section Average				2.9									Section Average			2.8			
						Standard Deviation				0.5									Standard Deviation			0.5			
							Project Planning Issues -CPTs																	
				Resource Issues														Scheduling Issues						
Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Number of Respondents	47	47	47	47	47	47	47	47	47	47	47	47	47	46	46		47	47	47	47	47	47	47	47	47
Average	3.0	2.8	3.0	3.1	2.0	2.8	2.9	2.5	2.7	3.2	2.5	2.8	2.3	2.3	2.7		3.0	2.9	2.5	2.5	3.2	1.7	2.1	2.7	2.3
Standard Deviation	1.4	1.3	1.4	1.1	1.0	1.2	1.4	1.2	1.2	1.4	1.3	1.3	1.1	1.2	1.4		1.3	1.3	1.2	1.2	1.3	0.8	1.1	1.3	1
			Section Average				2.7												Section Average			2.5			
			Standard Deviation				0.3												Standard Deviation			0.5			
							Project Planning Issues - WO1s																	
				Resource Issues														Scheduling Issues						
Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Number of Respondents	16	16	16	16	16	16	16	16	16	16	16	15	16	15	16		16	16	16	16	16	16	16	16	16
Average	2.7	2.6	2.6	3.4	2.3	2.8	3.3	2.7	3.1	3.1	2.3	2.5	2.3	2.1	2.8		2.6	2.8	2.5	2.6	2.9	2.3	2.1	2.3	2.2
Standard Deviation	0.9	1.0	1.1	0.9	1.1	1.2	1.0	1.1	1.3	1.1	0.9	1.1	1.2	1.2	1.2		0.9	0.9	0.9	1.0	1.2	0.9	1.0	1.0	0.9
			Section Average				2.7												Section Average			2.5			
			Standard Deviation				0.4												Standard Deviation			0.3			
							Project Planning Issues - Chiefs																	
				Resource Issues														Scheduling Issues						
Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Number of Respondents	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22		22	22	22	22	22	22	22	22	22
Average	3.0	3.1	2.8	3.2	2.0	3.3	3.2	3.1	3.4	3.4	2.8	2.8	2.5	3.1	2.8		2.9	2.8	2.4	2.6	3.3	2.1	2.5	2.6	2.6
Standard Deviation	1.0	1.0	1.3	1.2	1.0	1.1	1.3	1.3	1.1	1.3	1.1	1.2	0.9	1.0	1.1		1.1	1.2	1.1	1.1	1.0	1.2	1.3	1.1	0.9
				Section Average				3.0											Section Average			2.6			
				Standard Deviation				0.4											Standard Deviation			0.3			

Table 5

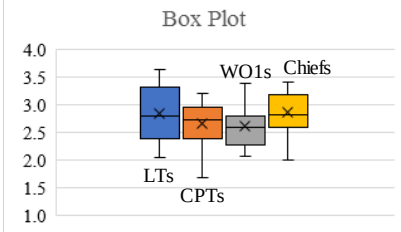
Section 2 – Project Planning: Average answers across experience groups

Control																								
				Resource Issues														Scheduling Issues						
Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Number of Respondents	57	57	57	57	57	57	57	57	57	57	57	56	57	55	56		57	57	57	57	57	57	57	57	57
Average	2.9	2.8	2.7	3.2	1.9	2.6	2.9	2.6	2.9	3.3	2.5	2.6	2.2	2.5	2.7		2.8	2.8	2.5	2.6	3.1	1.7	2.2	2.4	2.4
Standard Deviation	1.3	1.3	1.4	1.1	1.0	1.2	1.4	1.3	1.2	1.3	1.3	1.2	1.0	1.2	1.3		1.3	1.3	1.2	1.2	1.2	0.9	1.1	1.1	1.0
				Section Average				2.7										Section Average					2.5		
				Standard Deviation				0.3										Standard Deviation					0.4		
Experience																									
				Resource Issues														Scheduling Issues						
Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34	34	34
Number of Respondents	3.2	3.2	2.8	3.4	2.0	3.1	3.3	2.9	3.2	3.0	2.5	2.6	2.4	2.4	2.6		3.0	3.1	2.7	2.4	3.3	2.1	2.4	2.5	2.4
Number of Respondents	1.1	1.0	1.3	1.2	1.0	1.1	1.0	1.1	1.2	1.3	1.1	1.2	1.0	1.2	1.1		1.0	1.1	1.2	1.1	1.2	1.0	1.2	1.2	1.0
					Section Average					2.8								Section Average					2.7		
					Standard Deviation					0.4								Standard Deviation					0.4		
Education																									
				Resource Issues														Scheduling Issues						
Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34	34	34
Question Average	3.2	3.2	3.2	3.4	2.3	3.1	3.3	2.9	3.1	3.4	2.6	2.6	2.9	2.6	2.8		3.1	3.2	2.6	2.9	3.3	2.1	2.3	2.7	2.6
Standard Deviation	1.1	1.0	1.2	1.3	1.1	1.1	1.1	1.1	1.2	1.3	1.2	1.2	1.1	1.3	1.3		1.0	1.1	1.1	1.1	1.3	1.1	1.1	1.1	1.1
					Section Average					3.0								Section Average					2.8		
					Standard Deviation					0.3								Standard Deviation					0.4		

Table 6

Section 2 – Project Planning: Officer group ANOVA

Question Number	LTs	CPTs	WO1s	Chiefs
1	3.1	3.0	2.7	3.0
2	3.4	2.8	2.6	3.1
6	2.8	3.0	2.6	2.8
8	3.6	3.1	3.4	3.2
9	2.1	2.0	2.3	2.0
10	2.8	2.8	2.8	3.3
13	3.3	2.9	3.3	3.2
14	2.9	2.5	2.7	3.1
15	3.4	2.7	3.1	3.4
16	3.3	3.2	3.1	3.4
17	2.3	2.5	2.3	2.8
21	2.4	2.8	2.5	2.8
22	2.5	2.3	2.3	2.5
24	2.5	2.3	2.1	3.1
25	2.4	2.7	2.8	2.8
3	2.9	3.0	2.6	2.9
4	3.3	2.9	2.8	2.8
5	3.6	2.5	2.5	2.4
7	2.8	2.5	2.6	2.6
11	3.2	3.2	2.9	3.3
12	2.0	1.7	2.3	2.1
18	2.4	2.1	2.1	2.5
19	2.3	2.7	2.3	2.6
23	2.5	2.3	2.2	2.6



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
WO1	24	62.475	2.6031	0.12891
Chiefs	24	68.3636	2.8485	0.14834

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.722	1	0.7224	5.21131	0.027	4.052
Within Groups	6.377	46	0.1386			
Total	7.099	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	24	67.7756	2.824	0.24907
WO1s	24	62.475	2.6031	0.12891

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.585	1	0.5853	3.09728	0.085	4.052
Within Groups	8.693	46	0.189			
Total	9.279	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	24	67.7756	2.824	0.24907
Chiefs	24	68.3636	2.8485	0.14834

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.007	1	0.0072	0.03625	0.85	4.052
Within Groups	9.14	46	0.1987			
Total	9.148	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	24	67.7756	2.824	0.24907
CPTs	24	63.4459	2.6436	0.15187

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.391	1	0.3906	1.9482	0.1695	4.0517
Within Groups	9.222	46	0.2005			
Total	9.612	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	24	63.4459	2.6436	0.15187
WO1s	24	62.475	2.6031	0.12891

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.02	1	0.0196	0.13988	0.7101	4.0517
Within Groups	6.458	46	0.1404			
Total	6.478	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	24	63.4459	2.6436	0.15187
Chiefs	24	68.3636	2.8485	0.14834

ANOVA

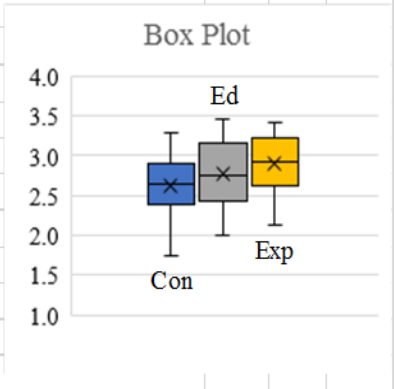
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.504	1	0.5038	3.35651	0.0734	4.0517
Within Groups	6.905	46	0.1501			
Total	7.409	47				

Note. No statistically significant findings were discovered between the groups.

Table 7

Section 2 – Project Planning: Experience group ANOVA

Question Number	Con	Ed	Exp
1	2.9	3.2	3.2
2	2.8	3.2	3.2
6	2.7	2.8	3.2
8	3.2	3.4	3.4
9	1.9	2.0	2.3
10	2.6	3.1	3.1
13	2.9	3.3	3.3
14	2.6	2.9	2.9
15	2.9	3.2	3.1
16	3.3	3.0	3.4
17	2.5	2.5	2.6
21	2.6	2.6	2.6
22	2.2	2.4	2.9
24	2.5	2.4	2.6
25	2.7	2.6	2.8
3	2.8	3.0	3.1
4	2.8	3.1	3.2
5	2.5	2.7	2.6
7	2.6	2.4	2.9
11	3.1	3.3	3.3
12	1.7	2.1	2.1
18	2.2	2.4	2.3
19	2.4	2.5	2.7
23	2.4	2.4	2.6



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	24	62.8104	2.6171	0.14027
Education	24	66.4681	2.7695	0.16512

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.279	1	0.2787	1.82528	0.183	4.052
Within Groups	7.024	46	0.1527			
Total	7.303	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	24	62.8104	2.6171	0.14027
Experience	24	69.5	2.8958	0.13532

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.932	1	0.9323	6.76566	0.012	4.052
Within Groups	6.339	46	0.1378			
Total	7.271	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Education	24	66.4681	2.7695	0.16512
Experience	24	69.5	2.8958	0.13532

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.192	1	0.1915	1.27485	0.265	4.052
Within Groups	6.91	46	0.1502			
Total	7.102	47				

Note. No statistically significant findings were discovered between the groups.

Section 3 – Project Execution Issues Results

Table 8

Survey Section 3: Statements by group

Resource Issues

26. The scope of a project change significantly during execution.
27. The design of a project changed significantly during execution.
31. Critical personnel or resource bottle necks occur that delay the project.
33. Issues don't become apparent until it's too late.
35. Assigned resources have to be moved to "more pressing needs".
37. Work assignments change significantly during the course of a project.
44. People try to look busy when they really are not.
46. Extra working, polishing, tinkering, or perfecting often goes beyond what is necessary.
47. People are reassigned to other tasks – or removed from the project if project leaders underutilize or don't keep them busy at all times
48. The same project execution issues plague every project and are never addressed.

Scheduling Issues

28. The scheduling of project tasks changed significantly during execution.
29. The scheduling of project completion changed significantly during execution.
30. There are frustrations or disagreements about the priority of tasks during execution.
32. Work expands to fill scheduled time available.
34. Procrastination or waiting until a task has become urgent before starting occurs.
36. People work on non-priority tasks while waiting for priority tasks to start.
38. When faced with time constraints, corners are cut and compromises made.
39. The project often faces non-scheduled events or tasks from outside the project that threaten completion times.
40. Project work is "hurry up and wait".
41. Progress tracking is inaccurate due to inefficient measures or tools.
42. Progress tracking is inaccurate due to inefficient communication or lack of understanding between teams or individuals.
43. Multitasking, or jumping form one task to another, is needed to complete the project on time.
45. Project estimates become "self-fulfilling prophesies".

Note. There is one written answer for Section 3. It is from a CPT that circled a 5 for Statement 39, but wrote in a number 10 next to it and then circled it.

Table 9

Section 3 – Project Execution: Average answers across officer groups

Project Execution Issues - LTs

	Resource Issues										Scheduling Issues													
Question Number>	26	27	31	33	35	37	44	46	47	48	28	29	30	32	34	36	38	39	40	41	42	43	45
Number of Respondents	34	34	34	34	34	34	34	33	34	34	34	34	34	34	34	34	34	34	34	33	34	34	34
Average	3.6	3.7	3.4	3.1	3.0	2.9	2.6	2.2	2.6	2.7	3.2	3.4	3.1	2.9	2.7	2.4	3.3	3.3	2.4	2.5	2.8	2.9	2.6
Standard Deviation	1.3	1.1	1.2	1.2	1.3	1.2	1.2	1.2	1.3	1.3	1.1	1.1	1.2	1.4	1.1	1.2	1.1	1.0	0.9	1.0	1.1	1.1	1.3
Section Average	3.0										Section Average	2.9												
Standard Deviation	0.5										Standard Deviation	0.3												

Project Execution Issues - CPTs

	Resource Issues										Scheduling Issues													
Question Number>	26	27	31	33	35	37	44	46	47	48	28	29	30	32	34	36	38	39	40	41	42	43	45
Number of Respondents	47	47	47	47	47	47	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Average	3.3	3.0	3.3	3.0	3.0	2.6	2.8	2.4	2.9	2.6	3.0	3.1	2.6	2.7	2.8	2.1	2.9	3.5	2.7	2.8	2.8	3.0	2.3
Standard Deviation	1.3	1.3	1.2	1.3	1.2	1.2	1.3	1.2	1.3	1.3	1.3	1.4	1.2	1.2	1.2	1.1	1.3	1.3	1.2	1.2	1.1	1.3	1.2
Section Average	2.9										Section Average	2.8												
Standard Deviation	0.3										Standard Deviation	0.3												

Project Execution Issues - WO1s

	Resource Issues										Scheduling Issues													
Question Number>	26	27	31	33	35	37	44	46	47	48	28	29	30	32	34	36	38	39	40	41	42	43	45
Number of Respondents	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Average	3.4	3.1	3.4	2.8	2.9	2.9	2.8	2.7	2.9	2.8	3.2	3.1	3.1	2.5	3.3	2.4	3.7	2.8	3.0	2.9	3.3	3.0	2.6
Standard Deviation	1.0	1.3	1.2	1.2	1.3	1.2	1.6	1.3	1.3	1.5	1.0	1.0	1.3	1.4	1.3	1.3	1.1	1.3	1.3	1.1	1.1	0.9	1.3
Section Average	3.0										Section Average	3.0												
Standard Deviation	0.3										Standard Deviation	0.4												

Project Execution Issues - Chiefs

	Resource Issues										Scheduling Issues													
Question Number>	26	27	31	33	35	37	44	46	47	48	28	29	30	32	34	36	38	39	40	41	42	43	45
Number of Respondents	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Average	3.3	3.5	3.3	3.1	3.1	2.6	3.0	2.5	3.1	2.6	3.2	3.4	2.8	2.8	3.0	2.2	3.4	3.7	2.8	2.9	3.2	2.9	2.7
Standard Deviation	1.4	1.3	1.1	1.1	1.2	1.1	1.3	1.1	1.2	1.1	1.1	1.1	1.1	1.1	1.5	1.4	1.3	1.2	1.2	1.3	1.1	1.0	1.0
Section Average	3.0										Section Average	3.0												
Standard Deviation	0.3										Standard Deviation	0.4												

Table 10

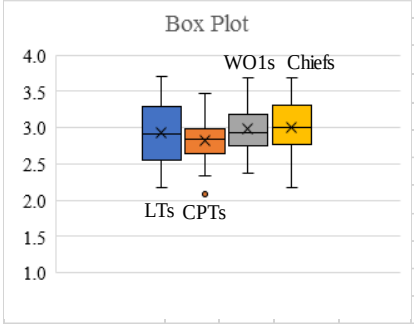
Section 3 – Project Execution: Average answers across experience groups

Project Execution Issues																								
Control																								
		Resource Issues															Scheduling Issues							
Question Number>	26	27	31	33	35	37	44	46	47	48		28	29	30	32	34	36	38	39	40	41	42	43	45
Number of Respondents	57	57	57	57	57	57	57	57	57	57		57	57	57	57	57	57	57	57	57	57	57	57	57
Average	3.2	3.0	3.3	3.0	2.7	2.5	2.7	2.3	2.8	2.4		3.0	3.1	2.7	2.6	2.8	2.0	3.0	3.2	2.6	2.7	2.9	2.8	2.5
Standard Deviation	1.3	1.4	1.2	1.2	1.3	1.2	1.3	1.2	1.3	1.2		1.2	1.3	1.2	1.3	1.1	1.1	1.3	1.3	1.1	1.2	1.2	1.2	1.3
	Section Average					2.9						Section Average					2.8							
	Standard Deviation					0.3						Standard Deviation					0.3							
Experience																								
		Resource Issues															Scheduling Issues							
Question Number>	26	27	31	33	35	37	44	46	47	48		28	29	30	32	34	36	38	39	40	41	42	43	45
Number of Respondents	34	34	34	34	34	34	34	33	34	34		34	34	34	34	34	34	34	34	34	33	34	34	34
Average	3.5	3.6	3.3	2.9	3.2	2.9	2.9	2.4	2.7	2.9		3.1	3.3	2.8	2.8	2.8	2.4	3.2	3.4	2.6	2.9	2.9	3.1	2.5
Standard Deviation	1.3	1.2	1.3	1.2	1.2	1.3	1.4	1.1	1.2	1.3		1.2	1.1	1.2	1.3	1.3	1.3	1.1	1.2	1.1	1.3	1.1	1.0	1.1
	Section Average				3.0							Section Average					2.9							
	Standard Deviation				0.4							Standard Deviation					0.3							
Education																								
		Resource Issues															Scheduling Issues							
Question Number>	26	27	31	33	35	37	44	46	47	48		28	29	30	32	34	36	38	39	40	41	42	43	45
Number of Respondents	34	34	34	34	34	34	34	33	34	34		34	34	34	34	34	34	34	34	34	33	34	34	34
Average	4.0	3.9	3.6	3.3	3.5	2.9	2.9	2.3	3.0	3.0		3.4	3.6	3.1	2.9	3.1	2.4	3.6	3.7	2.7	3.0	3.1	3.1	2.7
Standard Deviation	1.0	1.1	1.1	1.2	1.1	1.1	1.2	1.1	1.3	1.3		1.3	1.1	1.2	1.1	1.2	1.1	1.2	1.0	1.1	1.2	0.9	1.0	1.1
	Section Average				3.2							Section Average					3.1							
	Standard Deviation				0.5							Standard Deviation					0.4							

Table 11

Section 3 – Project Execution: Officer group ANOVA

Question Number	LTs	CPTs	WO1s	Chiefs
26	3.6	3.3	3.4	3.3
27	3.7	3.0	3.1	3.5
31	3.4	3.3	3.4	3.3
33	3.1	3.0	2.8	3.1
35	3.0	3.0	2.9	3.1
37	2.9	2.6	2.9	2.6
44	2.6	2.8	2.8	3.0
46	2.2	2.4	2.7	2.5
47	2.6	2.9	2.9	3.1
48	2.7	2.6	2.8	2.6
28	3.2	3.0	3.2	3.2
29	3.4	3.1	3.1	3.4
30	3.1	2.6	3.1	2.8
32	2.9	2.7	2.5	2.8
34	2.7	2.8	3.3	3.0
36	2.4	2.1	2.4	2.2
38	3.3	2.9	3.7	3.4
39	3.3	3.5	2.8	3.7
40	2.4	2.7	3.0	2.8
41	2.5	2.8	2.9	2.9
42	2.8	2.8	3.3	3.2
43	2.9	3.0	3.0	2.9
45	2.6	2.3	2.6	2.7



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
WO1s	23	68.6875	2.9864	0.09906
Chiefs	23	68.9091	2.996	0.12714

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.001	1	0.0011	0.00944	0.923	4.062
Within Groups	4.977	44	0.1131			
Total	4.978	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	23	67.2843	2.9254	0.16734
CPTs	23	65.0393	2.8278	0.10049

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.11	1	0.1096	0.81819	0.3706	4.0617
Within Groups	5.892	44	0.1339			
Total	6.002	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	23	67.2843	2.9254	0.16734
WO1s	23	68.6875	2.9864	0.09906

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.043	1	0.0428	0.32135	0.574	4.062
Within Groups	5.861	44	0.1332			
Total	5.904	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	23	65.0393	2.8278	0.10049
WO1s	23	68.6875	2.9864	0.09906

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.289	1	0.2893	2.89985	0.0956	4.0617
Within Groups	4.39	44	0.0998			
Total	4.679	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	23	67.2843	2.9254	0.16734
Chiefs	23	68.9091	2.996	0.12714

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.057	1	0.0574	0.38977	0.536	4.062
Within Groups	6.479	44	0.1472			
Total	6.536	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	23	65.0393	2.8278	0.10049
Chiefs	23	68.9091	2.996	0.12714

ANOVA

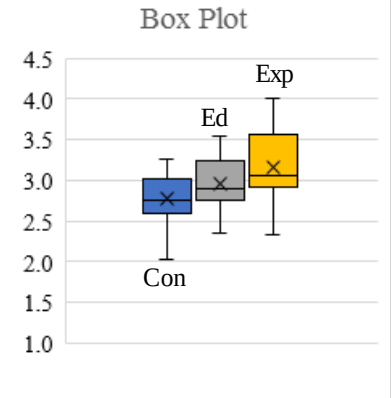
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.326	1	0.3255	2.8603	0.0979	4.0617
Within Groups	5.008	44	0.1138			
Total	5.333	45				

Note. No statistically significant findings were discovered between the groups.

Table 12

Section 3 – Project Execution: Experience group ANOVA

Question Number	Con	Ed	Exp
26	3.2	3.5	4.0
27	3.0	3.6	3.9
31	3.3	3.3	3.6
33	3.0	2.9	3.3
35	2.7	3.2	3.5
37	2.5	2.9	2.9
44	2.7	2.9	2.9
46	2.3	2.4	2.3
47	2.8	2.7	3.0
48	2.4	2.9	3.0
28	3.0	3.1	3.4
29	3.1	3.3	3.6
30	2.7	2.8	3.1
32	2.6	2.8	2.9
34	2.8	2.8	3.1
36	2.0	2.4	2.4
38	3.0	3.2	3.6
39	3.2	3.4	3.7
40	2.6	2.6	2.7
41	2.7	2.9	3.0
42	2.9	2.9	3.1
43	2.8	3.1	3.1
45	2.5	2.5	2.7



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	23	63.8596	2.7765	0.09329
Education	23	68.0486	2.9586	0.1117

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.381	1	0.3815	3.72157	0.06	4.062
Within Groups	4.51	44	0.1025			
Total	4.891	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	23	63.8596	2.7765	0.09329
Experience	23	72.6533	3.1588	0.19254

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.681	1	1.681	11.7626	0.001	4.062
Within Groups	6.288	44	0.1429			
Total	7.969	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Education	23	68.0486	2.9586	0.1117
Experience	23	72.6533	3.1588	0.19254

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.461	1	0.4609	3.03014	0.089	4.062
Within Groups	6.693	44	0.1521			
Total	7.154	45				

Note. There was a statistically significant finding between the experience and control group: F(1,44) = 11.763, p = .001

Section 4 – Project Completion Issues Results

Table 13

Survey Section 4: Statements by group

Resource Issues

52. Customers have expressed dissatisfaction with the quality of the finished product after completion.
55. The project required more physical or virtual resources than originally estimated.
57. The project required more personnel than originally estimated.
61. Additional/outside personnel had to be brought in to finish the project on time.

Scheduling Issues

49. Original scheduled completion dates for tasks are not met.
50. Original scheduled completion date for the entire project is not met.
51. A task or task had to be abandoned before completion in order to complete the project in a timely fashion.
53. Customers have expressed dissatisfaction with the extended length of time, over the original completion date, that a project takes.
54. Customers wanted the original estimate of the project to be much shorter.
56. The project required more time than originally estimated.
58. Meeting scheduled early start times for project tasks was difficult.
59. Meeting scheduled late start times for project tasks was difficult.
60. Non-critical tasks – those not a part of the Critical Path – had a greater impact on project than planned.
62. Project personnel had to work longer hours than originally scheduled in order to complete the project on time.
63. Project personnel could not complete non-project related tasks and assignments in order to complete the project on time.
64. Non-project related tasks and assignments negatively impacted the project's completion time.

Note. There was one written in answer for Section 4. It was from a CW2 that circled a 5 for Statement 64, but wrote the words "Mandatory Training [sic]" next to it.

Table 14

Section 4 – Project Completion: Average answers across officer groups

Project Completion Issues - LTs

	Resource Issues									Scheduling Issues							
Question Number>	52	55	57	61	49	50	51	53	54	56	58	59	60	62	63	64
Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Average	2.6	3.2	3.0	2.7	3.5	3.6	3.1	2.5	2.7	3.3	2.5	2.4	2.8	3.2	2.8	3.2
Standard Deviation	1.4	1.1	1.1	1.1	1.2	1.3	1.2	1.3	1.2	1.1	1.1	1.0	1.1	1.2	1.2	1.1
Section Average				2.9					Section Average			3.0				
Standard Deviation				0.3					Standard Deviation			0.4				

Project Completion Issues - CPTs

	Resource Issues									Scheduling Issues							
Question Number>	52	55	57	61	49	50	51	53	54	56	58	59	60	62	63	64
Number of Respondents	46	47	47	47	47	47	47	46	46	47	47	47	47	47	47	47
Average	2.6	3.1	3.1	2.7	3.0	3.1	2.7	2.7	2.7	3.5	2.4	2.7	2.7	2.9	2.6	2.8
Standard Deviation	1.4	1.4	1.1	1.2	1.2	1.3	1.2	1.4	1.5	1.2	1.3	1.3	1.1	1.3	1.3	1.4
Section Average				2.9					Section Average			2.8				
Standard Deviation				0.3					Standard Deviation			0.3				

Project Completion Issues WO1s

	Resource Issues									Scheduling Issues							
Question Number>	52	55	57	61	49	50	51	53	54	56	58	59	60	62	63	64
Number of Respondents	15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Average	2.9	3.1	2.9	2.8	3.7	3.3	2.9	3.0	2.6	3.2	2.5	2.3	2.3	3.1	2.5	2.8
Standard Deviation	1.5	1.2	1.4	1.2	1.4	1.4	1.3	1.3	1.0	1.3	1.2	0.9	1.1	1.4	1.5	1.5
Section Average				2.9					Section Average			2.8				
Standard Deviation				0.1					Standard Deviation			0.4				

Project Completion Issues - Chiefs

	Resource Issues									Scheduling Issues							
Question Number>	52	55	57	61	49	50	51	53	54	56	58	59	60	62	63	64
Number of Respondents	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Average	2.7	3.1	3.5	2.4	3.5	3.6	3.0	3.1	2.5	3.6	2.5	2.6	3.0	3.2	2.8	3.4
Standard Deviation	1.5	1.1	1.2	1.3	1.1	1.3	1.4	1.5	1.3	1.1	0.9	1.0	1.1	1.2	1.4	1.3
Section Average				2.9					Section Average			3.1				
Standard Deviation				0.5					Standard Deviation			0.4				

Table 15

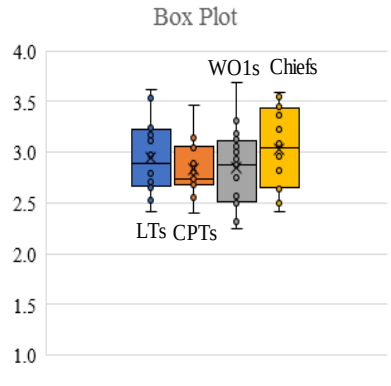
Section 4 – Project Completion: Average answers across experience groups

Control																	
Resource Issues									Scheduling Issues								
Question Number>	52	55	57	61		49	50	51	53	54	56	58	59	60	62	63	64
Number of Respondents	57	57	57	57		57	57	57	57	57	57	57	57	57	57	57	57
Average	2.5	3.1	3.1	2.6		3.0	3.1	2.8	2.5	2.5	3.2	2.3	2.7	2.6	2.9	2.6	2.9
Standard Deviation	1.4	1.3	1.2	1.2		1.3	1.3	1.2	1.3	1.3	1.2	1.1	1.3	1.2	1.3	1.3	1.3
Section Average				2.8					Section Average			2.8					
Standard Deviation				0.3					Standard Deviation			0.3					
Experience																	
Resource Issues									Scheduling Issues								
Question Number>	52	55	57	61		49	50	51	53	54	56	58	59	60	62	63	64
Number of Respondents	34	34	34	34		34	34	34	34	34	34	34	34	34	34	34	34
Average	2.6	3.2	3.0	2.6		3.8	3.6	3.1	2.9	2.7	3.4	2.6	2.3	2.8	3.2	2.7	3.1
Standard Deviation	1.4	1.1	1.2	1.1		1.1	1.3	1.3	1.4	1.3	1.1	1.2	1.1	1.1	1.3	1.4	1.4
Section Average				2.9					Section Average			3.0					
Standard Deviation				0.3					Standard Deviation			0.4					
Education																	
Resource Issues									Scheduling Issues								
Question Number>	52	55	57	61		49	50	51	53	54	56	58	59	60	62	63	64
Number of Respondents	34	34	34	34		34	34	34	34	34	34	34	34	34	34	34	34
Average	3.2	3.3	3.2	3.0		3.7	3.8	3.3	3.5	2.9	3.9	2.5	2.5	3.0	3.5	2.9	3.3
Standard Deviation	1.4	1.0	1.2	1.1		1.0	1.2	1.2	1.4	1.1	0.8	1.1	1.0	1.0	1.1	1.2	1.3
Section Average				3.2					Section Average			3.2					
Standard Deviation				0.1					Standard Deviation			0.5					

Table 16

Section 4 – Project Completion: Officer group ANOVA

Question Number	LTs	CPTs	WO1s	Chiefs
52	2.6	2.6	2.9	2.7
55	3.2	3.1	3.1	3.1
57	3.0	3.1	2.9	3.5
61	2.7	2.7	2.8	2.4
49	3.5	3.0	3.7	3.5
50	3.6	3.1	3.3	3.6
51	3.1	2.7	2.9	3.0
53	2.5	2.7	3.0	3.1
54	2.7	2.7	2.6	2.5
56	3.3	3.5	3.2	3.6
58	2.5	2.4	2.5	2.5
59	2.4	2.7	2.3	2.6
60	2.8	2.7	2.3	3.0
62	3.2	2.9	3.1	3.2
63	2.8	2.6	2.5	2.8
64	3.2	2.8	2.8	3.4



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
WO1s	16	45.6833	2.8552	0.14512
Chiefs	16	48.5455	3.0341	0.1646

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.256	1	0.256	1.65304	0.208	4.171
Within Groups	4.646	30	0.1549			
Total	4.902	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	16	47.2353	2.9522	0.13251
WO1s	16	45.6833	2.8552	0.14512

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.075	1	0.0753	0.54221	0.467	4.171
Within Groups	4.164	30	0.1388			
Total	4.24	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	16	47.2353	2.9522	0.13251
Chiefs	16	48.5455	3.0341	0.1646

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.054	1	0.0536	0.36108	0.552	4.171
Within Groups	4.457	30	0.1486			
Total	4.51	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	16	47.2353	2.9522	0.13251
CPTs	16	45.3201	2.8325	0.07197

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.115	1	0.1146	1.12117	0.2981	4.1709
Within Groups	3.067	30	0.1022			
Total	3.182	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	16	45.3201	2.8325	0.07197
WO1s	16	45.6833	2.8552	0.14512

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.004	1	0.0041	0.03799	0.8468	4.1709
Within Groups	3.256	30	0.1085			
Total	3.26	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	16	45.3201	2.8325	0.07197
Chiefs	16	48.5455	3.0341	0.1646

ANOVA

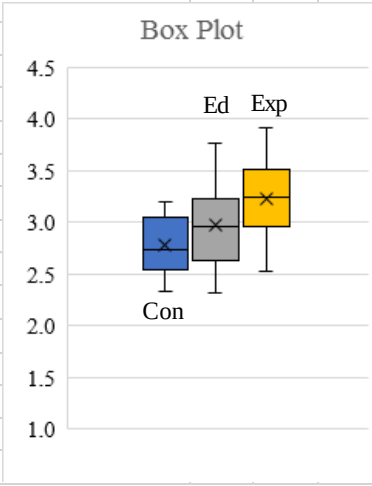
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.325	1	0.3251	2.74845	0.1078	4.1709
Within Groups	3.549	30	0.1183			
Total	3.874	31				

Note. No statistically significant findings were discovered between the groups.

Table 17

Section 4 – Project Completion: Experience group ANOVA

Question Number	Con	Ed	Exp
52	2.5	2.6	3.2
55	3.1	3.2	3.3
57	3.1	3.0	3.2
61	2.6	2.6	3.0
49	3.0	3.8	3.7
50	3.1	3.6	3.8
51	2.8	3.1	3.3
53	2.5	2.9	3.5
54	2.5	2.7	2.9
56	3.2	3.4	3.9
58	2.3	2.6	2.5
59	2.7	2.3	2.5
60	2.6	2.8	3.0
62	2.9	3.2	3.5
63	2.6	2.7	2.9
64	2.9	3.1	3.3



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	16	44.386	2.7741	0.07066
Education	16	47.587	2.9742	0.16494

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.32	1	0.3202	2.71811	0.10965	4.171
Within Groups	3.534	30	0.1178			
Total	3.854	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	16	44.386	2.7741	0.07066
Experience	16	51.5169	3.2198	0.1595

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.589	1	1.5891	13.8086	0.000828	4.171
Within Groups	3.452	30	0.1151			
Total	5.041	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Education	16	47.587	2.9742	0.16494
Experience	16	51.5169	3.2198	0.1595

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.483	1	0.4826	2.9753	0.094835	4.171
Within Groups	4.867	30	0.1622			
Total	5.349	31				

Note. There was a statistically significant finding between the experience and control group: F(1,33) = 13.8086, p = .0008

Section 5 – Project Solutions Results

Table 18

Survey Section 5: Statements by Group

Resource Issues

65. Having float planned into non-critical tasks is essential for flexibility during project execution.
69. Scheduled hard dates are the most important things to consider when leveling a project plan.
70. Having close to the same amount of personnel working each day is the most important thing to consider when leveling a project plan.
71. I would rather overestimate the length of a project or task, just to be safe, rather than risk not planning enough time.
72. The chain of command can always be relied upon to provide additional resources, equipment, and personnel if a project runs over time.
73. Because a critical task contains no float, it is essential to make sure that its duration is scheduled for as long as possible in order to allow for flexibility and safety.
74. Every critical task must be guaranteed a 100% chance to be complete at the scheduled time, because there is no flexibility.
75. Multitasking between tasks within project is a given and essential to success.
77. It would be ideal if the overall length of a project could be shortened, while maintaining flexibility and schedule safety.
78. Working personnel longer than scheduled is a given on any project.
80. The chain of command should provide the extra time, personnel, and resources needed if a project begins to go long.
82. Pulling people or resources off a project for required non-project work is unavoidable. It has to be taken into consideration when planning.
83. Personnel need to stay busy on something at all times, no matter what the schedule says.

Scheduling Issues

66. Project duration estimates are too padded, or extended too far, in order to be safe.
67. Personnel or equipment resources that are critical to certain tasks are the most important things to consider when leveling a project plan.
68. Multitasking during a project is a distraction that does more harm than good.
76. Resource, equipment, and critical personnel management should take precedence over all other concerns.
79. Focusing on one task or one job at a time until it is complete would be preferable to doing multiple things at the same time.
81. If a task had a 50% chance of being completed given the scheduled time, but time safeties were in place to protect a project over run, it would be an acceptable risk.
84. Procrastination and late start times are one in the same.

Table 19

Section 5 – Project Solutions: Average answers across officer groups

Project Solutions - LTs																					
	CPM													CCPM							
Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83	66	67	68	76	79	81	84
Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Average	3.7	2.9	2.1	3.8	2.4	3.0	2.7	3.1	3.1	2.7	3.4	3.2	2.1	2.7	3.6	2.8	3.2	2.8	2.5	2.4
Standard Deviation	1.1	1.2	1.1	1.1	1.3	1.3	1.1	1.1	1.1	1.2	1.0	1.1	1.2	1.2	0.9	1.3	1.1	1.2	1.0	1.5
Section Average								2.9						Section Average					2.9	
Standard Deviation								0.5						Standard Deviation					0.4	

Project Solutions - CPTs																					
	CPM													CCPM							
Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83	66	67	68	76	79	81	84
Number of Respondents	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	46	47
Average	3.6	3.0	2.6	3.7	2.4	3.3	3.0	3.2	3.7	2.6	3.7	3.4	2.7	2.6	3.6	2.7	3.4	2.6	3.2	2.3
Standard Deviation	1.4	1.2	1.2	1.1	1.3	1.3	1.3	1.2	1.0	1.3	1.2	1.1	1.4	1.1	1.1	1.3	1.0	1.2	1.2	1.4
Section Average								3.2						Section Average					2.9	
Standard Deviation								0.5						Standard Deviation					0.5	

Project Solutions - WO1s																					
	CPM													CCPM							
Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83	66	67	68	76	79	81	84
Number of Respondents	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Average	3.4	3.3	2.0	3.5	2.6	2.9	2.8	3.1	3.3	2.4	3.5	3.0	2.4	2.5	3.5	2.8	3.3	2.6	3.1	2.0
Standard Deviation	1.5	1.1	1.1	1.2	1.0	0.9	1.2	1.1	1.2	1.1	1.4	1.4	1.1	1.0	1.2	1.2	1.2	1.0	1.0	1.1
Section Average								2.9						Section Average					2.8	
Standard Deviation								0.5						Standard Deviation					0.5	

Project Solutions -Chiefs																					
	CPM													CCPM							
Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83	66	67	68	76	79	81	84
Number of Respondents	22	22	22	22	21	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Average	4.0	2.8	2.7	3.3	2.2	3.1	3.4	3.9	3.8	2.5	3.3	3.2	2.8	2.9	3.7	2.0	3.1	2.3	2.8	2.0
Standard Deviation	1.4	0.9	1.2	1.4	1.2	1.0	1.1	1.0	1.1	1.3	1.1	1.2	1.6	0.9	0.9	1.2	0.9	1.3	1.0	1.3
Section Average								3.1						Section Average					2.7	
Standard Deviation								0.5						Standard Deviation					0.6	

Table 20

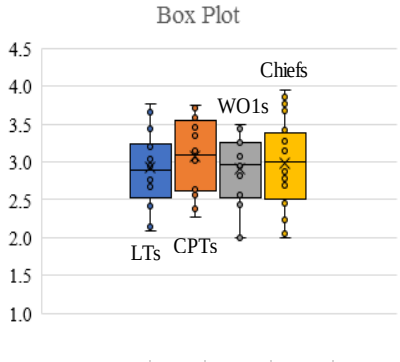
Section 5 – Project Solutions: Average answers across experience groups

											Control											
						CPM											CCPM					
Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83		66	67	68	76	79	81	84
Number of Respondents	57	57	57	57	56	57	57	57	57	57	57	57	57		57	57	57	57	57	57	57
Average	3.6	3.0	2.6	3.6	2.8	3.2	2.9	3.3	3.6	2.5	3.6	3.2	2.6		2.6	3.5	2.8	3.4	2.6	2.9	2.2
Standard Deviation	1.3	1.1	1.1	1.1	1.4	1.2	1.1	1.2	1.1	1.2	1.0	1.1	1.4		1.1	1.0	1.2	1.0	1.2	1.1	1.4
				Section Average				3.1								Section Average					2.8	
				Standard Deviation				0.4								Standard Deviation					0.4	
											Experience											
						CPM											CCPM					
Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83		66	67	68	76	79	81	84
Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34
Average	3.8	3.0	2.1	3.5	2.1	3.1	3.2	3.3	3.3	2.6	3.4	3.3	2.4		2.7	3.9	2.5	3.2	2.5	2.8	2.4
Standard Deviation	1.3	1.1	1.1	1.3	1.1	1.2	1.2	1.2	1.1	1.2	1.2	1.3	1.3		1.0	1.0	1.3	1.1	1.2	1.1	1.4
				Section Average				3.0								Section Average					2.8	
				Standard Deviation				0.5								Standard Deviation					0.5	
											Education											
						CPM											CCPM					
Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83		66	67	68	76	79	81	84
Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34
Average	3.8	3.1	2.1	3.7	2.1	3.3	2.9	3.2	3.2	2.9	3.5	3.4	2.6		2.6	3.7	2.5	3.4	2.6	2.8	2.2
Standard Deviation	1.3	1.2	1.1	1.1	1.1	1.2	1.3	1.2	1.1	1.1	1.2	1.2	1.4		1.0	1.1	1.3	1.1	1.1	1.1	1.4
				Section Average				3.1								Section Average					2.8	
				Standard Deviation				0.5								Standard Deviation					0.5	

Table 21

Section 5 – Project Solutions: Officer group ANOVA

Question Number	LTs	CPTs	WO1s	Chiefs
65	3.7	3.6	3.4	4.0
69	2.9	3.0	3.3	2.8
70	2.1	2.6	2.0	2.7
71	3.8	3.7	3.5	3.3
72	2.4	2.4	2.6	2.2
73	3.0	3.3	2.9	3.1
74	2.7	3.0	2.8	3.4
75	3.1	3.2	3.1	3.9
77	3.1	3.7	3.3	3.8
78	2.7	2.6	2.4	2.5
80	3.4	3.7	3.5	3.3
82	3.2	3.4	3.0	3.2
83	2.1	2.7	2.4	2.8
66	2.7	2.6	2.5	2.9
67	3.6	3.6	3.5	3.7
68	2.8	2.7	2.8	2.0
76	3.2	3.4	3.3	3.1
79	2.8	2.6	2.6	2.3
81	2.5	3.2	3.1	2.8
84	2.4	2.3	2.0	2.0



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
WO1s	20	58	2.9	0.22303
Chiefs	20	59.6472	2.9824	0.35265

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.068	1	0.0678	0.23566	0.63	4.098
Within Groups	10.94	38	0.2878			
Total	11.01	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	20	58.3824	2.9191	0.2351
WO1s	20	58	2.9	0.22303

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.004	1	0.0037	0.01596	0.9	4.098
Within Groups	8.704	38	0.2291			
Total	8.708	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	20	58.3824	2.9191	0.2351
Chiefs	20	59.6472	2.9824	0.35265

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.04	1	0.04	0.1361	0.714	4.098
Within Groups	11.17	38	0.2939			
Total	11.21	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	20	61.4075	3.0704	0.23886
Chiefs	20	59.6472	2.9824	0.35265

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.077	1	0.0775	0.26193	0.6118	4.0982
Within Groups	11.24	38	0.2958			
Total	11.32	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	20	58.3824	2.9191	0.2351
CPTs	20	61.4075	3.0704	0.23886

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.229	1	0.2288	0.96542	0.332	4.0982
Within Groups	9.005	38	0.237			
Total	9.234	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	20	61.4075	3.0704	0.23886
Chiefs	20	58	2.9	0.22303

ANOVA

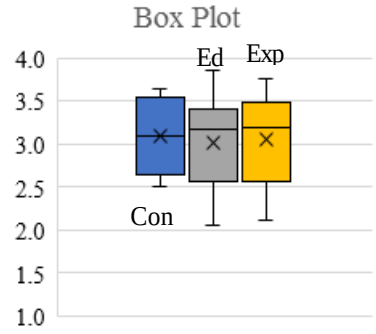
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.29	1	0.2903	1.2569	0.2693	4.0982
Within Groups	8.776	38	0.2309			
Total	9.066	39				

Note. No statistically significant findings were discovered between the groups.

Table 22

Section 5 – Project Solutions: Experience group ANOVA

Question Number	Con	Ed	Exp
65	3.6	3.8	3.8
69	3.0	3.0	3.1
70	2.6	2.1	2.1
71	3.6	3.5	3.7
72	2.8	2.1	2.1
73	3.2	3.1	3.3
74	2.9	3.2	2.9
75	3.3	3.3	3.2
77	3.6	3.3	3.2
78	2.5	2.6	2.9
80	3.6	3.4	3.5
82	3.2	3.3	3.4
83	2.6	2.4	2.6
66	2.6	2.7	2.6
67	3.5	3.9	3.7
68	2.8	2.5	2.5
76	3.4	3.2	3.4
79	2.6	2.5	2.6
81	2.9	2.8	2.8
84	2.2	2.4	2.2



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	20	60.4342	3.0217	0.20375
Education	20	59.2128	2.9606	0.2773

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.037	1	0.0373	0.15507	0.696	4.098
Within Groups	9.14	38	0.2405			
Total	9.177	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	20	60.4342	3.0217	0.20375
Experience	20	59.7585	2.9879	0.2849

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.011	1	0.0114	0.04672	0.83	4.098
Within Groups	9.284	38	0.2443			
Total	9.296	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Education	20	59.2128	2.9606	0.2773
Experience	20	59.7585	2.9879	0.2849

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.007	1	0.0074	0.02648	0.872	4.098
Within Groups	10.68	38	0.2811			
Total	10.69	39				

Note. There were no statistically significant findings discovered.

Conclusion

By applying a quantitative analysis methodology of the results, the researcher was able to answer some of the research questions put forth by the thesis. Other questions will require further research or more in-depth examination of the data to definitively answer.

Scheduling and Resource Questions Analysis and Interpretation.

1. What are the major scheduling issues negatively impacting on-time Army construction project completions?
2. What are the major personnel management issues in Army construction projects?

The evidence in the analysis across the three sections indicated that among all the officer groups, there was a large amount of disagreement as to the effectiveness of the system. There were no statistically significant findings in Officer Group ANOVAs. However, they did show a large degree of variance within each group. The average answers and analysis for the experience groups showed a much greater variance, including significant variance between experienced and non-experienced groups in the execution and conclusion sections.

The analysis gave evidence that there are both major scheduling and major resource issues within the current system among those with more education in project management and experience with Army construction projects. Statements pertaining to outside tasks causing delays and personnel issues, both in the execution and conclusion phases of projects (Statements 31, 39, 55 and 57), had the highest negative impact scores, especially among the more experienced. Concerns about customer satisfaction and

project scope changing also had a high negative impact among more experienced personnel (Statements 26, 27, 29, 49, 50, 53, 56, and 62). These issues caused the greatest concern with more experienced personnel. However, these issues were less of a concern to the less experienced officers.

The analysis pointed out that there are certain scheduling and personnel issues, during the execution and conclusion phases, among more experienced Army project managers. These issues deal with influences outside the project distracting or taking away personnel and causing delays. These delays then have a negative impact on timely project completion and customer perception. Interestingly, none of the two main groups, officer or experience, perceived extra detailing work, beautification, or busy work (Statements 32, 36, and 46) as having the same kind of negative impact. The planning phase for both main groups also had lower negative impact scores as a whole.

In summary, Army project managers have fewer issues with planning in the current system and more issues with outside influence negatively impacting their project schedules and resources during execution and conclusion. Conversely, there is less of a perceived impact for busy work and beautification on the schedule and resource allocation. The following provides additional detailed analysis and interpretation of each survey section in support of the conclusions above.

Section 2. For officer group responses (Table 4), percentage wise, most respondents indicated fewer issues with schedule planning. Statements 12 and 18 were low across all ranks. Interestingly, Statement 5 was low across CPTs, WO1s, and Chiefs, but high with 1LTs. In the resource issue section, Statements 9 and 22 were also lower on average across all ranks. Statements 17 and 24 also had lower than average responses

among 1LTs, CPTs, and WO1s. Statements 5 and 8 in the 1LT group were the only ones above the mean. Statement 5 deals with priority of tasks and 8 deals with assuming a project is smaller than it is. Statement 8 scored above the mean across all groups, though it was not originally labeled an outlier. This indicated that participants had some issue in planning project scope. Statement 5 impact may be due to 1LTs limited relative experience.

Overall, responses were average to slightly below average in both sub groups of the planning section. The lowest overall totals belonging to the CPTs and WO1a with Chiefs scoring closest to the mean. The ANOVA showed similar results (Table 6). No single group deviated far from an average answer of 3 for the overall section. Chiefs were closest to the mean, with 1LTs right behind. The ANOVA showed there is very little deviation between the group's answers and no statistically significant findings between groups. However, both the ANOVA and the Box Plot diagram for the section showed that there is a large degree of variance within the 1LTs compared to the other groups. 1LTs also had the largest group of answers above the section mean compared to the other groups. The data analysis indicated a degree of disagreement among the most junior officers about what is effective in project planning.

A similar situation was found in the analysis of the education and experience groups (Table 5). Overall scores were slightly below the mean. The ANOVA for the section (Table 7) did show there is both a degree of internal variance as well as some cross variance between those with less education and experience and those with higher. Even though both experience and education groups were at or below the mean on

average, having more experience seems to have indicated less agreement with the planning status quo.

The one written response placed next to Statement 16 by a CPT may indicate this disagreement. They circled 5, but wrote "actually 15 [sic]" next to the statement. Statement 16 deals with rules and procedures holding projects back. It scored above the mean across all groups, which indicated there is perception that current rules and procedures in the planning phase do more harm than good.

Analysis of the groups officer and experience, indicated there is, on average, slightly fewer issues among officers on the status quo when it comes to project planning effectiveness. This was especially true among officers with less education and experience. However, there was a large degree of variance among all the groups. This indicated that there are those that strongly agree the system works and those that may believe the system needs improvement.

Section 3. In the Section 3 Officer group responses (Table 9), average answers were closer to the mean. Unlike the previous section, there were fewer statements that each group agreed had little to no impact. Statement 36 in the scheduling issues section was the only exception. There were more statements in this section than in the first section that respondents felt had a more severe negative impact, though lower scores were more prominent.

The ANOVA showed similar results (Table 11). No single group deviated very far from an average answer for the overall section. The ANOVA showed little deviation between the group's answers and no statistically significant findings between the groups. Similar to the last section, both the ANOVA and the Box Plot diagram for the section

showed that 1LTs had the largest degree of internal variance, followed again by the Chiefs. CPTs, had the overall tightest group with one extreme outlier on the low end for Statement 36. This statement was about access to historical data and planning projects, which the majority respondents seemed to agree was not an issue.

The average answers for the experience groups varied from the officer groups in Section 3 (Table 10). Those with less education and experience in project management stayed close to or slightly below the mean. However, those with project management education had average scores just above the mean. There were also more statements in both sections that scored high, rather than low. The ANOVA supported this analysis (Table 12). There remained a high internal variance within groups and a widening variance between those without experience and education, and those with. There was a statistically significant variance between the less experienced (control) and experienced group $F(1,44) = 11.763$, $p = .001$.

There was also one write in answer for Section 3. It was from a CPT that circled a 5 for Statement 39, but wrote in a number 10 next to it and circled it. Statement 39 is about non-scheduled events cutting into completion times. It scored above the mean for all groups except WO1s. This written response indicated that there were concerns with this issue during project completion.

An analysis of all groups indicated that there is still wide disagreement among officers when it comes to the effectiveness of project execution with the current methods. However, the analysis indicated there is a greater dissatisfaction among those officers with more project management education and experience.

Section 4. Officer group responses (Table 16) answers were again close to the mean. However, aside from lower scores for Statement 58, indicating it had a low perceived impact on project completion, there is less agreement and more variance across the group. The ANOVA of the group (Table 14) shed more light on this issue. The average answers stayed close to the mean and there remained little variance between groups. However, variance within groups was extremely high, indicating there was a wide level of disagreement among officers as to the effectiveness of the current system during project completion.

The answer for this may be found in experience group for Section 4 (Table 14). Those with less education and experience remained more amiable to the current system. However, those officers with more education and experience, especially the education section, seemed more discontent with the effectiveness of the closing projects with the current system. There was also one write in answer for Section 4. It came from a CW2 that circled a five for Statement 64, but wrote next to it the words "Mandatory Training" [sic]. Statement 64 is about outside issues having a negative impact on project completion. The average score for this statement for Chiefs and those with education and experience was above the mean, indicating it was an issue for many in those groups. This analysis continued in the experience group ANOVA as well (Table 17). Intergroup variance continued to widen in this section. There was more agreement among those with less experience and education compared to those with, and their answers were mostly below the mean. However, those with more education and experience disagreed among themselves on the effectiveness of the current system.

Most tellingly, there was a statistically significant difference between the experience and control groups with $F(1,30) = 13.8086$, $p = .0008$. The experienced group's answers were well above the mean. This indicated a wide amount of disagreement among them, but not on whether the system is flawed, rather the degree to which it is flawed.

CPM and CCPM Research Questions Interpretation and Analysis.

3. Can CCPM be adapted for Army construction projects?
4. Do Army project supervisors perceive CPM as a viable and adaptable construction planning and scheduling tool for time and resource management?
5. Do Army project supervisors perceive CCPM as a viable and adaptable construction planning and scheduling tool for time and resource management?

It was difficult to answer Questions 3 or 5 with any degree of certainty. There are those within these groups that seem to have agreed with the merits of CPM and those that agreed with CCPM as well. Question 4 can be answered in the negative for the more experienced group. There was less consensus within the officer groups as to the effectiveness of the Army's CPM system. However, analysis of groups with more education and experience indicated there are definitive flaws with the current system for that group in both resource and schedule management during the execution and completion phases. More experienced and educated officers were less satisfied with the current system during the planning phase as well. Additional analysis of the survey section for these questions follow.

Section 5. Project Solutions Officer responses (Table 19) average answers varied drastically. What may be telling in the data was the fact that there is a slightly higher

average agreement for CPM solutions than there is for CCPM solutions to project management issues. On the CCPM side there is a positive response for Statement 67, which indicated that officers generally support the idea that resources should be of the upmost consideration when leveling a schedule on a project plan. Conversely, there was also agreement with Statement 84, indicating that procrastination was less of an issue. The ANOVA of the officers group (Table 21), showed much the same data as Table 19. There was a wide degree of intra-variance across each group, showing little consensus among the various officer types on what CPM or CCPM solutions would be most ideal. The data analysis from the experience groups also showed a high degree of variance and disagreement (Table 20). Again Statements 67 and 84 showed the same degree of agreement and disagreement. On the CPM side, there are three statements that had above average agreement. As with the officer group data, the scores for CPM solutions were at, or just above, the mean with CCPM scoring just below.

The ANOVA of the experience group tells a similar story (Table 21). Means were nearly identical across the board. There was also a large degree of variance within the groups themselves, indicating again that there was little consensus as to the effectiveness of CPM or CCPM solutions.

Research Questions on Age and Experience differences.

6. Are the responses of younger, less experienced Officers different from older, more experienced Officers?

This question was answered affirmatively with the ANOVA of the experience and education groups. Yes, the more educated and experience officers had a more negative view of the current system's effectiveness in both the execution and completion phases.

More experienced and educated officers were less satisfied with the current system during the planning phase as well. However, there was less consensus across the groups when it came to the viability of CCPM as an alternative.

Tying the Analysis Back to the Review of Literature

The original focus of this study was two-fold. First, the study identified major issues that exist with the current construction project planning and management methods used by the U.S. Army Corps of Engineers. These resource and schedule planning issues and short falls where discussed at length in the Review of Literature. Limitations in the current method for identifying the proper way to level resources across a project, managing extra time and float, over padding of schedules for safety, and issues regaining lost time were all identified.

The average statement response results and ANOVA comparisons of the officer and experience groups revealed that there were issues among the more experienced project planners during the execution and completion phase of a project. The greatest issues arose when it came to outside influence interfering with project completion. There was less concern, across all groups and sections, but especially during planning, with issues of extra busy work not on the critical path. These results give weight to the notion that there is disassociation between extra time padding and float planned into a project and the impact it has during execution and conclusion. Army project managers may perceive greater negative impact coming from outside the project, in the form of other work their personnel may have to do, rather than the way they are scheduled and leveled within the project itself. This disconnect in planning and resource management is congruent with Leach's (2014) assessment of government based "do more better"

approaches to projects (p. 37) and lack of scrutiny of the negative impacts of the current project planning systems. Army project supervisors may perceive that their current system of planning is sound, but the project execution and conclusion are hampered by outside forces. It may also demonstrate that officers planning projects have issues with the distractions of multitasking with tasks outside a project. However, multitasking within the project was perceived to be less of an issue.

What was not adequately demonstrated with the research, was the perceived effectiveness of CCPM as an alternative to Army CPM. The Review of Literature discussed the benefits CCPM could provide Army construction project managers. However, surveying Army construction project managers revealed there was less knowledge about CCPM as a management and planning tool and the benefits it could provide. Statements on CCPM contained in the survey met with varied responses and a positive or negative perception could not be ascertained with the given analysis of data. These unresolved issues mean that there are several excellent opportunities for research on this subject going forward.

Suggestions for Future Research

The research conducted in this study was able to identify several issues that project managers of Army construction projects face. It was also able to demonstrate that more experienced officers perceive the issues to be of greater consequence to successful project completion than their less experienced counterparts. However, the issue of the effectiveness of CCPM as viable and adaptable alternative for Army construction projects could not be ascertained with the results of this survey. This may be due to the fact that CCPM solution statements were limited and generic. Future research on this subject

should be more targeted to identify specific issues, unique to Army Corps of Engineer construction projects, and how CCPM could be adapted to fix them. Many respondents to the survey had little knowledge of CCPM as a project management method. There were also many verbal solicitations from survey participants at MSCOE inquired as to the nature of TOC and CCPM. Still others indicated their belief that the current system is fine, but only when used properly. The final hand written response, submitted by a 1LT at the end of their survey, speaks to this issue:

"As a KO (Contracting Officer) I find CPM to be useful, but only if taken seriously. Most of the time the government estimate or A&E don't take the appropriate time. Neither on or before award do we completely evaluate the appropriate CP." [sic]

Further research could more thoroughly examine the propensity of the Army Corps of Engineer's "do more better" approach to planning. There must also be reasons for the disconnect with officers who plan extra time and order extra work in a project and the minimal perceived impact it has on timely completion compared to outside influences. Discovering those reasons would shed light on planning issues not covered by this study. Another option for further research may be to identify what parts of CPM Army project managers feel are still effective when managers use them properly and what can be done to make more planners do so. Before another CCPM analysis is done on Army Officers, it would be more effective to make sure they are all educated on the benefits that CCPM can provide over CPM. Perhaps the best method of research would be to draw up construction project plans, one using Army CPM and one using a new Army specific CCPM tool set. It may then be possible to better gauge project managers perceived effectiveness of CPM against the exact CCPM solution for the same issue.

Appendix A: The Survey Instrument

A Leading American University with International Reach

Department of Architectural and Manufacturing Sciences

Date: February 7th, 2017

Dear Participant,

I am a graduate student and ROTC cadet at Western Kentucky University, Bowling Green, in the Architectural and Manufacturing Sciences Department. I am doing research on analyzing scheduling and resource management issues that negatively impact Army Engineering construction projects, as well as examining the feasibility of Critical Chain Project Management (CCPM) concepts to address those issues.

The purpose of this study is to identify the major issues that Army Engineer project supervisors face, and gauge perceptions on the effectiveness of both traditional and CCPM project management solutions to common problems.

Your participation in this study is completely voluntary and confidential. The survey takes approximately 20 minutes to complete. Your responses will be combined with other responses and analyzed to find the perceived severity of common project management issues as well as the effectives of the given solutions to those issues. A copy of the research will be available upon request.

If you have any questions regarding the survey, or this thesis research, please contact Cadet Eric Rohr (eric.rohr406@topper.wku.edu / 262-719-3874) or the Thesis Chair Dr. Mark Doggett (mark.dogget@wku.edu / 270-745-6951). Your participation in this research is greatly appreciated.

Sincerely,

Cadet Eric Rohr
WKU ROTC Hilltopper Battalion

Mark Doggett, PhD
Western Kentucky University
1906 College Heights Blvd.
Bowling Green, KY, 42101

Section 1 – Demographics and Knowledge Base

The purpose of the section is for demographic and project management experience information only. All responses will be kept confidential.

Please circle one answer in each of the following:

Your Service Component:

Active Duty National Guard Army Reserves

Your Rank:

2LT 1LT CPT MAJ LTC WO1 CW2 CW3 CW4 CW5

Years of Military Experience:

0-3 3-5 5-7 7-9 9-11 11-13 13-15 15+

How many Corps of Engineer construction projects have you been involved with where you have been in the role of Project Manager or Project Supervisor?

None 1 2 3 4 5 6 7 8 9 10+

How many Corps of Engineer construction projects have you been involved with (as an Officer or Enlisted Soldier) where you have been in a supporting role such as: crew leader, crew member, safety supervisor, equipment operator, or as an outside consultant, SME, or supporting advisor?

None 1 2 3 4 5 6 7 8 9 10+

How many years of civilian construction experience do you have outside the Corps of Engineers?

None 0-3 3-5 5-7 7-9 9-11 11-13 13-15 15+

Please circle all that apply:
On a scale of 1 to 5 (1 having little experience and 5 being very experienced) which of the following production and project management methods do you have experience with?

Six Sigma	Lean Production	Theory of Constraints (TOC)	Earned Value Management (EVM)	Critical Chain Project Management (CCPM)	Critical Path Method (CPM)
1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Section 2 – Project Planning Issues

The purpose of this section is to gauge the severity of common resource and time scheduling issues that occur during project planning. Think back on a project or projects you have worked on and assign and assign a score to each statement based on what occurred during that project.
-1 means that statement or event had little or no impact on a project, 5 means it had a **severe negative** impact.
Please circle one number for each of the following:

1. The scope of a project changed significantly during planning.	1	2	3	4	5
2. The design of a project changed significantly during planning.	1	2	3	4	5
3. The scheduling of project tasks changed significantly during planning.	1	2	3	4	5
4. The scheduling of project completion changed significantly during planning.	1	2	3	4	5
5. There are frustrations or disagreements about the priority of tasks during planning.	1	2	3	4	5
6. Too many tasks are assigned to too few people.	1	2	3	4	5
7. Tasks are poorly prioritized.	1	2	3	4	5
8. Planners assume the job is smaller than it really is.	1	2	3	4	5
9. Planners assume the job is larger than it really is.	1	2	3	4	5
10. Available resources are not used effectively.	1	2	3	4	5
11. Project schedules are too optimistic – not enough scheduled time.	1	2	3	4	5
12. Project schedules are too pessimistic – too much time scheduled.	1	2	3	4	5
13. There is a lack of communication between project planners.	1	2	3	4	5
14. There is a shortage of people needed to complete a schedule on time.	1	2	3	4	5
15. There is a shortage of equipment needed to complete a schedule on time.	1	2	3	4	5
16. Rules, procedures, or policies hold the project back rather than help.	1	2	3	4	5
17. It is difficult to plan things that have not been done before.	1	2	3	4	5
18. Project time estimates are padded or extended to be safe.	1	2	3	4	5
19. Project workload is either “feast or famine”. There is no steady day-to-day work load throughout the project.	1	2	3	4	5

21. It is difficult to access historical data that could help with planning projects.	1	2	3	4	5
22. Current project planning methods are difficult to change.	1	2	3	4	5
23. Project plans and estimates become self-fulfilling prophecies.	1	2	3	4	5
24. The current project planning system is good; project planners just don't know how to properly use it.	1	2	3	4	5
25. The same project planning issues plague every project and are never addressed.	1	2	3	4	5

Section 3 – Project Execution Issues

The purpose of this section is to gauge the severity of common resource and time issues that occurred once a project has begun. Think back on a project or projects you have worked on and assign and assign a score to each statement based on what occurred during that project(s).
-1 means that statement or event had little or no impact on a project, 5 means it had a **severe negative impact**.
Please circle one number for each of the following:

26. The scope of a project change significantly during execution.	1	2	3	4	5
27. The design of a project changed significantly during execution.	1	2	3	4	5
28. The scheduling of project tasks changed significantly during execution.	1	2	3	4	5
29. The scheduling of project completion changed significantly during execution.	1	2	3	4	5
30. There are frustrations or disagreements about the priority of tasks during execution.	1	2	3	4	5
31. Critical personnel or resource bottle necks occur that delay the project.	1	2	3	4	5
32. Work expands to fill scheduled time available.	1	2	3	4	5
33. Issues don't become apparent until it's too late.	1	2	3	4	5
34. Procrastination or waiting until a task has become urgent before starting occurs.	1	2	3	4	5
35. Assigned resources have to be moved to "more pressing needs".	1	2	3	4	5
36. People work on non-priority tasks while waiting for priority tasks to start.	1	2	3	4	5
37. Work assignments change significantly during the course of a project.	1	2	3	4	5
38. When faced with time constraints, corners are cut and compromises made.	1	2	3	4	5

39. The project often faces non-scheduled events or tasks from outside the project that threaten completion times.	1	2	3	4	5
40. Project work is “hurry up and wait”.	1	2	3	4	5
41. Progress tracking is inaccurate due to inefficient measures or tools.	1	2	3	4	5
42. Progress tracking is inaccurate due to inefficient communication or lack of understanding between teams or individuals.	1	2	3	4	5
43. Multitasking, or jumping form one task to another, is needed to complete the project on time.	1	2	3	4	5
44. People try to look busy when they really are not.	1	2	3	4	5
45. Project estimates become “self-fulfilling prophesies”.	1	2	3	4	5
46. Extra working, polishing, tinkering, or perfecting often goes beyond what is necessary.	1	2	3	4	5
47. People are reassigned to other tasks – or removed from the project if project leaders underutilize or don’t keep them busy at all times	1	2	3	4	5
48. The same project execution issues plague every project and are never addressed.	1	2	3	4	5

Section 4 – Project Completion Issues

The purpose of this section is to gauge the severity of common resource and time issues that occurred once a project is near completion or has completed. Think back on a project or projects you have worked on and assign and assign a score to each statement based on what occurred during that project(s).
-1 means that statement or event had little or no impact on a project, 5 means it had a **severe negative impact**.
Please circle one number for each of the following:

49. Original scheduled completion dates for tasks are not met.	1	2	3	4	5
50. Original scheduled completion date for the entire project is not met.	1	2	3	4	5
51. A task or task had to be abandoned before completion in order to complete the project in a timely fashion.	1	2	3	4	5
52. Customers have expressed dissatisfaction with the quality of the finished product after completion.	1	2	3	4	5
53. Customers have expressed dissatisfaction with the extended length of time, over the original completion date, that a project takes.	1	2	3	4	5
54. Customers wanted the original estimate of the project to be much shorter.	1	2	3	4	5
55. The project required more physical or virtual resources than originally estimated.	1	2	3	4	5
56. The project required more time than originally estimated.	1	2	3	4	5

57. The project required more personnel than originally estimated.	1 2 3 4 5
58. Meeting scheduled early start times for project tasks was difficult.	1 2 3 4 5
59. Meeting scheduled late start times for project tasks was difficult.	1 2 3 4 5
60. Non-critical tasks – those not a part of the Critical Path – had a greater impact on project than planned.	1 2 3 4 5
61. Additional/outside personnel had to be brought in to finish the project on time.	1 2 3 4 5
62. Project personnel had to work longer hours than originally scheduled in order to complete the project on time.	1 2 3 4 5
63. Project personnel could not complete non-project related tasks and assignments in order to complete the project on time.	1 2 3 4 5
64. Non-project related tasks and assignments negatively impacted the project's completion time.	1 2 3 4 5

Section 5 – Project Solutions

The purpose of this section is to gauge the effectiveness of common resource and time planning and execution solutions offered by the current Critical Path system and the Critical Chain based system. Each statement represents a positive attitude toward CPM or CCPM based ideas. The statements are intermixed and placed at random. –

- 1 means that you strongly disagree with the statement, 5 means you strongly agree with the statement.

Please circle one number for each of the following:

65. Having float planned into non-critical tasks is essential for flexibility during project execution.	1 2 3 4 5
66. Project duration estimates are too padded, or extended too far, in order to be safe.	1 2 3 4 5
67. Personnel or equipment resources that at critical to certain tasks are the most important things to consider when leveling a project plan.	1 2 3 4 5
68. Multitasking during a project is a distraction that does more harm than good.	1 2 3 4 5
69. Scheduled hard dates are the most important things to consider when leveling a project plan.	1 2 3 4 5
70. Having close to the same amount of personnel working each day is the most important thing to consider when leveling a project plan.	1 2 3 4 5
71. I would rather overestimate the length of a project or task, just to be safe, rather than risk not planning enough time.	1 2 3 4 5
72. The chain of command can always be relied upon to provide additional resources, equipment, and personnel if a project runs over time.	1 2 3 4 5
73. Because a critical task contains no float, it is essential to make sure that its duration is scheduled for as long as possible in order to allow for flexibility and safety.	1 2 3 4 5

74. Every critical task must be guaranteed a 100% chance to be complete at the scheduled time, because there is no flexibility.	1 2 3 4 5
75. Multitasking between tasks within project is a given and essential to success.	1 2 3 4 5
76. Resource, equipment, and critical personnel management should take precedence over all other concerns.	1 2 3 4 5
77. It would be ideal if the overall length of a project could be shortened, while maintaining flexibility and schedule safety.	1 2 3 4 5
78. Working personnel longer than scheduled is a given on any project.	1 2 3 4 5
79. Focusing on one task or one job at a time until it is complete would be preferable to doing multiple things at the same time.	1 2 3 4 5
80. The chain of command should provide the extra time, personnel, and resources needed if a project begins to go long.	1 2 3 4 5
81. If a task had a 50% chance of being completed given the scheduled time, but time safeties were in place to protect a project over run, it would be an acceptable risk.	1 2 3 4 5
82. Pulling people or resources off a project for required non-project work is unavoidable. It has to be taken into consideration when planning.	1 2 3 4 5
83. Personnel need to stay busy on something at all times, no matter what the schedule says.	1 2 3 4 5
84. Procrastination and late start times are one in the same.	1 2 3 4 5

Appendix B: Survey - Initial Results

Section 1 - Demographic Data and Knowledge Base: 1st Lieutenants

Respondent	Rank	Service Component	Years of Military Experience	CoE Projects as Supervisor	CoE Projects in Support	Years of Civilian Experience	Six Sigma	Lean	TOC	EVM	CCPM	CPM
1	1LT	AD	3-5				1	1	1	1	1	5
2	1LT	NG	5-7	10+	5	0-3 Y	1	1	1	1	1	3
3	1LT	AD	3-5	1		5-7 Y	1	1	1	1	1	3
4	1LT	AD	3-5				1	1	1	1	1	2
5	1LT	AD	3-5	10+	8	0-3 Y						
6	1LT	AD	3-5	5			1	1	1	1	1	1
7	1LT	AD	3-5				3	3	1	4	5	5
8	1LT	AR	7-9	10+	2	0-3 Y	4	4	2	3	5	5
9	1LT	AD	3-5			0-3 Y					3	4
10	1LT	AR	3-5	1			1	1	1	1	1	3
11	1LT	AD	3-5			3-5 Y	1	1	1	1	1	3
12	1LT	AD	3-5			0-3 Y	1	1	1	1	1	3
13	1LT	AD	3-5	2	2		3	3	2	4	2	4
14	1LT	AR	3-5	5	4		1	1	1	1	1	5
15	1LT	AR	3-5	2		5-7 Y	1	1	3	5	4	5
16	1LT	NG	5-7	1	2		1	1	1	1	1	3
17	1LT	NG	13-15	2	5	5-7 Y	3	2	2	2	5	5
18	1LT	AR	9-11	3	4	0-3 Y	1	1	1	1	1	3
19	1LT	NG	9-11				4	4	1	1	1	1
20	1LT	AR	3-5	6		0-3 Y	1	1	1	1	1	4
21	1LT	NG	15+	2	6	0-3 Y	1	1	1	1	1	1
22	1LT	NG	5-7	3	4	9-11 Y	3	3	4	3	5	5
23	1LT	NG	3-5	6	6	13-15 Y	1	1	1	2	1	5
24	1LT	NG	7-9	10+		3-5 Y	1	1		3	3	3
25	1LT	NG	13-15	3		5-7Y	3	1	1	1	1	4
26	1LT	NG	11-13			3-5Y	2	5	1	1	3	5
27	1LT	NG	5-7	10+	10+	11-13Y	1	1	3	2	3	5
28	1LT	NG	7-9			0-3Y	3	3	3	3	3	3
29	1LT	AR	13-15	4	10+	11-13Y	1	1	1	4	4	5
30	1LT	NG	3.-5	7	2	0-3Y	1	1	1	1	1	5
31	1LT	NG	0-3			0-3Y	1	1	1	1	1	2
32	1LT	AR	3-5	2		3-5Y	1	1	1	1	1	5
33	1LT	AD	13-15	10+	10+	0-3Y	3	4	1	5	5	5
34	1LT	AD	3-5		1		1	1	1	1	1	4

Section 1 - Demographic Data and Knowledge Base: Captains

Respondent	Rank	Service Component	Years of Military Experience	CoE Projects as Supervisor	CoE Projects in Support	Years of Civilian Experience	Six Sigma	Lean	TOC	EVM	CCPM	CPM
35	CPT	AD	3-5	4	1		1	1	1	1	1	3
36	CPT	AD	9-11	7	10+	0-3 Y	2	2	1	3	1	5
37	CPT	AD	3-5		6	0-3 Y	1	1	1	1	1	1
38	CPT	AD	3-5				1	1	1	1	2	2
39	CPT	AD	11-13				1	1	1	1	1	1
40	CPT	AD	3-5	1	1		1	1	1	1	1	3
41	CPT		5-7		2		1	1	1	1	1	3
42	CPT	AR	5-7				1	1	1	1	1	1
43	CPT	AD	3-5	5			3	3	1	2	1	5
44	CPT	AD	5-7			0-3 Y	1	1	2	2	5	5
45	CPT	AD	5-7			0-3 Y	3	3	1	2	1	4
46	CPT	AD	3-5		2							2
47	CPT	AD	3-5	5								2
48	CPT	USMC	7-9			0-3 Y	1	1	1	1	1	3
49	CPT	AD	3-5	5			2	2	1	2	1	3
50	CPT	AD	3-5		3		1	1	1	1	1	3
51	CPT	AD	5-7		1		1	1	1	1	1	1
52	CPT	AD	3-5				1	1	1	1	1	1
53	CPT	AD	15+		2							1
54	CPT	AD	7-9			9-11 Y	2	1	1	1	1	1
55	CPT	AD	3-5	2			1	1	1	1	1	1
56	CPT	AD	3-5				1	1	1	1	1	2
57	CPT	AD	3-5	2		0-3 Y	3					5
58	CPT	AD	5-7	3	3	0-3 Y	1	1	1	1	1	3
59	CPT	AD	5-7				1	1	1	1	1	3
60	CPT	AD	5-7				1	1	1	1	1	1
61	CPT	AD	3-5			0-3 Y	1	1	1	1	1	3
62	CPT	AD	5-7	6	4	0-3 Y				3	3	3
63	CPT	AD	3-5	4		0-3 Y	1	1	1	1	1	4
64	CPT	AD	7-9			0-3 Y	1	1	1	1	1	5
65	CPT	AD	5-7				1	1	1	2	1	4
66	CPT	AD	3-5			0-3 Y	3	1	1	1	2	2
67	CPT	NG	15+				1	1	1	1	1	1
68	CPT	NG	7-9	4	4	7-9 Y	3	3	3	5	5	5
69	CPT	AR	13-15	3	3		2	2	1	3	3	3
70	CPT	AR	7-9		8	15+	1	1	1	1	1	1
71	CPT	AR	11-13	10+	10+	5-7 Y	4	4	3	1	1	5
72	CPT	NG	15+	10+	6	0-3 Y	1	1	1	1	1	1
73	CPT	AR	13-15			3-5 Y	1	1	1	1	1	4
74	CPT	NG	11-13			0-3 Y	1	1	1	1	1	1
75	CPT	AR	5-7			3-5 Y	1	1	1	1	1	3
76	CPT	AR	5-7	3			2	2	2	2	2	2
77	CPT	NG	15+	10+	10+	11-13Y	2	1	1	1	2	5
78	CPT		9-11		3	0-3Y	2	2	4	4	3	5
79	CPT	NG	9-11		7		3	1	1	1	1	1
80	CPT	AR	9-11	4	4	0-3Y	1	1	1	1	1	1
81	CPT	AD	3-5		2	0-3Y	1	1	1	1	2	5

Section 1 - Demographic Data and Knowledge Base: Warrant Officer Level Ones

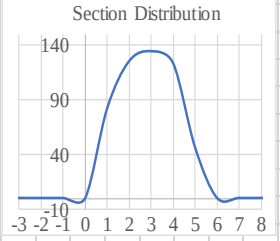
Respondent	Rank	Service Component	Years of Military Experience	CoE Projects as Supervisor	CoE Projects in Support	Years of Civilian Experience	Six Sigma	Lean	TOC	EVM	CCPM	CPM
82	WO1	AD	13-15	NA	10+	11-13Y	1	1	1	1	1	1
83	WO1	NG	9-11	1	NA	15+				4	4	5
84	WO1	AD	11-13	6	9	NA	1	2	2	2	1	5
85	WO1	AD	11-13	5	5	NA						
86	WO1	NG	15+	NA	NA	7-9Y	1	1	1	1	1	1
87	WO1	AD	11-13	8	10+	0-3Y	1	1	1	1	1	5
88	WO1	NG	5-7	NA	6	15+	1	1	1	1	1	1
89	WO1	AR	15+	4	10+	0-3Y	3	3	1	1	1	4
90	WO1	AR	7-9	NA	NA	5-7Y	3	4	4	4	4	4
91	WO1	AR	7-9	3		11-13Y	4	3	1	1	1	1
92	WO1	NG	11-13	3	4	3-5Y	1	1	1	1	1	2
93	WO1	AD	13-15	5	5	7-9Y	1	2	4	4	4	4
94	WO1	AD	11-13	4	3	NA	1	1	1	1	1	4
95	WO1	NG	13-15	NA	4	15+	1	2				
96	WO1	AR	7-9	3	10+	3-5Y	4	3	2	3	2	5
97	WO1	NG	15+	7	10+	0-3						5

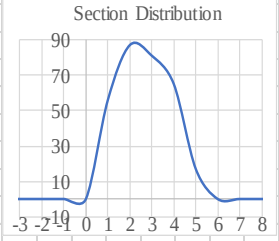
Section 1 - Demographic Data and Knowledge Base: Chief Warrant Officers

Respondent	Rank	Service Component	Years of Military Experience	CoE Projects as Supervisor	CoE Projects in Support	Years of Civilian Experience	Six Sigma	Lean	TOC	EVM	CCPM	CPM
98	CW2	NG	15+	10+	10+	9-11Y	1	1	1	3	3	5
99	CW2	AD	15+	10+	10+	NA	2	2	1	3	1	5
100	CW2	NG	15+	2	6	15+	1	3	1	2	2	3
101	CW2	NG	15+	10+	10+	15+			5	5		
102	CW2	NG	15+	NA	4	15+		5				5
103	CW2	NG	15+	10+	10+	15+	1	1	1	1	1	4
104	CW2	AR	15+	3	NA	9-11Y	3	2	1	1	1	3
105	CW2	NG	15+	10+	1	15+	1	1	1	2	1	4
106	CW2	AD	15+	10+	10+	5-7Y	2	1	1	3	1	4
107	CW2	NG	15+	10+	10+	15+	1	1	1	1	1	5
108	CW2	AR	15+	10+	10+	11-13Y	1	1	1	2	1	5
109	CW2	AD	13-15	NA	5	0-3Y	1	1	1	1	1	4
110	CW2	AD	15+	2	5	NA	2	3	2	2	2	3
111	CW2	AD	13-15	NA	3	0-3Y	1	1	1	4	5	5
112	CW2	NG	15+	1	2	13-15Y	1	1	1	1	1	3
113	CW2	AD	11-13	10+	10+	0-3Y	1	1	1	2	2	4
114	CW2	AD	15+	3	5	15+	3	1	1	2	2	4
115	CW2	AR	15+	NA	10+	0-3Y	1	1	1	1	1	3
116	CW2	AD	15+	10+	10+	NA						4
117	CW2	NG	15+	10+	10+	9-11Y	3	2	1	3	1	4
118	CW3	AR	15+	NA	NA	15+						2
119	CW3	AD	15+	10+	10+	5-7Y	2	2	2	1	1	5

Section 2 - Project Planning Issues: 1st Lieutenants

					Resource Issues													Scheduling Issues								
	Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Respondent	Rank																									
1	1LT	2	5	3	3	1	2	2	3	4	3	2	1	1	2	2		4	4	3	3	3	1	1	2	1
2	1LT	4	5	4	4	2	3	2	2	4	5	2	3	2	4	3		4	2	2	2	2	4	4	5	4
3	1LT	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1		1	2	1	1	1	2	2	1	1
4	1LT	1	4	1	2	3	1	5	2	4	2	1	3	1	1	1		2	1	1	2	2	1	1	1	1
5	1LT	3	3	5	5	1	3	3	4	4	3	2	2	3	3	5		4	5	4	4	4	1	1	2	2
6	1LT	5	4	3	4	3	4	3	4	2	4	3	1	4	3	4		3	4	3	3	2	4	4	2	4
7	1LT	3	4	2	4	4	5	4	2	5	5	1	4	4	4	3		3	3	3	4	2	3	2	2	3
8	1LT	4	5	4	5	1	2	3	3	5	3	2	2	2	1	2		3	3	4	3	2	2	2	1	2
9	1LT	4	4	2	2	5	2	3	2	2	1	1	2	4	4	3		3	4	2	2	2	2	3	3	4
10	1LT	4	4	3	4	3	4	3	4	5	4	2	2	3	4	2		3	3	3	4	4	2	2	2	3
11	1LT	4	3	2	4	2	5	2	4	4	4	3	5	4	3	2		3	5	3	4	4	2	3	1	5
12	1LT	2	2	2	4	1	1	1	1	1	4	2	1	1	1	4		3	2	2	1	4	1	3	2	1
13	1LT	3	3	2	5	2	3	4	3	3	4	5	4	2	4	4		4	4	4	3	4	2	4	2	2
14	1LT	3	2	2	4	2	3	3	1	2	3	1	5	2	4	2		1	1	1	1	4	2	3	1	1
15	1LT	3	3	3	4	2	3	3	3	4	4	3	3	3	2	1		3	3	3	3	2	4	1	3	2
16	1LT	1	2	2	1	2	3	4	2	3	3	2	1	1	1	1		4	5	2	5	2	4	4	3	1
17	1LT	5	4	5	5	2	3	5	4	1	4	4	2	4	4	4		5	5	5	3	5	1	4	2	4
18	1LT	3	3	3	3	3	4	4	3	4	4	2	2	2	3	4		2	3	4	2	4	3	2	3	3
19	1LT	4	4	4	4	1	4	4	3	4	4	2	2	3	2	2		3	4	3	3	4	2	2	3	2
20	1LT	3	3	1	5	1	2	5	1	4	1	1	1	1	3	1		1	3	4	5	4	1	3	1	1
21	1LT	2	3	1	3	4	3	4	3	4	1	1	1	2	1	1		2	2	1	1	4	2	2	3	3
22	1LT	4	3	3	4	2	2	3	3	3	3	5	2	2	2	2		3	4	3	3	2	2	2	3	3
23	1LT	3	3	3	4	2	4	4	4	5	3	3	4	2	2	3		3	3	4	2	4	2	3	2	4
24	1LT	2	4	1	3	3	2	3	3	5	5	2	1	1	1	1		3	4	3	1	3	1	1	1	1
25	1LT	2	3	4	5	3	4	5	4	4	5	3	3	3	3	3		3	2	4	5	4	4	3	3	3
26	1LT	2	2	3	2	1	2	2	2	2	2	2	2	2	1	1		2	2	2	3	2	1	2	3	1
27	1LT	3	5	2	1	1	3	4	4	2	3	1	1	5	2	4		4	5	2	2	2	1	3	2	2
28	1LT	3	4	4	4	2	4	4	4	4	4	3	3	3	5	4		2	3	3	4	4	2	1	2	2
29	1LT	2	3	4	4	3	4	3	3	3	3	3	2	3	2	2		3	3	4	3	2	2	2	3	3
30	1LT	5	3	3	4	1	1	5	5	5	5	2	4	2	1	1		3	4	2	1	4	1	1	1	1
31	1LT	4	3	2	3	2	2	3	2	3	3	3	2	3	3	2		2	3	1	2	4	2	2	2	2
32	1LT	3	4	5	5	1	2	3	4	4	4	3	3	2	1	2		5	4	3	4	5	1	2	3	4
33	1LT	5	2	1	4	1	2	3	5	3	2	2	2	2	2	2		2	4	1	1	5	2	1	3	5
34	1LT	4	3	4	4	2	3	3	2	4	3	4	3	4	4	3		3	3	3	4	4	2	4	4	3
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34	34	34
	Question Average	3.1	3.4	2.8	3.6	2.1	2.8	3.3	2.9	3.4	3.3	2.3	2.4	2.5	2.5	2.4		2.9	3.3	3.6	2.8	3.2	2.0	2.4	2.3	2.5
	Standard Deviation	1.1	0.9	1.1	1.2	1.0	1.1	1.1	1.1	1.2	1.1	1.1	1.2	1.1	1.2	1.2		1.0	1.1	1.2	1.3	1.1	1.0	1.0	1.0	1.3
							Section Average				2.9										Section Average		2.8			
							Standard Deviation				0.5										Standard Deviation		0.5			

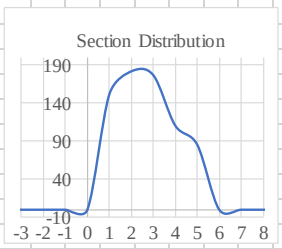


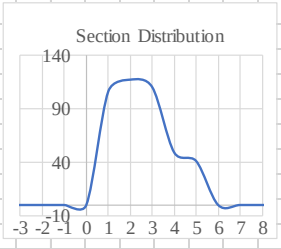


Section 2 - Project Planning Issues: Captains

					Resource Issues														Scheduling Issues							
	Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Respondent	Rank																									
35	CPT	3	2	2	4	2	2	2	2	2	5	2	5	3	3	3		5	5	3	2	3	2	4	4	2
36	CPT	4	4	5	5	2	5	5	4	5	3	5	4	3	3	4		5	5	3	3	5	2	2	4	3
37	CPT	1	1	1	1	1	1	1	1	1	1	4	3	2	1	1		1	1	1	1	1	1	2	1	2
38	CPT	3	3	3	3	2	2	2	3	4	2	2	3	2	2	3		2	2	2	3	3	2	2	3	3
39	CPT	1	1	1	3	3	3	5	5	4	4	5	3	3	3	5		1	1	1	3	3	3	4	4	3
40	CPT	1	2	2	3	2	2	1	1	1	1	1	1	2	1	1		1	3	1	1	2	3	3	1	2
41	CPT	2	2	4	3	1	1	2	4	3	1	1	3	1	1	1		3	2	4	1	1	1	3	1	2
42	CPT	5	5	2	4	2	3	4	2	2	4	3	3	2	3	3		2	3	3	2	2	2	2	3	4
43	CPT	5	3	1	4	1	1	2	5	3	3	4	3	2	2	1		2	2	1	1	3	1	2	1	1
44	CPT	3	4	4	2	2	4	1	3	3	5	5	1	3	1	1		5	4	2	4	2	1	2	3	1
45	CPT	2	1	4	3	1	3	2	3	3	3	3	2	2	3	3		1	1	2	4	4	1	1	2	3
46	CPT	4	2	1	4	1	4	3	2	3	2	1	2	2	2	1		3	5	2	2	3	2	1	4	3
47	CPT	3	3	4	3	2	1	2	2	3	3	3	2	1	2	3		4	4	2	2	2	1	2	1	1
48	CPT	4	4	2	3	1	2	4	2	5	4	1	4	2	1	1		4	3	3	2	3	3	1	2	1
49	CPT	4	5	2	4	1	3	5	2	2	3	3	1	1	1	4		2	1	2	2	4	3	1	2	2
50	CPT	4	2	4	3	1	1	4	2	2	2	2	2	2	2	2		2	2	3	1	3	1	1	1	2
51	CPT	4	4	2	2	2	2	3	2	2	5	2	4	2	2	4		3	4	4	2	3	1	4	5	2
52	CPT	3	2	4	4	2	3	4	4	4	2	3	3	4	2	3		3	3	2	3	4	1	3	3	2
53	CPT	1	1	2	1	3	1	1	1	1	2	1	2	3	4	2		1	1	1	1	2	1	2	1	3
54	CPT	3	1	5	5	5	3	4	2	4	5	5	5	1	3	1		2	3	5	3	5	1	1	1	3
55	CPT	3	3	1	2	1	3	1	1	1	1	1	1	1	1	1		4	5	1	1	5	1	1	1	1
56	CPT	3	2	4	2	3	2	3	3	3	3	2	3	2	2	3		3	3	2	3	2	2	1	2	3
57	CPT	1	2	1	4	2	5	1	2	2	5	5	3	1	3	3		5	4	2	1	1	1	3	3	3
58	CPT	1	1	2	3	1	3	2	1	2	1	1	3	1	1	2		1	1	2	2	3	1	1	2	1
59	CPT	3	3	4	3	3	4	3	4	4	3	3	3	3	3	3		3	3	4	4	3	3	3	3	3
60	CPT	4	4	4	3	3	2	2	4	4	2	1	1	2	1	3		4	3	3	4	4	1	1	2	1
61	CPT	2	1	2	3	2	2	2	2	3	3	5	3	3	2	3		3	2	4	2	3	1	3	2	2
62	CPT	3	3	1	2	2	2	2	1	2	5	2	4	4	2	2		3	2	1	1	4	4	1	4	3
63	CPT	1	2	1	4	1	3	1	1	4	4	4	2	3	4	2		1	2	1	1	2	1	2	3	2
64	CPT	5	5	5	5	1	5	5	4	3	5	4	2	4	3	4		4	1	3	2	4	2	5	5	4
65	CPT	5	5	5	5	1	3	5	2	2	5	2	5	3	5	5		5	5	5	3	5	1	2	3	3
66	CPT	4	3	5	5	1	3	5	2	3	4	1	5	4	3	1		5	2	4	3	5	2	1	3	3
67	CPT	4	5	5	3	3	2	5	5	5	2	3	3	3	4	4		4	4	3	3	4	2	3	3	3
68	CPT	5	4	4	3	2	4	4	3	3	3	2	2	4	3	3		3	2	2	3	3	3	2	3	2
69	CPT	1	2	2	1	1	1	2	1	1	1	1	1	1	1	1		2	2	1	1	1	1	1	1	1
70	CPT	3	4	4	2	2	5	5	2	2	5	1	2	1	1	5		5	5	4	5	5	1	1	2	5
71	CPT	4	2	4	4	2	5	4	4	2	5	2	3	4	1	5		2	2	5	4	5	2	4	5	1
72	CPT	3	2	2	3	3	2	3	2	2	1	2	1	2	2	2		1	3	2	1	2	3	2	2	1
73	CPT	4	3	4	2	4	3	4	4	2	4	2	3	2	4	3		3	2	2	2	3	3	4	3	3
74	CPT	3	2	2	3	1	3	3	3	3	3	2	3	3				3	3	2	3	3	2	2	2	3
75	CPT	4	4	2	3	3	3	1	1	2	3	3	5	3	1	1		4	2	2	3	4	1	2	5	2
76	CPT	3	3	5	1	1	5	5	1	5	5	1	5	5	5	5		3	5	1	5	5	1	1	5	1
77	CPT	5	5	4	2	2	2	3	2	2	4	3	1	1	1	1		3	5	3	3	4	2	3	5	3
78	CPT	2	3	4	3	3	4	4	3	4	4	4	4	3	3	3		3	2	2	3	4	2	3	2	4
79	CPT	5	5	5	2	3	3	2	2	2	5	2	3	2	5	5		5	5	5	5	1	1	2	2	2
80	CPT	1	1	2	5	1	4	2	3	3	1	1	1	1	1	3		3	3	1	4	5	1	1	4	1
81	CPT	1	1	3	4	3	2	2	1	1	2	3	2	1	2	2		2	2	2	3	2	1	2	2	2
	Number of Respondents	47	47	47	47	47	47	47	47	47	47	47	47	47	46	46		47	47	47	47	47	47	47	47	47
	Average	3.0	2.8	3.0	3.1	2.0	2.8	2.9	2.5	2.7	3.2	2.5	2.8	2.3	2.3	2.7		3.0	2.9	2.5	2.5	3.2	1.7	2.1	2.7	2.3
	Standard Deviation	1.4	1.3	1.4	1.1	1.0	1.2	1.4	1.2	1.2	1.4	1.3	1.3	1.1	1.2	1.4		1.3	1.3	1.2	1.2	1.3	0.8	1.1	1.3	1

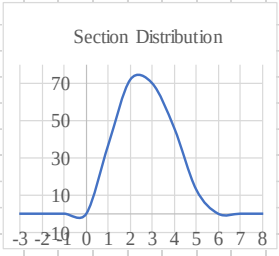
			Section Average		2.7													Section Average		2.5						
			Standard Deviation		0.3													Standard Deviation		0.5						

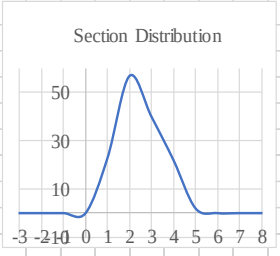




Section 2 - Project Planning Issues: Warrant Officer Level Ones

					Resource Issues													Scheduling Issues								
	Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Respondent	Rank																									
82	WO1	1	1	1	1	1	5	3	3	4	5	1	5	5	5	5		1	1	2	3	1	1	1	3	1
83	WO1	2	2	4	4	4	5	5	5	5	3	3	2	3	2	4		2	3	2	4	5	2	4	3	4
84	WO1	2	2	3	3	3	2	2	3	3	2	3	3	3	2	3		2	2	3	2	2	3	3	3	3
85	WO1	2	3	2	4	1	2	5	3	5	4	1	4	4	1	3		2	4	4	4	4	1	1	4	1
86	WO1	3	2	3	4	1	1	3	2	1	4	2	3	1	4	1		3	3	1	1	2	2	1	1	1
87	WO1	4	2	4	4	4	4	3	2	2	3	3	3	2	2	4		4	4	4	3	3	3	2	3	2
88	WO1	3	4	2	4	3	1	4	1	1	3	2		1		2		3	4	2	3	2	2	1	2	3
89	WO1	4	3	2	3	2	2	2	2	2	4	3	2	1	1	1		2	2	3	1	4	1	2	1	1
90	WO1	2	2	2	4	2	3	3	3	3	4	3	2	3	3	4		2	2	1	3	2	4	4	3	2
91	WO1	2	3	4	4	2	2	3	4	4	3	4	2	2	3	4		3	3	2	4	4	3	2	2	3
92	WO1	3	3	2	3	3	3	3	3	3	2	2	3	2	1	3		2	2	2	2	2	2	2	2	2
93	WO1	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2		3	3	3	2	2	2	2	2	2
94	WO1	3	3	1	4	1	3	4	1	4	3	2	1	1	1	1		2	2	3	2	3	3	1	1	3
95	WO1	2	1	4	3	3	4	4	3	4	2	1	1	2	1	3		2	2	3	3	4	3	2	4	2
96	WO1	3	3	4	4	1	3	2	4	4	4	3	3	3	2	3		4	4	3	2	5	2	3	2	3
97	WO1	4	5	2	3	3	2	4	2	2	1	2	2	1	1	2		4	3	2	3	2	2	2	1	2
	Number of Respondents	16	16	16	16	16	16	16	16	16	16	16	15	16	15	16		16	16	16	16	16	16	16	16	16
	Average	2.7	2.6	2.6	3.4	2.3	2.8	3.3	2.7	3.1	3.1	2.3	2.5	2.3	2.1	2.8		2.6	2.8	2.5	2.6	2.9	2.3	2.1	2.3	2.2
	Standard Deviation	0.9	1.0	1.1	0.9	1.1	1.2	1.0	1.1	1.3	1.1	0.9	1.1	1.2	1.2	1.2		0.9	0.9	0.9	1.0	1.2	0.9	1.0	1.0	0.9
				Section Average				2.7												Section Average			2.5			
				Standard Deviation				0.4												Standard Deviation			0.3			

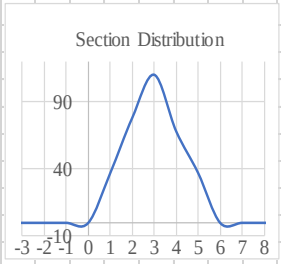


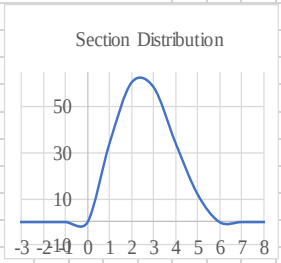


Section -2 Project Planning Issues: Chief Warrant Officers

					Resource Issues														Scheduling Issues							
	Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Respondent	Rank																									
98	CW2	5	3	4	5	2	3	3	4	4	1	1	5	3	4	5		3	3	3	3	2	1	1	1	3
99	CW2	2	3	5	4	1	3	3	4	1	1	2	2	1	3	2		2	3	4	3	3	1	1	4	2
100	CW2	4	4	2	4	5	2	4	2	2	2	4	3	2	4	3		5	3	2	2	3	1	1	2	4
101	CW2	2	2	1	1	2	5	2	1	4	5	2	2	4	2	2		2	2	3	3	3	4	3	4	3
102	CW2	1	1	1	1	1	2	1	4	2	5	1	1	1	2	2		1	1	1	1	2	1	3	2	2
103	CW2	3	4	1	4	1	5	4	4	5	5	3	3	3	3	3		4	3	5	1	2	1	1	5	3
104	CW2	3	3	3	4	3	3	3	4	4	4	5	2	3	4	4		5	4	4	3	4	3	3	2	3
105	CW2	2	2	1	2	2	2	2	1	2	4	3	4	3	3	3		3	3	3	1	2	2	3	3	3
106	CW2	3	4	3	4	2	3	3	3	3	3	2	5	3	3	2		3	2	2	3	4	3	4	2	2
107	CW2	5	3	2	1	1	3	2	2	4	3	3	2	2	3	2		4	5	2	2	5	1	3	1	3
108	CW2	4	4	4	4	1	5	5	2	5	4	3	3	3	4	3		3	1	1	2	3	1	4	2	3
109	CW2	3	1	3	4	1	3	5	5	4	3	1	1	2	3	5		1	1	1	4	5	2	1	3	2
110	CW2	3	5	4	3	3	4	5	4	4	5	4	3	3	4	3		3	5	2	4	5	3	4	4	2
111	CW2	4	3	5	5	3	5	5	5	5	4	3	3	4	4	5		3	4	3	5	4	4	2	4	4
112	CW2	2	2	2	3	2	3	1	2	3	4	3	2	2	3	3		2	2	2	2	3	1	2	3	2
113	CW2	3	3	4	5	3	4	3	3	3	3	2	3	4	3	3		4	4	3	4	4	5	4	3	3
114	CW2	3	4	2	3	2	3	3	2	3	3	3	3	2	4	3		2	2	3	2	4	2	3	2	4
115	CW2	3	3	3	3	2	2	3	4	4	3	2	3	2	1	2		3	3	2	3	3	2	1	2	2
116	CW2	2	4	4	3	2	2	3	4	2	2	4	2	2	5	2		2	2	2	2	3	2	4	2	2
117	CW2	3	3	1	2	2	3	2	1	3	2	3	2	1	1	1		2	2	1	1	2	2	1	1	1
118	CW3	4	4	2	3	2	3	3	4	4	5	3	2	3	3	2		4	4	2	2	3	3	2	2	3
119	CW3	2	3	4	3	1	5	5	4	4	3	4	5	3	3	2		2	3	2	4	4	1	5	3	1
	Number of Respondents	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22		22	22	22	22	22	22	22	22	22
	Average	3.0	3.1	2.8	3.2	2.0	3.3	3.2	3.1	3.4	3.4	2.8	2.8	2.5	3.1	2.8		2.9	2.8	2.4	2.6	3.3	2.1	2.5	2.6	2.6
	Standard Deviation	1.0	1.0	1.3	1.2	1.0	1.1	1.3	1.3	1.1	1.3	1.1	1.2	0.9	1.0	1.1		1.1	1.2	1.1	1.1	1.0	1.2	1.3	1.1	0.9

					Section Average				3.0										Section Average					2.6		
					Standard Deviation				0.4										Standard Deviation					0.3		

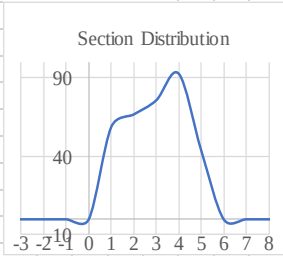




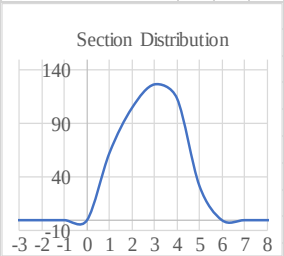
Section 3 – Project Execution Issues: 1st Lieutenants

			Resource Issues										Scheduling Issues											
	Question Number>	26	27	31	33	35	37	44	46	47	48		28	29	30	32	34	36	38	39	40	41	42	43	45
Respondent	Rank																								
1	1LT	5	5	1	3	1	3	1	1	1	4		5	3	3	2	2	2	3	1	2	2	2	1	1
2	1LT	5	3	4	2	2	2	4	4	2	2		2	2	3	5	2	3	4	4	3	2	4	3	4
3	1LT	1	1	2	1	1	1	1	1	1	1		1	1	1	1	1	1	1	2	1	1	1	1	1
4	1LT	5	5	4	5	1	2	1	3	1	1		3	1	1	4	2	1	1	4	1	1	5	2	1
5	1LT	4	4	3	4	3	5	2	1	2	5		3	4	3	2	3	1	3	3	2	3	3	3	2
6	1LT	4	4	4	3	4	4	4	4	5	4		3	5	3	5	4	2	4	4	5	4	3	3	4
7	1LT	3	2	5	4	4	3	2	2	4	3		4	3	4	4	4	3	4	4	2	3	3	4	4
8	1LT	5	5	2	3	2	3	1	1	1	1		3	3	2	1	2	1	2	5	3	3	2	5	1
9	1LT	4	2	4	2	4	3	3	2	4	2		4	3	3	2	3	3	4	4	2	3	2	4	3
10	1LT	5	4	4	4	3	4	3	3	4	2		4	3	4	2	4	2	4	3	2	3	4	4	3
11	1LT	4	4	5	4	4	3	4	5	5	4		3	4	4	3	4	4	4	3	2	4	4	3	5
12	1LT	2	2	4	3	1	1	3	1	1	1		2	2	2	4	2	1	3	2	3	2	2	2	1
13	1LT	4	3	3	4	4	4	2	3	5	5		4	4	2	2	3	2	3	4	2	2	3	4	3
14	1LT	2	4	1	2	2	5	1	4	2	3		2	2	1	4	1	4	4	5	4	4	2	4	1
15	1LT	4	4	4	4	2	4	4	2	2	3		4	4	4	4	4	2	4	4	3	3	3	2	3
16	1LT	1	1	5	3	4	4	5	3	3	3		1	5	4	5	3	4	5	3	4	4	2	4	4
17	1LT	4	4	4	5	5	4	4		2	2		5	5	5	5	4	4	5	2	2		4	4	2
18	1LT	4	4	3	3	2	4	1	2	3	3		3	4	3	3	2	3	4	2	3	2	2	3	2
19	1LT	4	4	3	4	4	4	3	3	2	2		4	4	3	3	4	4	4	4	3	3	3	3	3
20	1LT	1	5	5	1	1	1	1	1	1	1		3	3	5	1	1	1	1	5	1	2	4	3	1
21	1LT	2	3	3	1	3	2	2	2	4	1		3	3	4	1	1	1	3	2	3	2	3	3	3
22	1LT	5	5	2	3	2	2	2	2	2	3		2	3	2	2	3	2	4	3	2	2	2	2	2
23	1LT	3	3	4	3	4	4	4	5	3	3		4	3	4	5	3	4	4	3	2	2	2	4	4
24	1LT	2	3	2	2	3	1	3	1	2	1		2	3	3	3	1	1	1	2	2	1	1	1	1
25	1LT	4	4	4	5	3	4	3	1	2	3		4	4	4	2	4	4	5	3	3	3	5	3	3
26	1LT	4	5	4	4	4	3	2	1	1	2		4	4	4	3	4	3	4	4	3	4	3	4	1
27	1LT	3	4	5	4	2	1	4	1	2	4		2	4	2	2	4	1	3	3	1	2	2	4	2
28	1LT	5	5	3	3	4	4	3	1	3	2		5	4	3	1	4	3	4	4	2	2	4	2	2
29	1LT	3	3	3	2	3	2	3	2	2	3		2	3	3	3	3	3	3	3	2	2	3	2	3
30	1LT	5	5	5	1	4	1	2	1	1	4		4	3	4	1	1	1	3	4	2	1	1	3	1
31	1LT	2	3	2	3	2	2	3	3	3	3		2	2	1	2	2	3	2	3	3	2	2	1	2
32	1LT	4	4	5	3	5	3	1	2	4	1		5	5	5	5	2	3	2	4	3	1	1	3	5
33	1LT	5	5	1	5	5	3	5	2	4	5		3	5	2	3	2	1	3	3	2	5	3	2	5
34	1LT	4	4	4	4	4	3	3	2	3	4		3	4	3	4	3	4	4	4	3	2	4	3	4
	Number of Respondents	34	34	34	34	34	34	34	33	34	34		34	34	34	34	34	34	34	34	34	33	34	34	34
	Average	3.6	3.7	3.4	3.1	3.0	2.9	2.6	2.2	2.6	2.7		3.2	3.4	3.1	2.9	2.7	2.4	3.3	3.3	2.4	2.5	2.8	2.9	2.6
	Standard Deviation	1.3	1.1	1.2	1.2	1.3	1.2	1.2	1.2	1.3	1.3		1.1	1.1	1.2	1.4	1.1	1.2	1.1	1.0	0.9	1.0	1.1	1.1	1.3

Section Average	3.0
Standard Deviation	0.5

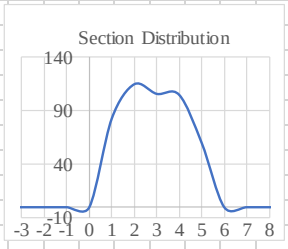


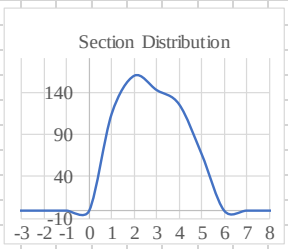
Section Average	2.9
Standard Deviation	0.3



Section 3 – Project Execution Issues: Captains

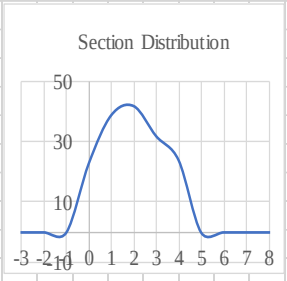
			Resource Issues										Scheduling Issues											
	Question Number>	26	27	31	33	35	37	44	46	47	48	28	29	30	32	34	36	38	39	40	41	42	43	45
Respondent	Rank																							
35	CPT	3	2	3	3	3	1	2	2	2	2	5	5	2	2	2	1	4	5	2	5	2	5	2
36	CPT	4	4	5	5	5	5	2	2	5	5	5	5	4	3	5	1	4	5	3	5	3	5	2
37	CPT	1	1	1	1	1	1	2	3	1	1	1	1	1	1	1	2	1	3	1	1	1	2	2
38	CPT	5	4	3	3	3	3	3	2	2	3	4	3	3	3	2	2	4	4	3	2	4	2	3
39	CPT	3	4	4	4	4	5	5	4	5	4	4	4	4	4	4	5	5	4	4	5	5	3	4
40	CPT	1	2	3	1	1	2	2	1	1	1	1	1	2	2	1	1	3	2	1	1	1	2	1
41	CPT	2	1	3	1	1	3	1	1	2	1	1	1	3	1	2	1	2	3	1	1	1	1	1
42	CPT	4	4	3	2	5	4	2	5	2	3	3	4	2	5	3	2	3	4	3	4	2	5	4
43	CPT	2	1	4	1	2	3	2	2	4	1	1	3	1	1	1	1	1	5	2	1	2	3	1
44	CPT	2	3	4	2	2	2	3	4	4	1	1	2	2	3	2	1	5	4	1	2	3	3	1
45	CPT	4	5	4	3	3	4	4	2	3	3	3	2	3	1	4	1	4	4	4	4	4	4	1
46	CPT	3	2	5	4	4	3	4	4	5	2	4	4	4	2	1	4	3	4	4	3	5	3	3
47	CPT	3	4	3	4	2	2	1	1	4	4	4	4	2	2	3	2	4	4	4	2	3	2	2
48	CPT	4	5	2	1	2	4	2	3	4	2	4	4	2	1	3	1	1	5	2	2	3	1	1
49	CPT	4	5	3	4	2	2	1	1	1	4	2	2	2	3	4	2	3	3	2	1	1	2	2
50	CPT	3	1	3	3	2	1	1	4	2	1	1	3	2	1	3	1	3	3	2	2	2	4	1
51	CPT	5	3	5	4	4	3	3	2	2	4	2	2	2	2	4	1	3	3	4	3	2	2	1
52	CPT	4	4	3	5	4	2	3	2	4	2	3	4	2	4	4	1	2	2	3	3	4	5	3
53	CPT	2	2	2	2	3	2	4	4	3	3	2	1	1	2	2	3	2	3	4	3	3	3	4
54	CPT	1	1	5	2	5	1	5	1	3	3	3	5	1	3	5	3	2	5	1	3	3	5	1
55	CPT	5	5	5	2	1	1	1	1	1	5	4	5	3	1	1	1	4	1	1	3	1	1	2
56	CPT	3	3	4	4	4	2	5	2	4	3	3	2	3	4	3	2	3	4	3	3	3	4	2
57	CPT	1	1	1	1	3	1	1	1	1	1	5	5	3	3	3	4	1	5	3	1	1	4	1
58	CPT	3	2	1	4	2	2	2	3	1	1	2	2	2	1	2	2	3	2	3	4	3	3	3
59	CPT	4	3	4	5	4	3	5	3	4	3	4	4	4	4	4	2	5	4	3	4	4	4	4
60	CPT	5	4	4	4	2	5	1	4	1	2	3	5	4	4	2	1	2	5	2	2	3	1	1
61	CPT	2	1	3	3	3	2	4	3	3	2	2	2	1	3	4	3	2	2	4	4	2	4	2
62	CPT	3	3	3	2	3	3	4	2	4	2	3	3	2	2	3	3	1	5	4	3	2	5	3
63	CPT	2	2	4	4	4	4	3	1	5	3	2	3	2	4	2	1	4	3	3	4	4	1	4
64	CPT	4	3	4	4	5	2	3	4	4	3	4	4	4	4	4	3	5	5	4	4	3	4	4
65	CPT	5	5	5	5	4	4	4	1	4	5	5	5	4	5	5	1	5	5	5	2	4	3	1
66	CPT	4	4	5	4	2	2	2	2	5	3	2	2	4	2	2	4	5	4	2	2	3	2	2
67	CPT	4	2	2	3	3	3	2	3	2	2	3	3	2	2	2	2	1	2	2	4	3	3	3
68	CPT	5	4	4	2	2	4	1	3	4	3	2	3	3	3	3	2	3	4	3	2	2	2	2
69	CPT	5	5	2	2	2	2	4	3	3	3	1	2	1	2	2	2	2	2	1	3	2	2	4
70	CPT	2	2	1	1	1	1	5	2	2	1	2	2	1	1	1	1	1	1	1	2	5	2	2
71	CPT	4	3	5	2	5	4	4	2	2	5	5	5	5	3	2	3	4	5	5	5	4	4	2
72	CPT	2	3	1	2	2	1	2	1	2	2	2	1	1	2	1	2	1	2	2	3	1	1	2
73	CPT	4	2	3	4	2	4	4	3	3	2	3	1	5	3	3	2	3	4	3	4	2	4	5
74	CPT	2	2	3	3	3	2	3	2	3	2	3	4	3	2	2	3	4	3	3	4	4	4	3
75	CPT	4	4	2	3	3	1	5	3	2	1	4	2	2	3	3	4	1	1	2	3	3	2	5
76	CPT	5	3	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5	5	2	4	4	1
77	CPT	5	5	4	2	4	2	1	1	1	1	5	5	4	2	4	1	4	3	1	2	3	3	1
78	CPT	4	3	3	3	4	2	4	1	3	4	3	2	3	5	3	2	3	4	3	2	4	3	3
79	CPT	4	4	4	5	3	3	3	2	4	2	4	4	4	4	4	2	2	4	2	3	3	4	3
80	CPT	1	1	3	4	2	1	3	1	1	1	1	1	2	3	2	1	2	1	1	1	3	3	1
81	CPT	2	2	3	2	4	3	3	4	3	3	3	2	2	4	3	3	2	2	3	2	3	2	4
	Number of Respondents	47	47	47	47	47	47	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
	Average	3.3	3.0	3.3	3.0	3.0	2.6	2.8	2.4	2.9	2.6	3.0	3.1	2.6	2.7	2.8	2.1	2.9	3.5	2.7	2.8	2.8	3.0	2.3
	Standard Deviation	1.3	1.3	1.2	1.3	1.2	1.2	1.3	1.2	1.3	1.3	1.3	1.4	1.2	1.2	1.2	1.1	1.3	1.3	1.2	1.2	1.1	1.3	1.2
		Section Average					2.9					Section Average					2.8							
		Standard Deviation					0.3					Standard Deviation					0.3							

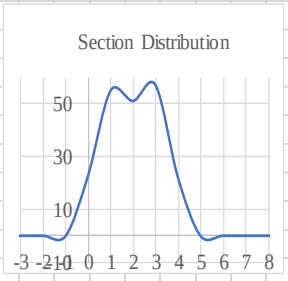




Section 3 - Project Execution Issues: Warrant Officer Level Ones

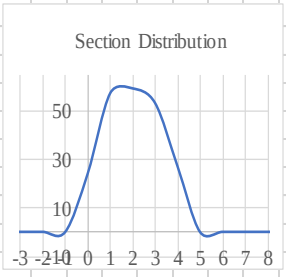
			Resource Issues										Scheduling Issues											
	Question Number>	26	27	31	33	35	37	44	46	47	48	28	29	30	32	34	36	38	39	40	41	42	43	45
Respondent	Rank																							
82	WO1	2	2	4	3	1	3	1	1	5	5	2	2	3	1	4	1	5	1	5	4	4	1	1
83	WO1	5	5	5	5	5	4	5	5	5	1	5	5	5	5	5	3	5	5	4	3	4	4	3
84	WO1	1	2	3	2	3	3	2	3	3	2	3	3	3	2	3	2	2	2	4	3	2	3	3
85	WO1	4	3	4	1	2	5	5	3	4	5	4	2	5	5	5	4	4	3	4	4	5	4	4
86	WO1	4	1	1	2	3	1	2	1	1	1	3	2	1	3	2	1	4	1	1	1	2	3	1
87	WO1	4	4	5	4	4	4	5	5	3	5	4	4	3	4	5	5	3	3	5	3	4	3	3
88	WO1	3	2	2	2	2	4	2	3	3	2	2	3	4	2	3	2	4	2	3	2	4	3	4
89	WO1	3	2	3	1	1	1	1	2	1	1	2	2	1	1	3	1	2	1	2	2	2	4	1
90	WO1	3	4	3	3	3	2	2	3	3	4	3	4	4	2	2	4	4	3	3	4	4	3	4
91	WO1	3	3	4	3	3	2	2	2	4	3	4	4	4	4	4	2	4	3	2	2	2	2	3
92	WO1	4	4	4	5	4	4	5	3	4	4	3	4	3	3	3	4	3	3	4	3	4	4	4
93	WO1	4	2	3	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2
94	WO1	3	3	4	3	4	3	3	4	3	1	2	3	2	1	5	1	4	3	3	4	4	2	1
95	WO1	3	3	2	3	1	4	5	3	3	2	3	2	4	2	3	2	5	5	3	3	4	4	4
96	WO1	4	5	5	3	4	3	2	2	1	4	5	4	4	2	3	2	3	4	2	5	4	3	3
97	WO1	5	5	2	2	4	2	1	1	2	2	4	4	2	1	2	2	5	4	1	2	2	3	1
	Number of Respondents	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
	Average	3.4	3.1	3.4	2.8	2.9	2.9	2.8	2.7	2.9	2.8	3.2	3.1	3.1	2.5	3.3	2.4	3.7	2.8	3.0	2.9	3.3	3.0	2.6
	Standard Deviation	1.0	1.3	1.2	1.2	1.3	1.2	1.6	1.3	1.3	1.5	1.0	1.0	1.3	1.4	1.3	1.3	1.1	1.3	1.3	1.1	1.1	0.9	1.3
		Section Average					3.0					Section Average					3.0							
		Standard Deviation					0.3					Standard Deviation					0.4							

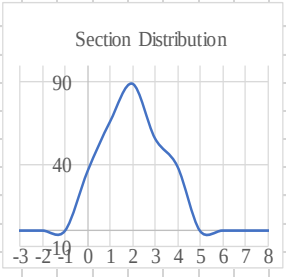




Section 3 - Project Execution Issues: Chief Warrant Officers

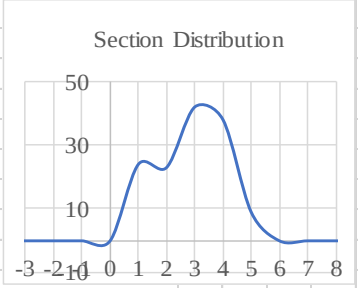
			Resource Issues										Scheduling Issues										
	Question Number>	26	27	31	33	35	37	44	46	47	48	28	29	30	32	34	36	38	39	40	41	42	43	45
Respondent	Rank																							
98	CW2	5	5	2	4	4	4	3	2	2	2	3	3	1	4	5	1	2	3	2	4	3	2	3
99	CW2	2	3	2	4	2	4	5	5	5	2	2	2	3	2	5	4	4	5	2	1	5	3	2
100	CW2	2	3	3	3	5	3	1	2	3	4	5	3	2	1	4	2	5	5	4	5	2	4	2
101	CW2	2	2	4	2	4	2	4	2	2	2	2	2	2	3	2	3	2	3	2	3	4	3	3
102	CW2	1	1	2	2	1	1	2	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2	1
103	CW2	4	4	5	4	1	3	5	2	3	3	3	3	2	5	5	3	5	4	5	1	4	1	3
104	CW2	4	4	4	4	4	3	4	3	3	3	4	4	4	3	4	4	4	3	4	4	4	3	3
105	CW2	3	3	4	2	4	2	2	3	2	1	4	4	3	2	2	2	3	1	1	2	2	5	3
106	CW2	4	4	2	2	3	1	3	4	3	3	3	3	2	3	1	1	2	5	2	4	3	3	2
107	CW2	4	4	3	2	2	3	1	1	1	3	3	5	3	2	1	2	4	3	2	2	2	1	2
108	CW2	4	4	3	3	4	4	2	3	2	2	4	4	3	4	4	5	3	5	3	2	4	3	3
109	CW2	5	5	4	3	3	3	4	1	4	4	5	5	3	2	3	1	5	5	3	3	3	2	3
110	CW2	5	5	5	5	4	5	5	3	4	4	4	5	4	4	5	5	4	4	4	5	4	4	4
111	CW2	5	5	4	5	4	3	3	3	5	5	4	5	4	3	5	2	5	4	5	4	4	3	4
112	CW2	2	2	3	2	2	1	1	3	3	3	2	3	3	2	2	1	2	3	3	3	2	2	3
113	CW2	5	5	5	5	3	1	3	4	3	3	5	5	5	3	3	1	5	5	3	5	5	3	5
114	CW2	3	4	4	2	4	3	3	2	5	3	3	3	3	3	2	3	4	4	3	2	3	4	3
115	CW2	4	4	3	3	3	3	3	2	3	2	3	3	2	3	3	1	3	3	3	2	3	2	3
116	CW2	1	1	3	2	2	2	3	2	4	2	1	2	3	2	2	3	2	3	2	2	2	3	2
117	CW2	2	2	1	2	2	1	2	1	4	1	3	3	1	3	1	1	1	2	1	2	2	3	1
118	CW3	4	4	4	4	3	3	2	4	3	2	3	4	3	2	4	1	4	4	4	4	4	4	3
119	CW3	2	2	3	4	5	2	4	2	3	2	3	3	4	5	2	1	3	5	3	2	4	3	1
	Number of Respondents	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
	Average	3.3	3.5	3.3	3.1	3.1	2.6	3.0	2.5	3.1	2.6	3.2	3.4	2.8	2.8	3.0	2.2	3.4	3.7	2.8	2.9	3.2	2.9	2.7
	Standard Deviation	1.4	1.3	1.1	1.1	1.2	1.1	1.3	1.1	1.2	1.1	1.1	1.1	1.1	1.1	1.5	1.4	1.3	1.2	1.2	1.3	1.1	1.0	1.0
		Section Average					3.0					Section Average					3.0							
		Standard Deviation					0.3					Standard Deviation					0.4							

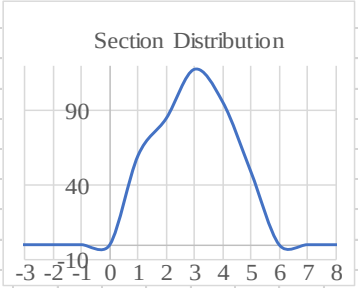




Section 4 – Project Completion Issues: 1st Lieutenants

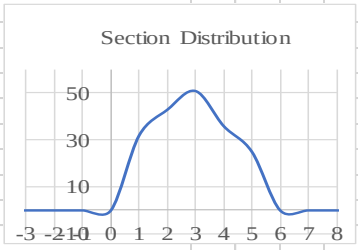
	Resource Issues									Scheduling Issues							
	Question Number>	52	55	57	61	49	50	51	53	54	56	58	59	60	62	63	64
Respondent	Rank																
1	1LT	3	3	3	3	4	4	3	2	3	3	2	2	2	2	2	2
2	1LT	4	2	2	4	2	2	1	2	4	3	4	2	5	4	2	2
3	1LT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1LT	1	5	2	1	1	1	2	1	1	1	1	1	3	3	2	4
5	1LT	3	4	3	2	4	4	4	2	3	3	2	2	3	2	2	2
6	1LT	1	4	4	4	5	5	2	1	2	4	4	4	3	5	4	5
7	1LT	3	4	4	4	3	3	2	3	2	4	3	3	4	4	4	4
8	1LT	1	4	4	4	4	5	3	1	1	4	1	1	2	4	3	3
9	1LT	1	3	3	3	3	3	2	1	3	3	3	3	4	3	3	3
10	1LT	4	5	5	2	3	4	4	4	4	4	3	3	2	4	4	4
11	1LT	4	2	3	4	4	4	3	3	2	3	4	3	5	4	3	4
12	1LT	2	2	2	2	4	4	3	3	4	2	4	3	2	2	2	3
13	1LT	2	4	4	4	4	3	4	2	4	4	3	2	4	4	5	5
14	1LT	1	3	2	1	2	1	3	1	1	1	1	1	2	1	1	2
15	1LT	4	4	4	2	5	5	4	4	3	4	3	2	3	4	4	4
16	1LT	1	2	1	3	5	5	5	2	5	5	4	2	2	3	2	3
17	1LT	2	4	4	4	4	4	4	4	2	4	4	4	4	5	5	4
18	1LT	4	3	3	3	4	4	4	4	3	3	2	2	3	3	3	3
19	1LT	2	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3
20	1LT	1	5	3	3	3	5	1	1	1	5	3	3	1	5	1	1
21	1LT	1	3	3	1	2	2	1	1	2	3	1	1	1	2	1	3
22	1LT	4	2	2	4	5	5	4	4	3	3	2	2	4	4	2	2
23	1LT	2	4	4	3	2	2	3	2	2	3	4	2	3	5	4	3
24	1LT	1	4	1	1	2	2	1	1	4	4	2	2	1	5	1	3
25	1LT	4	3	4	2	4	4	4	5	4	4	3	3	3	3	3	2
26	1LT	5	3	4	4	4	5	3	5	3	4	3	3	3	2	3	4
27	1LT	4	2	2	1	5	5	5	5	5	4	2	2	4	5	3	2
28	1LT	3	3	3	3	4	4	3	2	2	3	2	3	2	2	2	3
29	1LT	3	3	3	3	3	2	3	3	2	3	3	3	2	2	3	3
30	1LT	1	1	3	2	4	4	2	1	2	1	1	1	2	1	1	4
31	1LT	3	4	3	3	5	5	4	3	3	3	1	5	3	2	3	3
32	1LT	5	5	5	3	5	5	5	4	5	5	3	3	5	3	5	5
33	1LT	5	3	1	1	3	5	5	2	1	4	1	1	2	3	5	5
34	1LT	4	3	3	4	4	3	4	3	2	3	3	4	3	3	3	4
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
	Average	2.6	3.2	3.0	2.7	3.5	3.6	3.1	2.5	2.7	3.3	2.5	2.4	2.8	3.2	2.8	3.2
	Standard Deviation	1.4	1.1	1.1	1.1	1.2	1.3	1.2	1.3	1.2	1.1	1.1	1.0	1.1	1.2	1.2	1.1
	Section Average				2.9		Section Average					3.0					
	Standard Deviation				0.3		Standard Deviation					0.4					

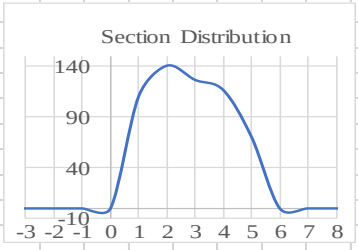




Section 4 – Project Completion Issues: Captains

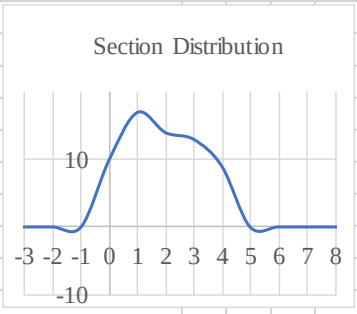
	Resource Issues										Scheduling Issues								
	Question Number>	52	55	57	61		49	50	51	53	54	56	58	59	60	62	63	64
Respondent	Rank																	
35	CPT	1	1	3	1		4	4	2	1	1	3	3	3	3	3	2	3
36	CPT	4	5	5	5		4	5	5	5	4	5	5	5	5	5	5	5
37	CPT	3	1	1	1		1	1	1	2	1	1	1	5	2	1	1	1
38	CPT		4	4	2		3	4	3			4	2	2	3	2	3	3
39	CPT	5	5	5	5		4	5	5	5	5	5	5	5	5	5	5	5
40	CPT	1	2	2	2		3	2	2	1	2	2	2	1	1	1	1	1
41	CPT	1	1	3	2		2	2	1	2	1	1	3	2	1	1	2	1
42	CPT	3	3	4	5		4	2	5	2	4	4	2	4	3	2	4	3
43	CPT	3	4	3	3		4	4	2	2	1	4	1	2	3	2	4	5
44	CPT	4	3	4	3		3	3	3	4	2	4	2	2	2	3	1	1
45	CPT	3	4	4	2		2	2	3	2	2	4	2	4	3	2	1	4
46	CPT	2	4	3	2		3	4	3	2	5	4	4	4	2	4	4	5
47	CPT	2	4	3	4		3	4	3	3	2	4	3	3	4	3	3	2
48	CPT	3	4	5	4		2	2	4	3	1	4	3	2	4	4	3	3
49	CPT	5	3	2	1		2	3	3	4	3	3	1	2	2	1	1	2
50	CPT	1	2	2	3		2	2	3	3	4	3	1	1	3	4	3	3
51	CPT	2	4	2	3		4	4	4	2	2	4	2	2	3	4	4	2
52	CPT	3	2	4	4		4	4	2	4	3	3	2	3	3	4	2	3
53	CPT	1	1	2	2		1	1	2	1	1	1	3	3	3	3	4	4
54	CPT	1	5	1	3		3	3	2	3	5	5	3	5	1	3	4	3
55	CPT	1	3	2	1		5	4	1	1	1	2	1	1	1	1	1	1
56	CPT	3	3	3	2		4	3	4	3	4	3	3	2	3	2	2	2
57	CPT	1	5	3	3		1	1	3	1	5	5	1	1	1	4	4	5
58	CPT	1	3	2	2		2	2	1	2	1	3	2	2	1	2	1	1
59	CPT	5	5	5	2		5	4	5	5	4	4	3	4	4	4	4	4
60	CPT	3	1	4	1		2	5	2	2	1	1	1	4	4	4	1	4
61	CPT	3	2	2	1		2	1	2	2	3	2	2	2	3	3	2	2
62	CPT	1	3	2	3		4	4	3	4	3	3	1	1	2	3	3	5
63	CPT	4	4	4	4		3	4	3	2	3	4	2	4	2	4	2	3
64	CPT	3	3	3	4		5	4	3	3	3	3	4	4	4	4	4	5
65	CPT	5	5	2	2		5	5	5	5	5	5	5	5	2	5	3	3
66	CPT	4	1	3	5		5	5	2	5	4	5	1	1	3	5	3	5
67	CPT	2	3	3	3		3	3	3	2	4	3	3	2	3	2	2	2
68	CPT	3	3	2	3		3	3	4	4	4	4	4	2	3	3	2	2
69	CPT	5	3	3	2		4	4	1	4	2	3	2	2	1	2	1	1
70	CPT	1	5	5	1		2	2	1	1	1	5	1	1	1	2	2	2
71	CPT	3	5	3	4		4	5	2	5	5	5	5	5	2	4	2	2
72	CPT	1	1	3	2		2	2	2	1	1	3	3	3	2	2	1	1
73	CPT	2	3	4	4		2	4	3	4	2	2	3	2	4	3	5	3
74	CPT	2	2	4	2		3	3	3	2	2	4	1	1	2	3	3	3
75	CPT	3	5	2	3		4	3	2	1	3	4	4	3	2	1	4	5
76	CPT	4	1	1	2		1	1	1	5	5	5	1	3	4	5	1	1
77	CPT	5	4	4	4		4	4	5	5	1	4	2	4	4	2	2	4
78	CPT	3	4	5	2		4	2	3	2	4	4	4	3	3	4	4	2
79	CPT	1	4	4	4		2	2	3	1	1	4	1	1	4	1	1	2
80	CPT	1	3	3	2		1	1	1	1	1	3	1	1	2	1	1	1
81	CPT	2	2	2	2		3	2	3	2	2	2	2	2	3	3	2	2
	Number of Respondents	46	47	47	47		47	47	47	46	46	47	47	47	47	47	47	47
	Average	2.6	3.1	3.1	2.7		3.0	3.1	2.7	2.7	2.7	3.5	2.4	2.7	2.7	2.9	2.6	2.8
	Standard Deviation	1.4	1.4	1.1	1.2		1.2	1.3	1.2	1.4	1.5	1.2	1.3	1.3	1.1	1.3	1.3	1.4
				Section Average	2.9						Section Average		2.8					
				Standard Deviation	0.3						Standard Deviation		0.3					

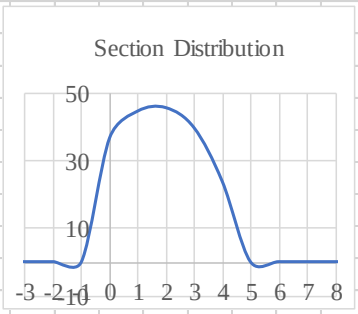




Section 4 – Project Completion Issues: Warrant Officer Level Ones

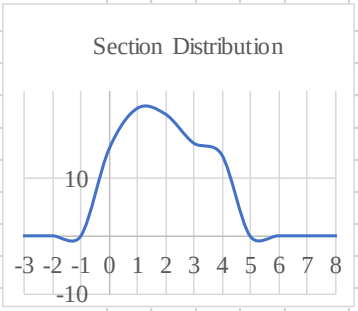
		Resource Issues									Scheduling Issues							
	Question Number>	52	55	57	61		49	50	51	53	54	56	58	59	60	62	63	64
Respondent	Rank																	
82	WO1	1	1	4	1		1	1	1	1	2	1	1	1	1	1	1	3
83	WO1	5	5	5	5		5	5	5	5	4	5	4	3	3	5	1	5
84	WO1	3	3	3	3		4	3	2	3	2	2	3	3	2	2	2	1
85	WO1	5	5	5	2		5	4	4	2	4	5	4	4	2	2	5	1
86	WO1	1	2	1	1		2	3	2	3	3	2	1	1	1	1	1	1
87	WO1		2	2	4		3	2	3	1	1	3	4	2	4	4	5	5
88	WO1	2	2	3	3		2	2	3	4	2	3	2	3	2	5	4	4
89	WO1	2	3	2	2		5	5	1	5	4	4	2	2	1	3	1	1
90	WO1	4	3	4	4		4	4	3	3	3	4	3	2	3	3	3	3
91	WO1	4	3	3	4		4	4	4	4	2	4	3	3	3	4	3	3
92	WO1	4	5	4	4		5	5	4	4	3	4	4	4	3	4	3	4
93	WO1	1	2	1	2		2	1	2	1	3	2	1	2	2	2	2	2
94	WO1	3	3	1	1		3	2	1	2	3	2	2	2	1	4	1	2
95	WO1	5	4	2	3		4	4	3	4	1	3	2	2	1	3	1	1
96	WO1	2	4	4	3		5	3	4	3	2	5	3	2	4	5	4	5
97	WO1	2	2	2	2		5	5	4	3	2	2	1	1	3	2	3	3
	Number of Respondents	15	16	16	16		16	16	16	16	16	16	16	16	16	16	16	16
	Average	2.9	3.1	2.9	2.8		3.7	3.3	2.9	3.0	2.6	3.2	2.5	2.3	2.3	3.1	2.5	2.8
	Standard Deviation	1.5	1.2	1.4	1.2		1.4	1.4	1.3	1.3	1.0	1.3	1.2	0.9	1.1	1.4	1.5	1.5
				Section Average	2.9					Section Average			2.8					
				Standard Deviation	0.1					Standard Deviation			0.4					

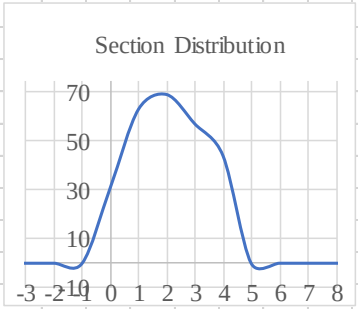




Section 4 – Project Completion Issues: Chief Warrant Officers

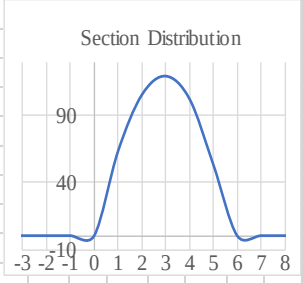
		Resource Issues									Scheduling Issues							
	Question Number>	52	55	57	61		49	50	51	53	54	56	58	59	60	62	63	64
Respondent	Rank																	
98	CW2	2	3	3	2		3	5	4	3	2	3	2	2	2	2	2	2
99	CW2	1	4	5	4		5	5	2	3	1	4	3	3	4	5	1	4
100	CW2	3	5	5	4		3	5	4	4	4	5	3	3	5	4	4	5
101	CW2	2	4	2	2		4	3	3	2	3	2	3	2	2	1	1	5
102	CW2	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1
103	CW2	5	5	5	1		4	4	5	5	3	5	2	2	2	1	1	4
104	CW2	3	3	4	1		2	3	3	3	3	4	2	2	2	3	2	2
105	CW2	1	2	2	1		2	1	1	1	1	2	2	2	2	3	2	2
106	CW2	3	2	2	2		4	4	2	2	1	3	2	2	2	4	3	4
107	CW2	3	2	3	2		5	5	4	4	2	3	4	4	4	4	5	3
108	CW2	1	4	4	1		4	3	2	2	5	4	3	2	2	4	2	2
109	CW2	5	2	5	5		5	5	5	5	3	5	1	5	5	5	5	5
110	CW2	5	4	5	5		5	5	5	5	3	5	4	4	4	4	4	3
111	CW2	3	2	3	2		3	4	5	4	2	5	4	3	4	4	4	5
112	CW2	3	3	4	3		3	3	3	3	3	4	3	3	3	3	3	3
113	CW2	5	4	4	3		5	4	3	5	3	4	2	5	4	5	5	5
114	CW2	3	4	3	3		4	4	3	4	4	4	2	2	3	3	2	3
115	CW2	1	2	3	2		3	3	2	2	2	3	2	2	3	2	3	3
116	CW2	1	2	2	1		2	1	1	1	1	2	2	2	2	3	2	2
117	CW2	1	3	3	2		3	3	1	1	1	3	2	2	2	4	2	3
118	CW3	5	3	4	4		4	3	4	4	3	4	3	3	4	3	4	3
119	CW3	2	4	4	2		4	5	3	5	5	4	3	2	3	3	4	5
	Number of Respondents	22	22	22	22		22	22	22	22	22	22	22	22	22	22	22	22
	Average	2.7	3.1	3.5	2.4		3.5	3.6	3.0	3.1	2.5	3.6	2.5	2.6	3.0	3.2	2.8	3.4
	Standard Deviation	1.5	1.1	1.2	1.3		1.1	1.3	1.4	1.5	1.3	1.1	0.9	1.0	1.1	1.2	1.4	1.3
		Section Average			2.9				Section Average				3.1					
		Standard Deviation			0.5				Standard Deviation				0.4					

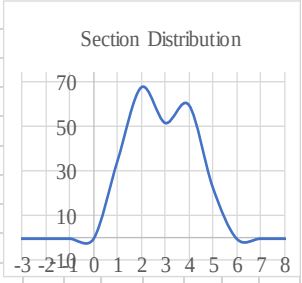




Section 5 - Project Solutions - 1st Lieutenants

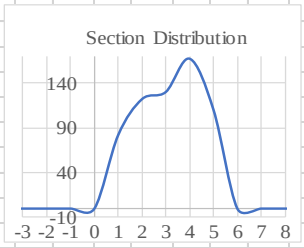
							CPM											CCPM				
	Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83	66	67	68	76	79	81	84
Respondent	Rank																				
1	1LT	5	3	1	5	1	1	1	3	5	2	2	3	1	5	4	2	3	1	3	1
2	1LT	4	1	1	4	2	2	4	4	3	2	2	1	1	5	4	2	2	1	4	1
3	1LT	4	3	3	2	2	3	3	1	4	2	3	3	2	2	4	4	3	2	2	2
4	1LT	4	2	1	5	3	3	3	1	4	2	4	3	1	1	4	4	4	4	3	1
5	1LT	4	4	3	5	2	4	4	4	3	2	4	2	2	3	4	4	1	1	2	4
6	1LT	5	4	5	3	5	4	3	4	5	3	5	3	1	3	4	5	5	4	3	3
7	1LT	4	4	1	5	3	5	3	4	3	3	5	4	1	4	3	2	4	2	3	1
8	1LT	5	2	1	3	1	3	4	3	4	3	3	3	1	3	5	3	4	3	1	1
9	1LT	4	4	3	3	3	4	3	4	3	4	3	3	3	3	3	2	4	2	3	2
10	1LT	3	4	2	4	1	3	3	3	3	1	4	2	1	2	5	3	4	3	2	4
11	1LT	4	2	1	3	3	5	1	1	3	3	4	2	1	1	3	4	2	3	2	1
12	1LT	5	2	2	4	1	1	2	2	3	4	2	3	2	3	3	2	2	2	1	1
13	1LT	3	2	2	4	1	2	4	2	4	2	4	5	4	2	4	4	4	4	2	1
14	1LT	2	4	2	5	2	4	3	4	2	2	4	3	5	3	5	3	3	4	2	3
15	1LT	2	2	3	2	2	2	4	2	2	4	2	4	4	4	2	3	2	3	2	5
16	1LT	4	4	5	2	3	3	3	2	3	3	3	2	2	3	3	5	4	4	2	1
17	1LT	5	3	1	4	4	4	2	4	2	4	4	2	4	4	5	2	4	4	5	5
18	1LT	4	2	2	4	3	4	1	4	3	3	4	2	2	3	4	1	4	2	3	4
19	1LT	2	2	2	2	4	2	2	3	2	3	3	4	4	2	2	4	2	3	4	1
20	1LT	5	3	3	5	4	4	3	4	3	1	4	5	2	2	5	2	5	1	2	1
21	1LT	2	2	3	3	2	2	3	2	1	1	4	3	2	1	3	4	4	4	2	4
22	1LT	5	4	1	5	1	5	3	4	3	3	3	4	4	1	3	1	3	3	1	2
23	1LT	3	4	2	4	2	4	5	3	4	5	4	3	2	2	5	4	5	3	2	3
24	1LT	5	5	3	5	2	5	1	5	1	1	5	4	1	1	5	1	4	1	2	1
25	1LT	3	2	2	4	5	3	2	2	3	2	3	3	2	3	3	4	3	2	2	2
26	1LT	2	1	2	3	2	1	1	3	3	4	4	2	1	2	3	5	2	4	3	2
27	1LT	5	5	1	5	2	5	5	4	4	5	5	4	1	4	4	2	2	5	2	1
28	1LT	3	3	1	3	1	3	4	3	2	2	3	3	2	2	4	2	4	4	3	2
29	1LT	3	3	2	3	2	3	2	3	3	2	3	3	2	2	2	2	2	2	2	3
30	1LT	4	4	3	2	1	1	2	5	4	4	4	5	2	2	4	1	4	1	3	5
31	1LT	3	4	2	4	2	2	2	3	4	2	2	2	2	2	3	4	4	2	2	2
32	1LT	1	1	1	5	5	1	3	1	1	5	4	5	4	5	3	1	1	3	5	5
33	1LT	5	1	1	5	1	3	1	3	5	1	1	5	1	2	4	1	2	3	2	4
34	1LT	3	4	3	3	4	2	3	4	3	3	3	4	3	4	2	3	4	4	2	4
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
	Average	3.7	2.9	2.1	3.8	2.4	3.0	2.7	3.1	3.1	2.7	3.4	3.2	2.1	2.7	3.6	2.8	3.2	2.8	2.5	2.4
	Standard Deviation	1.1	1.2	1.1	1.1	1.3	1.3	1.1	1.1	1.1	1.2	1.0	1.1	1.2	1.2	0.9	1.3	1.1	1.2	1.0	1.5
				Section Average					2.9							Section Average				2.9	
				Standard Deviation					0.5							Standard Deviation				0.4	

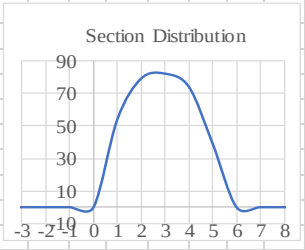




Section 5 - Project Solutions - Captains

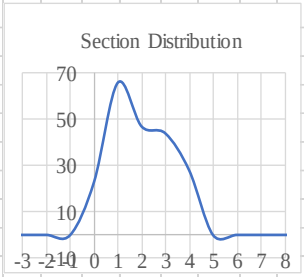
							CPM											CCPM				
	Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83		66	67	68	76	79	81	84
Respondent	Rank																					
35	CPT	5	3	3	4	2	4	3	5	3	3	3	3	5		3	5	1	4	1	1	1
36	CPT	5	4	4	5	1	1	5	1	4	3	2	5	1		1	5	5	5	4	2	4
37	CPT	1	3	2	4	1	2	1	3	2	1	5	4	1		1	4	3	2	1	5	1
38	CPT	4	2	1	4	2	3	4	4	4	2	2	4	1		3	3	2	3	2		2
39	CPT	5	3	4	4	4	3	4	4	4	5	3	5	5		3	4	2	5	5	4	5
40	CPT	3	3	4	4	4	3	2	3	4	1	3	3	2		1	2	3	3	2	4	1
41	CPT	4	2	4	4	2	3	3	1	4	2	3	2	1		3	5	4	5	3	3	1
42	CPT	5	3	2	2	4	5	3	5	3	3	5	2	3		3	4	2	4	4	5	4
43	CPT	4	3	1	4	1	3	4	4	5	1	4	3	4		3	4	2	3	1	4	1
44	CPT	5	5	4	4	2	4	1	1	2	4	5	2	4		1	3	2	1	2	3	1
45	CPT	2	2	1	5	1	5	2	2	5	1	4	1	1		2	4	5	2	2	4	1
46	CPT	1	2	3	3	1	4	4	2	3	2	2	4	1		2	3	2	3	4	4	3
47	CPT	3	5	2	5	1	4	1	3	5	1	2	2	2		2	4	2	4	2	3	1
48	CPT	3	4	2	4	2	2	2	4	5	2	3	4	4		4	4	2	4	2	4	3
49	CPT	2	3	1	5	2	4	2	3	3	4	3	4	1		2	5	2	4	4	2	4
50	CPT	4	2	2	4	3	3	4	4	5	4	4	4	4		4	4	2	4	3	4	3
51	CPT	4	3	2	4	1	5	4	4	3	4	5	5	5		2	4	4	3	4	1	1
52	CPT	3	2	3	3	2	3	3	3	3	2	4	3	3		4	3	2	3	2	3	1
53	CPT	4	4	4	5	3	2	3	3	4	4	5	3	2		4	3	2	3	2	3	4
54	CPT	2	3	5	5	2	4	3	5	4	5	5	5	4		5	2	4	5	5	4	4
55	CPT	5	2	2	5	2	4	4	4	4	1	4	4	2		2	4	2	5	2	4	1
56	CPT	4	3	2	5	3	2	2	4	4	2	4	4	2		4	3	2	4	2	2	2
57	CPT	5	5	4	4	5	5	5	5	5	1	5	4	3		5	4	3	4	1	5	1
58	CPT	3	3	3	4	2	4	3	4	4	2	4	4	3		3	3	4	3	3	2	1
59	CPT	5	3	4	3	2	3	2	3	5	2	5	3	3		3	3	5	3	3	4	2
60	CPT	5	4	2	5	4	5	4	5	4	4	5	4	1		2	5	2	4	1	1	1
61	CPT	4	3	3	3	2	2	4	3	4	2	2	3	4		3	3	5	3	3	4	3
62	CPT	2	3	3	5	3	5	2	1	3	3	5	5	2		2	3	3	2	3	4	5
63	CPT	4	1	2	4	2	2	4	4	4	1	4	3	1		2	2	1	3	1	1	1
64	CPT	5	4	5	3	5	3	5	5	4	4	4	4	5		3	5	5	4	4	5	5
65	CPT	5	3	3	5	1	5	5	3	5	5	5	5	5		1	4	5	4	5	4	1
66	CPT	5	1	3	5	1	5	1	3	3	2	5	5	1		2	5	5	5	3	3	1
67	CPT	3	3	3	3	5	5	4	3	4	4	4	2	1		3	2	3	3	2	2	2
68	CPT	4	4	2	2	2	2	2	4	4	3	4	4	1		3	3	2	3	2	4	2
69	CPT	1	4	1	2	2	2	1	3	1	1	2	3	4		1	5	1	3	2	2	2
70	CPT	1	1	1	1	5	5	1	1	1	1	1	5	1		1	1	1	3	1	1	1
71	CPT	5	4	1	3	1	5	5	5	3	3	5	2	3		2	5	1	5	1	4	3
72	CPT	1	2	2	1	2	1	1	1	3	4	2	3	3		1	1	2	2	3	4	2
73	CPT	4	5	1	3	3	2	4	4	2	4	4	3	2		2	4	2	2	2	3	5
74	CPT	4	2	2	4	3	2	2	4	5	3	4	4	1		3	4	2	3	3	3	2
75	CPT	4	1	3	2	5	4	2	3	4	3	2	2	1		1	3	4	2	1	3	4
76	CPT	1	5	5	5	5	1	4	2	4	2	4	5	5		4	4	1	4	2	1	1
77	CPT	4	4	2	4	2	2	4	4	3	2	4	4	4		3	4	2	3	4	2	2
78	CPT	4	2	2	4	1	3	4	2	4	4	5	2	3		2	4	4	3	4	3	1
79	CPT	5	5	4	3	1	5	3	3	5	2	5	1	4		3	4	2	4	2	3	5
80	CPT	5	2	2	2	1	4	4	3	3	1	3	3	4		3	3	2	3	3	3	4
81	CPT	2	2	2	4	1	2	2	1	4	4	3	3	3		3	2	2	5	3	5	1
	Number of Respondents	47	47	47	47	47	47	47	47	47	47	47	47	47		47	47	47	47	47	46	47
	Average	3.6	3.0	2.6	3.7	2.4	3.3	3.0	3.2	3.7	2.6	3.7	3.4	2.7		2.6	3.6	2.7	3.4	2.6	3.2	2.3
	Standard Deviation	1.4	1.2	1.2	1.1	1.3	1.3	1.3	1.2	1.0	1.3	1.2	1.1	1.4		1.1	1.1	1.3	1.0	1.2	1.2	1.4
					Section Average				3.2								Section Average					2.9	
					Standard Deviation				0.5								Standard Deviation					0.5	

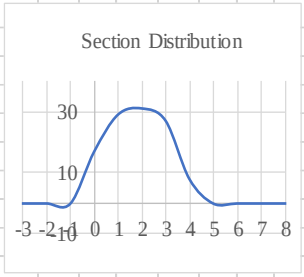




Section 5 - Project Solutions - Warrant Officer Level Ones

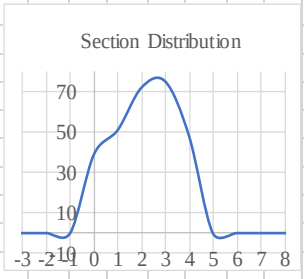
							CPM										CCPM				
	Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83	66	67	68	76	79	81	84
Respondent	Rank																				
82	WO1	1	3	3	1	5	3	1	5	3	3	5	4	1	1	1	1	5	1	3	1
83	WO1	5	3	3	4	2	4	4	3	5	4	5	2	2	3	5	4	5	3	5	3
84	WO1	4	3	1	3	2	3	2	2	2	4	4	5	4	2	3	4	3	4	3	4
85	WO1	5	5	1	5	2	1	4	1	3	2	1	5	4	3	4	1	1	2	4	4
86	WO1	2	1	1	3	3	4	2	3	2	1	3	2	2	1	2	3	2	4	3	1
87	WO1	3	4	5	5	5	3	4	5	4	4	5	5	2	4	2	4	3	3	5	1
88	WO1	5	4	2	4	2	3	1	3	4	2	3	2	4	3	4	3	3	4	2	2
89	WO1	1	2	1	4	3	2	3	4	5	3	3	2	1	2	4	2	3	2	4	1
90	WO1	2	4	2	3	3	4	2	3	2	1	1	2	2	4	3	3	4	1	2	1
91	WO1	4	4	3	4	3	3	3	4	4	2	3	4	3	3	4	2	4	2	2	3
92	WO1	2	3	2	2	2	2	3	2	5	2	3	2	4	3	4	4	4	4	3	2
93	WO1	4	2	2	2	2	2	2	2	2	2	2	2	2	1	4	2	2	2	2	2
94	WO1	5	2	1	5	2	3	5	4	3	2	5	2	1	3	5	1	5	3	3	3
95	WO1	3	4	1	3	2	2	2	2	4	2	5	2	3	2	2	3	2	2	3	2
96	WO1	4	5	2	4	2	4	3	3	3	4	4	5	2	2	5	4	4	2	3	1
97	WO1	5	3	2	4	2	4	4	3	1	1	4	2	2	3	4	4	2	2	3	1
	Number of Respondents	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
	Average	3.4	3.3	2.0	3.5	2.6	2.9	2.8	3.1	3.3	2.4	3.5	3.0	2.4	2.5	3.5	2.8	3.3	2.6	3.1	2.0
	Standard Deviation	1.5	1.1	1.1	1.2	1.0	0.9	1.2	1.1	1.2	1.1	1.4	1.4	1.1	1.0	1.2	1.2	1.2	1.0	1.0	1.1
				Section Average					2.9						Section Average					2.8	
				Standard Deviation					0.5						Standard Deviation					0.5	

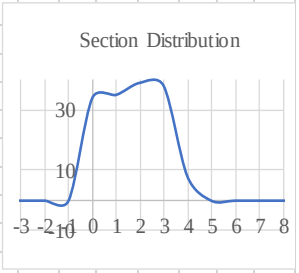




Section 5 - Project Solutions - Chief Warrant Officers

							CPM											CCPM				
	Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83	66	67	68	76	79	81	84
Respondent	Rank																				
98	CW2	5	3	4	4	4	3	4	5	5	3	3	2	2	4	4	1	3	1	4	2
99	CW2	5	3	2	1	3	1	3	4	3	1	4	3	1	4	4	1	2	1	3	1
100	CW2	3	3	2	5	1	4	4	5	4	4	4	5	5	2	5	5	4	1	4	1
101	CW2	3	1	3	2	1	3	1	2	4	1	5	2	1	2	3	2	4	2	4	3
102	CW2	5	3	3	2	2	4	5	5	2	1	3	5	5	1	3	1	3	2	3	2
103	CW2	5	4	3	5	1	5	4	3	5	1	1	3	1	3	4	1	1	1	1	2
104	CW2	1	4	4	3	2	2	4	4	2	3	4	2	4	3	2	2	2	3	2	1
105	CW2	4	4	4	2		2	2	4	3	1	2	2	1	2	4	1	3	4	3	4
106	CW2	4	2	4	4	4	4	4	4	2	3	3	4	4	4	3	2	4	2	4	2
107	CW2	5	2	1	2	2	5	4	5	4	5	4	4	5	4	4	1	3	2	3	1
108	CW2	5	3	3	4	1	4	4	4	3	3	4	2	1	2	3	2	4	1	3	1
109	CW2	2	3	3	4	2	3	3	3	5	2	3	2	4	2	4	3	4	4	3	1
110	CW2	5	4	3	5	3	4	4	4	4	3	4	3	5	3	4	3	5	4	2	5
111	CW2	5	3	1	4	2	2	3	5	3	4	2	5	3	2	4	1	3	1	3	4
112	CW2	5	2	2	2	4	3	3	5	3	4	4	3	4	4	4	1	3	3	3	1
113	CW2	5	3	1	1	1	3	5	4	5	1	3	1	1	4	4	2	4	2	3	1
114	CW2	2	2	4	3	5	3	2	2	3	4	2	4	3	4	1	5	2	4	2	4
115	CW2	4	3	3	5	3	4	4	4	4	3	4	3	3	3	4	3	3	2	3	2
116	CW2	4	3	2	3	1	2	2	3	4	2	1	4	3	3	4	2	3	5	2	4
117	CW2	5	1	1	5	2	3	2	5	5	3	4	3	1	2	5	2	3	1	1	1
118	CW3	4	2	5	4	2	3	3	3	5	1	4	3	3	2	3	2	3	3	4	1
119	CW3	1	4	1	2	1	2	5	2	5	1	5	5	1	3	5	1	3	1	1	1
	Number of Respondents	22	22	22	22	21	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
	Average	4.0	2.8	2.7	3.3	2.2	3.1	3.4	3.9	3.8	2.5	3.3	3.2	2.8	2.9	3.7	2.0	3.1	2.3	2.8	2.0
	Standard Deviation	1.4	0.9	1.2	1.4	1.2	1.0	1.1	1.0	1.1	1.3	1.1	1.2	1.6	0.9	0.9	1.2	0.9	1.3	1.0	1.3
					Section Average				3.1									Section Average			2.7	
					Standard Deviation				0.5									Standard Deviation			0.6	

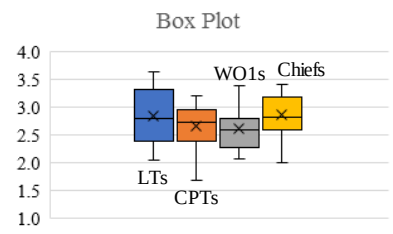




Appendix C: ANOVA of Initial Results

Section 2: Project Planning Issues – Commissioned vs. Warrant Officers

Question Number	LTs	CPTs	WO1s	Chiefs
1	3.1	3.0	2.7	3.0
2	3.4	2.8	2.6	3.1
6	2.8	3.0	2.6	2.8
8	3.6	3.1	3.4	3.2
9	2.1	2.0	2.3	2.0
10	2.8	2.8	2.8	3.3
13	3.3	2.9	3.3	3.2
14	2.9	2.5	2.7	3.1
15	3.4	2.7	3.1	3.4
16	3.3	3.2	3.1	3.4
17	2.3	2.5	2.3	2.8
21	2.4	2.8	2.5	2.8
22	2.5	2.3	2.3	2.5
24	2.5	2.3	2.1	3.1
25	2.4	2.7	2.8	2.8
3	2.9	3.0	2.6	2.9
4	3.3	2.9	2.8	2.8
5	3.6	2.5	2.5	2.4
7	2.8	2.5	2.6	2.6
11	3.2	3.2	2.9	3.3
12	2.0	1.7	2.3	2.1
18	2.4	2.1	2.1	2.5
19	2.3	2.7	2.3	2.6
23	2.5	2.3	2.2	2.6



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
WO1	24	62.475	2.6031	0.12891
Chiefs	24	68.3636	2.8485	0.14834

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.722	1	0.7224	5.21131	0.027	4.052
Within Groups	6.377	46	0.1386			
Total	7.099	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	24	67.7756	2.824	0.24907
WO1s	24	62.475	2.6031	0.12891

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.585	1	0.5853	3.09728	0.085	4.052
Within Groups	8.693	46	0.189			
Total	9.279	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	24	67.7756	2.824	0.24907
Chiefs	24	68.3636	2.8485	0.14834

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.007	1	0.0072	0.03625	0.85	4.052
Within Groups	9.14	46	0.1987			
Total	9.148	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	24	67.7756	2.824	0.24907
CPTs	24	63.4459	2.6436	0.15187

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.391	1	0.3906	1.9482	0.1695	4.0517
Within Groups	9.222	46	0.2005			
Total	9.612	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	24	63.4459	2.6436	0.15187
WO1s	24	62.475	2.6031	0.12891

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.02	1	0.0196	0.13988	0.7101	4.0517
Within Groups	6.458	46	0.1404			
Total	6.478	47				

Anova: Single Factor

SUMMARY

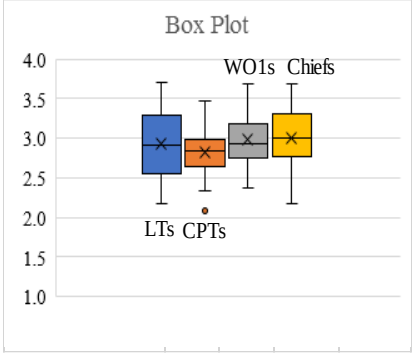
Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	24	63.4459	2.6436	0.15187
Chiefs	24	68.3636	2.8485	0.14834

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.504	1	0.5038	3.35651	0.0734	4.0517
Within Groups	6.905	46	0.1501			
Total	7.409	47				

Section 3: Project Execution Issues – Commissioned vs. Warrant Officers

Question Number	LTs	CPTs	WO1s	Chiefs
26	3.6	3.3	3.4	3.3
27	3.7	3.0	3.1	3.5
31	3.4	3.3	3.4	3.3
33	3.1	3.0	2.8	3.1
35	3.0	3.0	2.9	3.1
37	2.9	2.6	2.9	2.6
44	2.6	2.8	2.8	3.0
46	2.2	2.4	2.7	2.5
47	2.6	2.9	2.9	3.1
48	2.7	2.6	2.8	2.6
28	3.2	3.0	3.2	3.2
29	3.4	3.1	3.1	3.4
30	3.1	2.6	3.1	2.8
32	2.9	2.7	2.5	2.8
34	2.7	2.8	3.3	3.0
36	2.4	2.1	2.4	2.2
38	3.3	2.9	3.7	3.4
39	3.3	3.5	2.8	3.7
40	2.4	2.7	3.0	2.8
41	2.5	2.8	2.9	2.9
42	2.8	2.8	3.3	3.2
43	2.9	3.0	3.0	2.9
45	2.6	2.3	2.6	2.7



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
WO1s	23	68.6875	2.9864	0.09906
Chiefs	23	68.9091	2.996	0.12714

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.001	1	0.0011	0.00944	0.923	4.062
Within Groups	4.977	44	0.1131			
Total	4.978	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	23	67.2843	2.9254	0.16734
WO1s	23	68.6875	2.9864	0.09906

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.043	1	0.0428	0.32135	0.574	4.062
Within Groups	5.861	44	0.1332			
Total	5.904	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	23	67.2843	2.9254	0.16734
Chiefs	23	68.9091	2.996	0.12714

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.057	1	0.0574	0.38977	0.536	4.062
Within Groups	6.479	44	0.1472			
Total	6.536	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	23	67.2843	2.9254	0.16734
CPTs	23	65.0393	2.8278	0.10049

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.11	1	0.1096	0.81819	0.3706	4.0617
Within Groups	5.892	44	0.1339			
Total	6.002	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	23	65.0393	2.8278	0.10049
WO1s	23	68.6875	2.9864	0.09906

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.289	1	0.2893	2.89985	0.0956	4.0617
Within Groups	4.39	44	0.0998			
Total	4.679	45				

Anova: Single Factor

SUMMARY

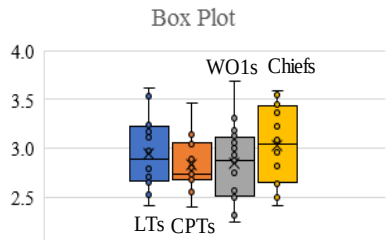
Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	23	65.0393	2.8278	0.10049
Chiefs	23	68.9091	2.996	0.12714

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.326	1	0.3255	2.8603	0.0979	4.0617
Within Groups	5.008	44	0.1138			
Total	5.333	45				

Section 4: Project Completion Issues – Commissioned vs. Warrant Officers

Question Number	LTs	CPTs	WO1s	Chiefs
52	2.6	2.6	2.9	2.7
55	3.2	3.1	3.1	3.1
57	3.0	3.1	2.9	3.5
61	2.7	2.7	2.8	2.4
49	3.5	3.0	3.7	3.5
50	3.6	3.1	3.3	3.6
51	3.1	2.7	2.9	3.0
53	2.5	2.7	3.0	3.1
54	2.7	2.7	2.6	2.5
56	3.3	3.5	3.2	3.6
58	2.5	2.4	2.5	2.5
59	2.4	2.7	2.3	2.6
60	2.8	2.7	2.3	3.0
62	3.2	2.9	3.1	3.2
63	2.8	2.6	2.5	2.8
64	3.2	2.8	2.8	3.4



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
WO1s	16	45.6833	2.8552	0.14512
Chiefs	16	48.5455	3.0341	0.1646

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.256	1	0.256	1.65304	0.208	4.171
Within Groups	4.646	30	0.1549			
Total	4.902	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	16	47.2353	2.9522	0.13251
CPTs	16	45.3201	2.8325	0.07197

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.115	1	0.1146	1.12117	0.2981	4.1709
Within Groups	3.067	30	0.1022			
Total	3.182	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	16	47.2353	2.9522	0.13251
WO1s	16	45.6833	2.8552	0.14512

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.075	1	0.0753	0.54221	0.467	4.171
Within Groups	4.164	30	0.1388			
Total	4.24	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	16	45.3201	2.8325	0.07197
WO1s	16	45.6833	2.8552	0.14512

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.004	1	0.0041	0.03799	0.8468	4.1709
Within Groups	3.256	30	0.1085			
Total	3.26	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	16	47.2353	2.9522	0.13251
Chiefs	16	48.5455	3.0341	0.1646

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.054	1	0.0536	0.36108	0.552	4.171
Within Groups	4.457	30	0.1486			
Total	4.51	31				

Anova: Single Factor

SUMMARY

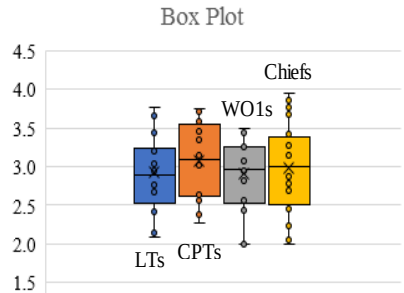
Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	16	45.3201	2.8325	0.07197
Chiefs	16	48.5455	3.0341	0.1646

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.325	1	0.3251	2.74845	0.1078	4.1709
Within Groups	3.549	30	0.1183			
Total	3.874	31				

Section – 5: Project Solutions – Commissioned vs. Warrant Officers

Question Number	LTs	CPTs	WO1s	Chiefs
65	3.7	3.6	3.4	4.0
69	2.9	3.0	3.3	2.8
70	2.1	2.6	2.0	2.7
71	3.8	3.7	3.5	3.3
72	2.4	2.4	2.6	2.2
73	3.0	3.3	2.9	3.1
74	2.7	3.0	2.8	3.4
75	3.1	3.2	3.1	3.9
77	3.1	3.7	3.3	3.8
78	2.7	2.6	2.4	2.5
80	3.4	3.7	3.5	3.3
82	3.2	3.4	3.0	3.2
83	2.1	2.7	2.4	2.8
66	2.7	2.6	2.5	2.9
67	3.6	3.6	3.5	3.7
68	2.8	2.7	2.8	2.0
76	3.2	3.4	3.3	3.1
79	2.8	2.6	2.6	2.3
81	2.5	3.2	3.1	2.8
84	2.4	2.3	2.0	2.0



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
WO1s	20	58	2.9	0.22303
Chiefs	20	59.6472	2.9824	0.35265

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.068	1	0.0678	0.23566	0.63	4.098
Within Groups	10.94	38	0.2878			
Total	11.01	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	20	58.3824	2.9191	0.2351
WO1s	20	58	2.9	0.22303

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.004	1	0.0037	0.01596	0.9	4.098
Within Groups	8.704	38	0.2291			
Total	8.708	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	20	58.3824	2.9191	0.2351
Chiefs	20	59.6472	2.9824	0.35265

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.04	1	0.04	0.1361	0.714	4.098
Within Groups	11.17	38	0.2939			
Total	11.21	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
LTs	20	58.3824	2.9191	0.2351
CPTs	20	61.4075	3.0704	0.23886

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.229	1	0.2288	0.96542	0.332	4.0982
Within Groups	9.005	38	0.237			
Total	9.234	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	20	61.4075	3.0704	0.23886
Chiefs	20	58	2.9	0.22303

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.29	1	0.2903	1.2569	0.2693	4.0982
Within Groups	8.776	38	0.2309			
Total	9.066	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
CPTs	20	61.4075	3.0704	0.23886
Chiefs	20	59.6472	2.9824	0.35265

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.077	1	0.0775	0.26193	0.6118	4.0982
Within Groups	11.24	38	0.2958			
Total	11.32	39				

Appendix D: Demographic Analysis – Results

Section – 1 Demographics and Knowledge Base

Group 1: Control Group: Less Education and Experience

Respondent	Rank	Service Component	Years of Military Experience	CoE Projects as Supervisor	CoE Projects in Support	Years of Civilian Experience	Six Sigma	Lean	TOC	EVM	CCPM	CPM
1	1LT	AD	3-5 Y	NA	NA	NA	1	1	1	1	1	5
3	1LT	AD	3-5 Y	1	NA	5-7 Y	1	1	1	1	1	3
4	1LT	AD	3-5 Y	NA	NA	NA	1	1	1	1	1	2
6	1LT	AD	3-5 Y	5	NA	NA	1	1	1	1	1	1
10	1LT	AR	3-5 Y	1	NA	NA	1	1	1	1	1	3
11	1LT	AD	3-5 Y	NA	NA	3-5 Y	1	1	1	1	1	3
12	1LT	AD	3-5 Y	NA	NA	0-3 Y	1	1	1	1	1	3
19	1LT	NG	9-11 Y	NA	NA	NA	4	4	1	1	1	1
20	1LT	AR	3-5 Y	6	NA	0-3 Y	1	1	1	1	1	4
25	1LT	NG	13-15Y	3	NA	5-7Y	3	1	1	1	1	4
31	1LT	NG	0-3Y	NA	NA	0-3Y	1	1	1	1	1	2
32	1LT	AR	3-5Y	2	NA	3-5Y	1	1	1	1	1	5
34	1LT	AD	3-5 Y	NA	1	NA	1	1	1	1	1	4
35	CPT	AD	3-5 Y	4	1	NA	1	1	1	1	1	3
37	CPT	AD	3-5 Y	NA	6	0-3 Y	1	1	1	1	1	1
39	CPT	AD	11-13 Y	NA	NA	NA	1	1	1	1	1	1
40	CPT	AD	3-5 Y	1	1	NA	1	1	1	1	1	3
41	CPT		5-7 Y	NA	2	NA	1	1	1	1	1	3
42	CPT	AR	5-7 Y	NA	NA	NA	1	1	1	1	1	1
43	CPT	AD	3-5 Y	5	NA	NA	3	3	1	2	1	5
45	CPT	AD	5-7 Y	NA	NA	0-3 Y	3	3	1	2	1	4
46	CPT	AD	3-5 Y	NA	2	NA						2
47	CPT	AD	3-5 Y	5	NA	NA						2
48	CPT	USMC	7-9 Y	NA	NA	0-3 Y	1	1	1	1	1	3
49	CPT	AD	3-5 Y	5	NA	NA	2	2	1	2	1	3
50	CPT	AD	3-5 Y	NA	3	NA	1	1	1	1	1	3
51	CPT	AD	5-7 Y	NA	1	NA	1	1	1	1	1	1
52	CPT	AD	3-5 Y	NA	NA	NA	1	1	1	1	1	1
53	CPT	AD	15+	NA	2	NA						1
54	CPT	AD	7-9 Y	NA	NA	9-11 Y	2	1	1	1	1	1
55	CPT	AD	3-5 Y	2	NA	NA	1	1	1	1	1	1
56	CPT	AD	3-5 Y	NA	NA	NA	1	1	1	1	1	2
57	CPT	AD	3-5 Y	2	NA	0-3 Y	3					5
58	CPT	AD	5-7 Y	3	3	0-3 Y	1	1	1	1	1	3
59	CPT	AD	5-7 Y	NA	NA	NA	1	1	1	1	1	3
60	CPT	AD	5-7 Y	NA	NA	NA	1	1	1	1	1	1
61	CPT	AD	3-5 Y	NA	NA	0-3 Y	1	1	1	1	1	3
63	CPT	AD	3-5 Y	4	NA	0-3 Y	1	1	1	1	1	4
64	CPT	AD	7-9 Y	NA	NA	0-3 Y	1	1	1	1	1	5
65	CPT	AD	5-7 Y		NA	NA	1	1	1	2	1	4
67	CPT	NG	15+	NA	NA	NA	1	1	1	1	1	1
70	CPT	AR	7-9 Y	NA	8	15+	1	1	1	1	1	1
73	CPT	AR	13-15	NA	NA	3-5 Y	1	1	1	1	1	4
74	CPT	NG	11-13 Y	NA	NA	0-3 Y	1	1	1	1	1	1
75	CPT	AR	5-7 Y	NA	NA	3-5 Y	1	1	1	1	1	3
79	CPT	NG	9-11Y	NA	7	NA	3	1	1	1	1	1
82	WO1	AD	13-15Y	NA	10+	11-13Y	1	1	1	1	1	1
86	WO1	NG	15+	NA	NA	7-9Y	1	1	1	1	1	1
88	WO1	NG	5-7Y	NA	6	15+	1	1	1	1	1	1
91	WO1	AR	7-9Y	3		11-13Y	4	3	1	1	1	1
95	WO1	NG	13-15	NA	4	15+	1	2				
102	CW2	NG	15+	NA	4	15+		5				5
104	CW2	AR	15+	3	NA	9-11Y	3	2	1	1	1	3
105	CW2	NG	15+	10+	1	15+	1	1	1	2	1	4
109	CW2	AD	13-15Y	NA	5	0-3Y	1	1	1	1	1	4
112	CW2	NG	15+	1	2	13-15Y	1	1	1	1	1	3
115	CW2	AR	15+	NA	10+	0-3Y	1	1	1	1	1	3

Group 2: Project Management Education

Respondent	Rank	Service Component	Years of Military Experience	CoE Projects as Supervisor	CoE Projects in Support	Years of Civilian Experience	Six Sigma	Lean	TOC	EVM	CCPM	CPM
7	1LT	AD	3-5	NA	NA	NA	3	3	1	4	5	5
8	1LT	AR	7-9	10+	2	0-3 Y	4	4	2	3	5	5
9	1LT	AD	3-5	NA	NA	0-3 Y					3	4
13	1LT	AD	3-5	2	2	NA	3	3	2	4	2	4
15	1LT	AR	3-5	2		5-7 Y	1	1	3	5	4	5
17	1LT	NG	13-15	2	5	5-7 Y	3	2	2	2	5	5
22	1LT	NG	5-7	3	4	9-11 Y	3	3	4	3	5	5
24	1LT	NG	7-9	10+	NA	3-5 Y	1	1		3	3	3
26	1LT	NG	11-13	NA	NA	3-5Y	2	5	1	1	3	5
27	1LT	NG	5-7	10+	10+	11-13Y	1	1	3	2	3	5
28	1LT	NG	7-9	NA	NA	0-3Y	3	3	3	3	3	3
29	1LT	AR	13-15	4	10+	11-13Y	1	1	1	4	4	5
33	1LT	AD	13-15	10+	10+	0-3Y	3	4	1	5	5	5
38	CPT	AD	3-5	NA	NA	NA	1	1	1	1	2	2
44	CPT	AD	5-7	NA	NA	0-3 Y	1	1	2	2	5	5
62	CPT	AD	5-7	6	4	0-3 Y				3	3	3
66	CPT	AD	3-5	NA	NA	0-3 Y	3	1	1	1	2	2
68	CPT	NG	7-9	4	4	7-9 Y	3	3	3	5	5	5
69	CPT	AR	13-15	3	3	NA	2	2	1	3	3	3
71	CPT	AR	11-13	10+	10+	5-7 Y	4	4	3	1	1	5
76	CPT	AR	5-7	3	NA	NA	2	2	2	2	2	2
77	CPT	NG	15+	10+	10+	11-13Y	2	1	1	1	2	5
78	CPT		9-11	NA	3	0-3Y	2	2	4	4	3	5
81	CPT	AD	3-5	NA	2	0-3Y	1	1	1	1	2	5
83	WO1	NG	9-11	1	NA	15+				4	4	5
90	WO1	AR	7-9	NA	NA	5-7Y	3	4	4	4	4	4
93	WO1	AD	13-15	5	5	7-9Y	1	2	4	4	4	4
96	WO1	AR	7-9	3	10+	3-5Y	4	3	2	3	2	5
98	CW2	NG	15+	10+	10+	9-11Y	1	1	1	3	3	5
100	CW2	NG	15+	2	6	15+	1	3	1	2	2	3
110	CW2	AD	15+	2	5	NA	2	3	2	2	2	3
111	CW2	AD	13-15	NA	3	0-3Y	1	1	1	4	5	5
113	CW2	AD	11-13	10+	10+	0-3Y	1	1	1	2	2	4
114	CW2	AD	15+	3	5	15+	3	1	1	2	2	4

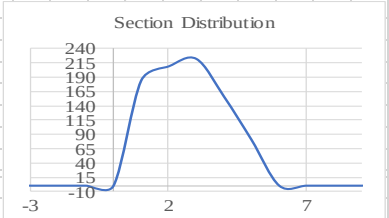
Section – 1 Demographics and Knowledge Base

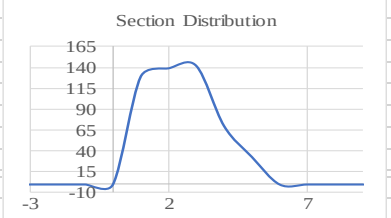
Group 3: Project Management Experience

Respondent	Rank	Service Component	Years of Military Experience	CoE Projects as Supervisor	CoE Projects in Support	Years of Civilian Experience	Six Sigma	Lean	TOC	EVM	CCPM	CPM
2	1LT	NG	5-7	10+	5	0-3 Y	1	1	1	1	1	3
5	1LT	AD	3-5	10+	8	0-3 Y						
8	1LT	AR	7-9	10+	2	0-3 Y	4	4	2	3	5	5
13	1LT	AD	3-5	2	2		3	3	2	4	2	4
14	1LT	AR	3-5	5	4		1	1	1	1	1	5
16	1LT	NG	5-7	1	2		1	1	1	1	1	3
17	1LT	NG	13-15	2	5	5-7 Y	3	2	2	2	5	5
18	1LT	AR	9-11	3	4	0-3 Y	1	1	1	1	1	3
21	1LT	NG	15+	2	6	0-3 Y	1	1	1	1	1	1
22	1LT	NG	5-7	3	4	9-11 Y	3	3	4	3	5	5
23	1LT	NG	3-5	6	6	13-15 Y	1	1	1	2	1	5
27	1LT	NG	5-7	10+	10+	11-13Y	1	1	3	2	3	5
29	1LT	AR	13-15	4	10+	11-13Y	1	1	1	4	4	5
30	1LT	NG	3.-5	7	2	0-3Y	1	1	1	1	1	5
33	1LT	AD	13-15	10+	10+	0-3Y	3	4	1	5	5	5
36	CPT	AD	9-11	7	10+	0-3 Y	2	2	1	3	1	5
62	CPT	AD	5-7	6	4	0-3 Y				3	3	3
68	CPT	NG	7-9	4	4	7-9 Y	3	3	3	5	5	5
69	CPT	AR	13-15	3	3		2	2	1	3	3	3
71	CPT	AR	11-13	10+	10+	5-7 Y	4	4	3	1	1	5
72	CPT	NG	15+	10+	6	0-3 Y	1	1	1	1	1	1
80	CPT	AR	9-11	4	4	0-3Y	1	1	1	1	1	1
84	WO1	AD	11-13	6	9		1	2	2	2	1	5
85	WO1	AD	11-13	5	5							
87	WO1	AD	11-13	8	10+	0-3Y	1	1	1	1	1	5
89	WO1	AR	15+	4	10+	0-3Y	3	3	1	1	1	4
92	WO1	NG	11-13	3	4	3-5Y	1	1	1	1	1	2
93	WO1	AD	13-15	5	5	7-9Y	1	2	4	4	4	4
94	WO1	AD	11-13	4	3		1	1	1	1	1	4
96	WO1	AR	7-9	3	10+	3-5Y	4	3	2	3	2	5
97	WO1	NG	15+	7	10+	0-3						5
96	WO1	AR	7-9	3	10+	3-5Y	4	3	2	3	2	5
97	WO1	NG	15+	7	10+	0-3						5
98	CW2	NG	15+	10+	10+	9-11Y	1	1	1	3	3	5
99	CW2	AD	15+	10+	10+		2	2	1	3	1	5
100	CW2	NG	15+	2	6	15+	1	3	1	2	2	3
101	CW2	NG	15+	10+	10+	15+			5	5		
103	CW2	NG	15+	10+	10+	15+	1	1	1	1	1	4
106	CW2	AD	15+	10+	10+	5-7Y	2	1	1	3	1	4
107	CW2	NG	15+	10+	10+	15+	1	1	1	1	1	5
108	CW2	AR	15+	10+	10+	11-13Y	1	1	1	2	1	5
110	CW2	AD	15+	2	5		2	3	2	2	2	3
113	CW2	AD	11-13	10+	10+	0-3Y	1	1	1	2	2	4
114	CW2	AD	15+	3	5	15+	3	1	1	2	2	4
116	CW2	AD	15+	10+	10+							4
117	CW2	NG	15+	10+	10+	9-11Y	3	2	1	3	1	4
119	CW3	AD	15+	10+	10+	5-7Y	2	2	2	1	1	5

Section – 2: Project Planning Issues – Control Group

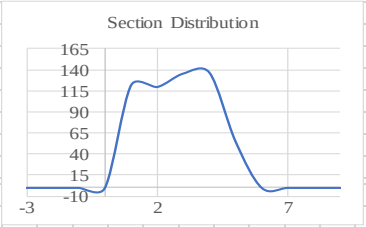
				Resource Issues														Scheduling Issues							
Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Rank																									
1LT	2	5	3	3	1	2	2	3	4	3	2	1	1	2	2		4	4	3	3	3	1	1	2	1
1LT	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1		1	2	1	1	1	2	2	1	1
1LT	1	4	1	2	3	1	5	2	4	2	1	3	1	1	1		2	1	1	2	2	1	1	1	1
1LT	5	4	3	4	3	4	3	4	2	4	3	1	4	3	4		3	4	3	3	2	4	4	2	4
1LT	4	4	3	4	3	4	3	4	5	4	2	2	3	4	2		3	3	3	4	4	2	2	2	3
1LT	4	3	2	4	2	5	2	4	4	4	3	5	4	3	2		3	5	3	4	4	2	3	1	5
1LT	2	2	2	4	1	1	1	1	1	4	2	1	1	1	4		3	2	2	1	4	1	3	2	1
1LT	4	4	4	4	1	4	4	3	4	4	2	2	3	2	2		3	4	3	3	4	2	2	3	2
1LT	3	3	1	5	1	2	5	1	4	1	1	1	1	3	1		1	3	4	5	4	1	3	1	1
1LT	2	3	4	5	3	4	5	4	4	5	3	3	3	3	3		3	2	4	5	4	4	3	3	3
1LT	4	3	2	3	2	2	3	2	3	3	3	2	3	3	2		2	3	1	2	4	2	2	2	2
1LT	3	4	5	5	1	2	3	4	4	4	3	3	2	1	2		5	4	3	4	5	1	2	3	4
1LT	4	3	4	4	2	3	3	2	4	3	4	3	4	4	3		3	3	3	4	4	2	4	4	3
CPT	3	2	2	4	2	2	2	2	2	5	2	5	3	3	3		5	5	3	2	3	2	4	4	2
CPT	1	1	1	1	1	1	1	1	1	1	4	3	2	1	1		1	1	1	1	1	1	2	1	2
CPT	1	1	1	3	3	3	5	5	4	4	5	3	3	3	5		1	1	1	3	3	3	4	4	3
CPT	1	2	2	3	2	2	1	1	1	1	1	1	2	1	1		1	3	1	1	2	3	3	1	2
CPT	2	2	4	3	1	1	2	4	3	1	1	3	1	1	1		3	2	4	1	1	1	3	1	2
CPT	5	5	2	4	2	3	4	2	2	4	3	3	2	3	3		2	3	3	2	2	2	2	3	4
CPT	5	3	1	4	1	1	2	5	3	3	4	3	2	2	1		2	2	1	1	3	1	2	1	1
CPT	2	1	4	3	1	3	2	3	3	3	3	2	2	3	3		1	1	2	4	4	1	1	2	3
CPT	4	2	1	4	1	4	3	2	3	2	1	2	2	2	1		3	5	2	2	3	2	1	4	3
CPT	3	3	4	3	2	1	2	2	3	3	3	2	1	2	3		4	4	2	2	2	1	2	1	1
CPT	4	4	2	3	1	2	4	2	5	4	1	4	2	1	1		4	3	3	2	3	3	1	2	1
CPT	4	5	2	4	1	3	5	2	2	3	3	1	1	1	4		2	1	2	2	4	3	1	2	2
CPT	4	2	4	3	1	1	4	2	2	2	2	2	2	2	2		2	2	3	1	3	1	1	1	2
CPT	4	4	2	2	2	2	3	2	2	5	2	4	2	2	4		3	4	4	2	3	1	4	5	2
CPT	3	2	4	4	2	3	4	4	4	2	3	3	4	2	3		3	3	2	3	4	1	3	3	2
CPT	1	1	2	1	3	1	1	1	1	2	1	2	3	4	2		1	1	1	1	2	1	2	1	3
CPT	3	1	5	5	5	3	4	2	4	5	5	5	1	3	1		2	3	5	3	5	1	1	1	3
CPT	3	3	1	2	1	3	1	1	1	1	1	1	1	1	1		4	5	1	1	5	1	1	1	1
CPT	3	2	4	2	3	2	3	3	3	3	2	3	2	2	3		3	3	2	3	2	2	1	2	3
CPT	1	2	1	4	2	5	1	2	2	5	5	3	1	3	3		5	4	2	1	1	1	3	3	3
CPT	1	1	2	3	1	3	2	1	2	1	1	3	1	1	2		1	1	2	2	3	1	1	2	1
CPT	3	3	4	3	3	4	3	4	4	3	3	3	3	3	3		3	3	4	4	3	3	3	3	3
CPT	4	4	4	3	3	2	2	4	4	2	1	1	2	1	3		4	3	3	4	4	1	1	2	1
CPT	2	1	2	3	2	2	2	3	3	5	3	3	2	3	3		3	2	4	2	3	1	3	2	2
CPT	1	2	1	4	1	3	1	1	4	4	4	2	3	4	2		1	2	1	1	2	1	2	3	2
CPT	5	5	5	5	1	5	5	4	3	5	4	2	4	3	4		4	1	3	2	4	2	5	5	4
CPT	5	5	5	5	1	3	5	2	2	5	2	5	3	5	5		5	5	5	3	5	1	2	3	3
CPT	4	5	5	3	3	2	5	5	5	2	3	3	3	4	4		4	4	3	3	4	2	3	3	3
CPT	3	4	4	2	2	5	5	2	2	5	1	2	1	1	5		5	5	4	5	5	1	1	2	5
CPT	4	3	4	2	4	3	4	4	2	4	2	3	2	4	3		3	2	2	2	3	3	4	3	3
CPT	3	2	2	3	1	3	3	3	3	3	2	3	3				3	3	2	3	3	2	2	2	3
CPT	4	4	2	3	3	3	1	1	2	3	3	5	3	1	1		4	2	2	3	4	1	2	5	2
CPT	5	5	5	2	3	3	2	2	2	5	2	3	2	5	5		5	5	5	5	1	1	2	2	2
WO1	1	1	1	1	1	5	3	3	4	5	1	5	5	5	5		1	1	2	3	1	1	1	3	1
WO1	3	2	3	4	1	1	3	2	1	4	2	3	1	4	1		3	3	1	1	2	2	1	1	1
WO1	3	4	2	4	3	1	4	1	1	3	2		1		2		3	4	2	3	2	2	1	2	3
WO1	2	3	4	4	2	2	3	4	4	3	4	2	2	3	4		3	3	2	4	4	3	2	2	3
WO1	2	1	4	3	3	4	4	3	4	2	1	1	2	1	3		2	2	3	3	4	3	2	4	2
CW2	1	1	1	1	1	2	1	4	2	5	1	1	1	2	2		1	1	1	1	2	1	3	2	2
CW2	3	3	3	4	3	3	3	4	4	4	5	2	3	4	4		5	4	4	3	4	3	3	2	3
CW2	2	2	1	2	2	2	2	1	2	4	3	4	3	3	3		3	3	3	1	2	2	3	3	3
CW2	3	1	3	4	1	3	5	5	4	3	1	1	2	3	5		1	1	1	4	5	2	1	3	2
CW2	2	2	2	3	2	3	1	2	3	4	3	2	2	3	3		2	2	2	2	3	1	2	3	2
CW2	3	3	3	3	2	2	3	4	4	3	2	3	2	1	2		3	3	2	3	3	2	1	2	2
Number of Respondents	57	57	57	57	57	57	57	57	57	57	57	56	57	55	56		57	57	57	57	57	57	57	57	57
Average	2.9	2.8	2.7	3.2	1.9	2.6	2.9	2.6	2.9	3.3	2.5	2.6	2.2	2.5	2.7		2.8	2.8	2.5	2.6	3.1	1.7	2.2	2.4	2.4
Standard Deviation	1.3	1.3	1.4	1.1	1.0	1.2	1.4	1.3	1.2	1.3	1.3	1.2	1.0	1.2	1.3		1.3	1.3	1.2	1.2	1.2	0.9	1.1	1.1	1.0
				Section Average				2.7											Section Average			2.5				
				Standard Deviation				0.3											Standard Deviation			0.4				

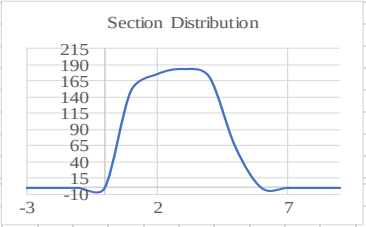




Section – 3: Project Execution Issues – Control Group

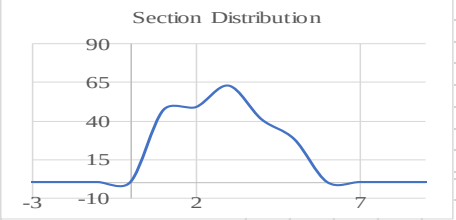
			Resource Issues										Scheduling Issues											
	Question Number>	26	27	31	33	35	37	44	46	47	48		28	29	30	32	34	36	38	39	40	41	42	43	45
Respondent	Rank																								
1	1LT	5	5	1	3	1	3	1	1	1	4		5	3	3	2	2	2	3	1	2	2	2	1	1
3	1LT	1	1	2	1	1	1	1	1	1	1		1	1	1	1	1	1	1	2	1	1	1	1	1
4	1LT	5	5	4	5	1	2	1	3	1	1		3	1	1	4	2	1	1	4	1	1	5	2	1
6	1LT	4	4	4	3	4	4	4	4	5	4		3	5	3	5	4	2	4	4	5	4	3	3	4
10	1LT	5	4	4	4	3	4	3	3	4	2		4	3	4	2	4	2	4	3	2	3	4	4	3
11	1LT	4	4	5	4	4	3	4	5	5	4		3	4	4	3	4	4	4	3	2	4	4	3	5
12	1LT	2	2	4	3	1	1	3	1	1	1		2	2	2	4	2	1	3	2	3	2	2	2	1
19	1LT	4	4	3	4	4	4	3	3	2	2		4	4	3	3	4	4	4	4	3	3	3	3	3
20	1LT	1	5	5	1	1	1	1	1	1	1		3	3	5	1	1	1	1	5	1	2	4	3	1
25	1LT	4	4	4	5	3	4	3	1	2	3		4	4	4	2	4	4	5	3	3	3	5	3	3
31	1LT	2	3	2	3	2	2	3	3	3	3		2	2	1	2	2	3	2	3	3	2	2	1	2
32	1LT	4	4	5	3	5	3	1	2	4	1		5	5	5	5	2	3	2	4	3	1	1	3	5
34	1LT	4	4	4	4	4	3	3	2	3	4		3	4	3	4	3	4	4	4	3	2	4	3	4
35	CPT	3	2	3	3	3	1	2	2	2	2		5	5	2	2	2	1	4	5	2	5	2	5	2
37	CPT	1	1	1	1	1	1	2	3	1	1		1	1	1	1	1	2	1	3	1	1	1	2	2
39	CPT	3	4	4	4	4	5	5	4	5	4		4	4	4	4	4	5	5	4	4	5	5	3	4
40	CPT	1	2	3	1	1	2	2	1	1	1		1	1	2	2	1	1	3	2	1	1	1	2	1
41	CPT	2	1	3	1	1	3	1	1	2	1		1	1	3	1	2	1	2	3	1	1	1	1	1
42	CPT	4	4	3	2	5	4	2	5	2	3		3	4	2	5	3	2	3	4	3	4	2	5	4
43	CPT	2	1	4	1	2	3	2	2	4	1		1	3	1	1	1	1	1	5	2	1	2	3	1
45	CPT	4	5	4	3	3	4	4	2	3	3		3	2	3	1	4	1	4	4	4	4	4	4	1
46	CPT	3	2	5	4	4	3	4	4	5	2		4	4	4	2	1	4	3	4	4	3	5	3	3
47	CPT	3	4	3	4	2	2	1	1	4	4		4	4	2	2	3	2	4	4	4	2	3	2	2
48	CPT	4	5	2	1	2	4	2	3	4	2		4	4	2	1	3	1	1	5	2	2	3	1	1
49	CPT	4	5	3	4	2	2	1	1	1	4		2	2	2	3	4	2	3	3	2	1	1	2	2
50	CPT	3	1	3	3	2	1	1	4	2	1		1	3	2	1	3	1	3	3	2	2	2	4	1
51	CPT	5	3	5	4	4	3	3	2	2	4		2	2	2	2	4	1	3	3	4	3	2	2	1
52	CPT	4	4	3	5	4	2	3	2	4	2		3	4	2	4	4	1	2	2	3	3	4	5	3
53	CPT	2	2	2	2	3	2	4	4	3	3		2	1	1	2	2	3	2	3	4	3	3	3	4
54	CPT	1	1	5	2	5	1	5	1	3	3		3	5	1	3	5	3	2	5	1	3	3	5	1
55	CPT	5	5	5	2	1	1	1	1	1	5		4	5	3	1	1	1	4	1	1	3	1	1	2
56	CPT	3	3	4	4	4	2	5	2	4	3		3	2	3	4	3	2	3	4	3	3	3	4	2
57	CPT	1	1	1	1	3	1	1	1	1	1		5	5	3	3	3	4	1	5	3	1	1	4	1
58	CPT	3	2	1	4	2	2	2	3	1	1		2	2	2	1	2	2	3	2	3	4	3	3	3
59	CPT	4	3	4	5	4	3	5	3	4	3		4	4	4	4	4	2	5	4	3	4	4	4	4
60	CPT	5	4	4	4	2	5	1	4	1	2		3	5	4	4	2	1	2	5	2	2	3	1	1
61	CPT	2	1	3	3	3	2	4	3	3	2		2	2	1	3	4	3	2	2	4	4	2	4	2
63	CPT	2	2	4	4	4	4	3	1	5	3		2	3	2	4	2	1	4	3	3	4	4	1	4
64	CPT	4	3	4	4	5	2	3	4	4	3		4	4	4	4	4	3	5	5	4	4	3	4	4
65	CPT	5	5	5	5	4	4	4	1	4	5		5	5	4	5	5	1	5	5	5	2	4	3	1
67	CPT	4	2	2	3	3	3	2	3	2	2		3	3	2	2	2	2	1	2	2	4	3	3	3
70	CPT	2	2	1	1	1	1	5	2	2	1		2	2	1	1	1	1	1	1	1	2	5	2	2
73	CPT	4	2	3	4	2	4	4	3	3	2		3	1	5	3	3	2	3	4	3	4	2	4	5
74	CPT	2	2	3	3	3	2	3	2	3	2		3	4	3	2	2	3	4	3	3	4	4	4	3
75	CPT	4	4	2	3	3	1	5	3	2	1		4	2	2	3	3	4	1	1	2	3	3	2	5
79	CPT	4	4	4	5	3	3	3	2	4	2		4	4	4	4	4	2	2	4	2	3	3	4	3
82	WO1	2	2	4	3	1	3	1	1	5	5		2	2	3	1	4	1	5	1	5	4	4	1	1
86	WO1	4	1	1	2	3	1	2	1	1	1		3	2	1	3	2	1	4	1	1	1	2	3	1
88	WO1	3	2	2	2	2	4	2	3	3	2		2	3	4	2	3	2	4	2	3	2	4	3	4
91	WO1	3	3	4	3	3	2	2	2	4	3		4	4	4	4	4	2	4	3	2	2	2	2	3
95	WO1	3	3	2	3	1	4	5	3	3	2		3	2	4	2	3	2	5	5	3	3	4	4	4
102	CW2	1	1	2	2	1	1	2	1	1	1		1	1	1	1	1	1	2	2	1	1	1	2	1
104	CW2	4	4	4	4	4	3	4	3	3	3		4	4	4	3	4	4	4	3	4	4	4	3	3
105	CW2	3	3	4	2	4	2	2	3	2	1		4	4	3	2	2	2	3	1	1	2	2	5	3
109	CW2	5	5	4	3	3	3	4	1	4	4		5	5	3	2	3	1	5	5	3	3	3	2	3
112	CW2	2	2	3	2	2	1	1	3	3	3		2	3	3	2	2	1	2	3	3	3	2	2	3
115	CW2	4	4	3	3	3	3	3	2	3	2		3	3	2	3	3	1	3	3	3	2	3	2	3
	Number of Respondents	57	57	57	57	57	57	57	57	57	57		57	57	57	57	57	57	57	57	57	57	57	57	57
	Average	3.2	3.0	3.3	3.0	2.7	2.5	2.7	2.3	2.8	2.4		3.0	3.1	2.7	2.6	2.8	2.0	3.0	3.2	2.6	2.7	2.9	2.8	2.5
	Standard Deviation	1.3	1.4	1.2	1.2	1.3	1.2	1.3	1.2	1.3	1.2		1.2	1.3	1.2	1.3	1.1	1.1	1.3	1.3	1.1	1.2	1.2	1.2	1.3
		Section Average					2.9						Section Average					2.8							
		Standard Deviation					0.3						Standard Deviation					0.3							

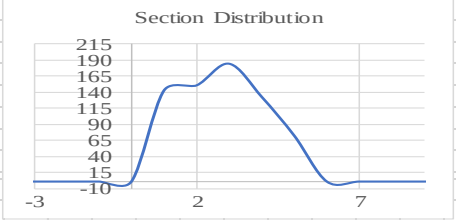




Section – 4: Project Completion Issues – Control Group

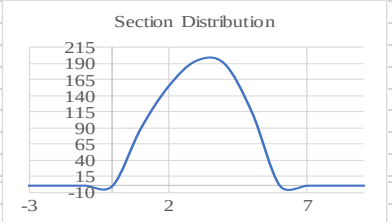
	Resource Issues									Scheduling Issues								
	Question Number>	52	55	57	61	49	50	51	53	54	56	58	59	60	62	63	64
Respondent	Rank																
1	1LT	3	3	3	3	4	4	3	2	3	3	2	2	2	2	2	2
3	1LT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1LT	1	5	2	1	1	1	2	1	1	1	1	1	3	3	2	4
6	1LT	1	4	4	4	5	5	2	1	2	4	4	4	3	5	4	5
10	1LT	4	5	5	2	3	4	4	4	4	4	3	3	2	4	4	4
11	1LT	4	2	3	4	4	4	3	3	2	3	4	3	5	4	3	4
12	1LT	2	2	2	2	4	4	3	3	4	2	4	3	2	2	2	3
19	1LT	2	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3
20	1LT	1	5	3	3	3	5	1	1	1	5	3	3	1	5	1	1
25	1LT	4	3	4	2	4	4	4	5	4	4	3	3	3	3	3	2
31	1LT	3	4	3	3	5	5	4	3	3	3	1	5	3	2	3	3
32	1LT	5	5	5	3	5	5	5	4	5	5	3	3	5	3	5	5
34	1LT	4	3	3	4	4	3	4	3	2	3	3	4	3	3	3	4
35	CPT	1	1	3	1	4	4	2	1	1	3	3	3	3	3	2	3
37	CPT	3	1	1	1	1	1	1	2	1	1	1	5	2	1	1	1
39	CPT	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5
40	CPT	1	2	2	2	3	2	2	1	2	2	2	1	1	1	1	1
41	CPT	1	1	3	2	2	2	1	2	1	1	3	2	1	1	2	1
42	CPT	3	3	4	5	4	2	5	2	4	4	2	4	3	2	4	3
43	CPT	3	4	3	3	4	4	2	2	1	4	1	2	3	2	4	5
45	CPT	3	4	4	2	2	2	3	2	2	4	2	4	3	2	1	4
46	CPT	2	4	3	2	3	4	3	2	5	4	4	4	2	4	4	5
47	CPT	2	4	3	4	3	4	3	3	2	4	3	3	4	3	3	2
48	CPT	3	4	5	4	2	2	4	3	1	4	3	2	4	4	3	3
49	CPT	5	3	2	1	2	3	3	4	3	3	1	2	2	1	1	2
50	CPT	1	2	2	3	2	2	3	3	4	3	1	1	3	4	3	3
51	CPT	2	4	2	3	4	4	4	2	2	4	2	2	3	4	4	2
52	CPT	3	2	4	4	4	4	2	4	3	3	2	3	3	4	2	3
53	CPT	1	1	2	2	1	1	2	1	1	1	3	3	3	3	4	4
54	CPT	1	5	1	3	3	3	2	3	5	5	3	5	1	3	4	3
55	CPT	1	3	2	1	5	4	1	1	1	2	1	1	1	1	1	1
56	CPT	3	3	3	2	4	3	4	3	4	3	3	2	3	2	2	2
57	CPT	1	5	3	3	1	1	3	1	5	5	1	1	1	4	4	5
58	CPT	1	3	2	2	2	2	1	2	1	3	2	2	1	2	1	1
59	CPT	5	5	5	2	5	4	5	5	4	4	3	4	4	4	4	4
60	CPT	3	1	4	1	2	5	2	2	1	1	1	4	4	4	1	4
61	CPT	3	2	2	1	2	1	2	2	3	2	2	2	3	3	2	2
63	CPT	4	4	4	4	3	4	3	2	3	4	2	4	2	4	2	3
64	CPT	3	3	3	4	5	4	3	3	3	3	4	4	4	4	4	5
65	CPT	5	5	2	2	5	5	5	5	5	5	5	5	2	5	3	3
67	CPT	2	3	3	3	3	3	3	2	4	3	3	2	3	2	2	2
70	CPT	1	5	5	1	2	2	1	1	1	5	1	1	1	2	2	2
73	CPT	2	3	4	4	2	4	3	4	2	2	3	2	4	3	5	3
74	CPT	2	2	4	2	3	3	3	2	2	4	1	1	2	3	3	3
75	CPT	3	5	2	3	4	3	2	1	3	4	4	3	2	1	4	5
79	CPT	1	4	4	4	2	2	3	1	1	4	1	1	4	1	1	2
82	WO1	1	1	4	1	1	1	1	1	2	1	1	1	1	1	1	3
86	WO1	1	2	1	1	2	3	2	3	3	2	1	1	1	1	1	1
88	WO1	2	2	3	3	2	2	3	4	2	3	2	3	2	5	4	4
91	WO1	4	3	3	4	4	4	4	4	2	4	3	3	3	4	3	3
95	WO1	5	4	2	3	4	4	3	4	1	3	2	2	1	3	1	1
102	CW2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
104	CW2	3	3	4	1	2	3	3	3	3	4	2	2	2	3	2	2
105	CW2	1	2	2	1	2	1	1	1	1	2	2	2	2	3	2	2
109	CW2	5	2	5	5	5	5	5	5	3	5	1	5	5	5	5	5
112	CW2	3	3	4	3	3	3	3	3	3	4	3	3	3	3	3	3
115	CW2	1	2	3	2	3	3	2	2	2	3	2	2	3	2	3	3
	Number of Respondents	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
	Average	2.5	3.1	3.1	2.6	3.0	3.1	2.8	2.5	2.5	3.2	2.3	2.7	2.6	2.9	2.6	2.9
	Standard Deviation	1.4	1.3	1.2	1.2	1.3	1.3	1.2	1.3	1.3	1.2	1.1	1.3	1.2	1.3	1.3	1.3
	Section Average				2.8		Section Average					2.8					
	Standard Deviation				0.3		Standard Deviation					0.3					

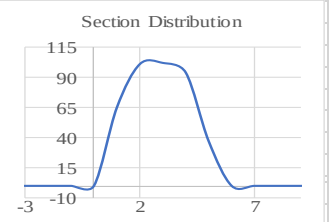




Section – 5: Project Solutions – Control Group

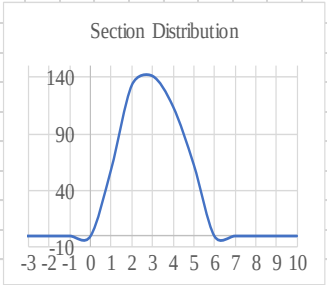
							CPM											CCPM			
	Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83	66	67	68	76	79	81	84
Respondent	Rank																				
1	1LT	5	3	1	5	1	1	1	3	5	2	2	3	1	5	4	2	3	1	3	1
3	1LT	4	3	3	2	2	3	3	1	4	2	3	3	2	2	4	4	3	2	2	2
4	1LT	4	2	1	5	3	3	3	1	4	2	4	3	1	1	4	4	4	4	3	1
6	1LT	5	4	5	3	5	4	3	4	5	3	5	3	1	3	4	5	5	4	3	3
10	1LT	3	4	2	4	1	3	3	3	3	1	4	2	1	2	5	3	4	3	2	4
11	1LT	4	2	1	3	3	5	1	1	3	3	4	2	1	1	3	4	2	3	2	1
12	1LT	5	2	2	4	1	1	2	2	3	4	2	3	2	3	3	2	2	2	1	1
19	1LT	2	2	2	2	4	2	2	3	2	3	3	4	4	2	2	4	2	3	4	1
20	1LT	5	3	3	5	4	4	3	4	3	1	4	5	2	2	5	2	5	1	2	1
25	1LT	3	2	2	4	5	3	2	2	3	2	3	3	2	3	3	4	3	2	2	2
31	1LT	3	4	2	4	2	2	2	3	4	2	2	2	2	2	3	4	4	2	2	2
32	1LT	1	1	1	5	5	1	3	1	1	5	4	5	4	5	3	1	1	3	5	5
34	1LT	3	4	3	3	4	2	3	4	3	3	3	4	3	4	2	3	4	4	2	4
35	CPT	5	3	3	4	2	4	3	5	3	3	3	3	5	3	5	1	4	1	1	1
37	CPT	1	3	2	4	1	2	1	3	2	1	5	4	1	1	4	3	2	1	5	1
39	CPT	5	3	4	4	4	3	4	4	4	5	3	5	5	3	4	2	5	5	4	5
40	CPT	3	3	4	4	4	3	2	3	4	1	3	3	2	1	2	3	3	2	4	1
41	CPT	4	2	4	4	2	3	3	1	4	2	3	2	1	3	5	4	5	3	3	1
42	CPT	5	3	2	2	4	5	3	5	3	3	5	2	3	3	4	2	4	4	5	4
43	CPT	4	3	1	4	1	3	4	4	5	1	4	3	4	3	4	2	3	1	4	1
45	CPT	2	2	1	5	1	5	2	2	5	1	4	1	1	2	4	5	2	2	4	1
46	CPT	1	2	3	3	1	4	4	2	3	2	2	4	1	2	3	2	3	4	4	3
47	CPT	3	5	2	5	1	4	1	3	5	1	2	2	2	2	4	2	4	2	3	1
48	CPT	3	4	2	4	2	2	2	4	5	2	3	4	4	4	4	2	4	2	4	3
49	CPT	2	3	1	5	2	4	2	3	3	4	3	4	1	2	5	2	4	4	2	4
50	CPT	4	2	2	4	3	3	4	4	5	4	4	4	4	4	4	2	4	3	4	3
51	CPT	4	3	2	4	1	5	4	4	3	4	5	5	5	2	4	4	3	4	1	1
52	CPT	3	2	3	3	2	3	3	3	3	2	4	3	3	4	3	2	3	2	3	1
53	CPT	4	4	4	5	3	2	3	3	4	4	5	3	2	4	3	2	3	2	3	4
54	CPT	2	3	5	5	2	4	3	5	4	5	5	5	4	5	2	4	5	5	4	4
55	CPT	5	2	2	5	2	4	4	4	4	1	4	4	2	2	4	2	5	2	4	1
56	CPT	4	3	2	5	3	2	2	4	4	2	4	4	2	4	3	2	4	2	2	2
57	CPT	5	5	4	4	5	5	5	5	5	1	5	4	3	5	4	3	4	1	5	1
58	CPT	3	3	3	4	2	4	3	4	4	2	4	4	3	3	3	4	3	3	2	1
59	CPT	5	3	4	3	2	3	2	3	5	2	5	3	3	3	3	5	3	3	4	2
60	CPT	5	4	2	5	4	5	4	5	4	4	5	4	1	2	5	2	4	1	1	1
61	CPT	4	3	3	3	2	2	4	3	4	2	2	3	4	3	3	5	3	3	4	3
63	CPT	4	1	2	4	2	2	4	4	4	1	4	3	1	2	2	1	3	1	1	1
64	CPT	5	4	5	3	5	3	5	5	4	4	4	4	5	3	5	5	4	4	5	5
65	CPT	5	3	3	5	1	5	5	3	5	5	5	5	5	1	4	5	4	5	4	1
67	CPT	3	3	3	3	5	5	4	3	4	4	4	2	1	3	2	3	3	2	2	2
70	CPT	1	1	1	1	5	5	1	1	1	1	1	5	1	1	1	1	3	1	1	1
73	CPT	4	5	1	3	3	2	4	4	2	4	4	3	2	2	4	2	2	2	3	5
74	CPT	4	2	2	4	3	2	2	4	5	3	4	4	1	3	4	2	3	3	3	2
75	CPT	4	1	3	2	5	4	2	3	4	3	2	2	1	1	3	4	2	1	3	4
79	CPT	5	5	4	3	1	5	3	3	5	2	5	1	4	3	4	2	4	2	3	5
82	WO1	1	3	3	1	5	3	1	5	3	3	5	4	1	1	1	1	5	1	3	1
86	WO1	2	1	1	3	3	4	2	3	2	1	3	2	2	1	2	3	2	4	3	1
88	WO1	5	4	2	4	2	3	1	3	4	2	3	2	4	3	4	3	3	4	2	2
91	WO1	4	4	3	4	3	3	3	4	4	2	3	4	3	3	4	2	4	2	2	3
95	WO1	3	4	1	3	2	2	2	2	4	2	5	2	3	2	2	3	2	2	3	2
102	CW2	5	3	3	2	2	4	5	5	2	1	3	5	5	1	3	1	3	2	3	2
104	CW2	1	4	4	3	2	2	4	4	2	3	4	2	4	3	2	2	2	3	2	1
105	CW2	4	4	4	2		2	2	4	3	1	2	2	1	2	4	1	3	4	3	4
109	CW2	2	3	3	4	2	3	3	3	5	2	3	2	4	2	4	3	4	4	3	1
112	CW2	5	2	2	2	4	3	3	5	3	4	4	3	4	4	4	1	3	3	3	1
115	CW2	4	3	3	5	3	4	4	4	4	3	4	3	3	3	4	3	3	2	3	2
	Number of Respondents	57	57	57	57	56	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
	Average	3.6	3.0	2.6	3.6	2.8	3.2	2.9	3.3	3.6	2.5	3.6	3.2	2.6	2.6	3.5	2.8	3.4	2.6	2.9	2.2
	Standard Deviation	1.3	1.1	1.1	1.1	1.4	1.2	1.1	1.2	1.1	1.2	1.0	1.1	1.4	1.1	1.0	1.2	1.0	1.2	1.1	1.4
					Section Average				3.1											Section Average		2.8
					Standard Deviation				0.4											Standard Deviation		0.4

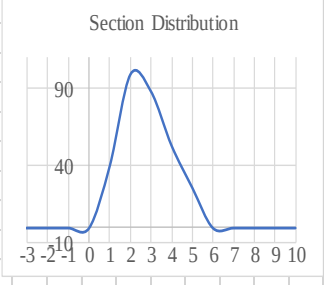




Section - 2: Project Planning Issues – Project Management Education

					Resource Issues													Scheduling Issues								
	Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Respondent	Rank																									
7	1LT	3	4	2	4	4	5	4	2	5	5	1	4	4	4	3		3	3	3	4	2	3	2	2	3
8	1LT	4	5	4	5	1	2	3	3	5	3	2	2	2	1	2		3	3	4	3	2	2	2	1	2
9	1LT	4	4	2	2	5	2	3	2	2	1	1	2	4	4	3		3	4	2	2	2	2	3	3	4
13	1LT	3	3	2	5	2	3	4	3	3	4	5	4	2	4	4		4	4	4	3	4	2	4	2	2
15	1LT	3	3	3	4	2	3	3	3	4	4	3	3	3	2	1		3	3	3	3	2	4	1	3	2
17	1LT	5	4	5	5	2	3	5	4	1	4	4	2	4	4	4		5	5	5	3	5	1	4	2	4
22	1LT	4	3	3	4	2	2	3	3	3	3	5	2	2	2	2		3	4	3	3	2	2	2	3	3
24	1LT	2	4	1	3	3	2	3	3	5	5	2	1	1	1	1		3	4	3	1	3	1	1	1	1
26	1LT	2	2	3	2	1	2	2	2	2	2	2	2	2	1	1		2	2	2	3	2	1	2	3	1
27	1LT	3	5	2	1	1	3	4	4	2	3	1	1	5	2	4		4	5	2	2	2	1	3	2	2
28	1LT	3	4	4	4	2	4	4	4	4	4	3	3	3	5	4		2	3	3	4	4	2	1	2	2
29	1LT	2	3	4	4	3	4	3	3	3	3	3	2	3	2	2		3	3	4	3	2	2	2	3	3
33	1LT	5	2	1	4	1	2	3	5	3	2	2	2	2	2	2		2	4	1	1	5	2	1	3	5
38	CPT	3	3	3	3	2	2	2	3	4	2	2	3	2	2	3		2	2	2	3	3	2	2	3	3
44	CPT	3	4	4	2	2	4	1	3	3	5	5	1	3	1	1		5	4	2	4	2	1	2	3	1
62	CPT	3	3	1	2	2	2	2	1	2	5	2	4	4	2	2		3	2	1	1	4	4	1	4	3
66	CPT	4	3	5	5	1	3	5	2	3	4	1	5	4	3	1		5	2	4	3	5	2	1	3	3
68	CPT	5	4	4	3	2	4	4	3	3	3	2	2	4	3	3		3	2	2	3	3	3	2	3	2
69	CPT	1	2	2	1	1	1	2	1	1	1	1	1	1	1	1		2	2	1	1	1	1	1	1	1
71	CPT	4	2	4	4	2	5	4	4	2	5	2	3	4	1	5		2	2	5	4	5	2	4	5	1
76	CPT	3	3	5	1	1	5	5	1	5	5	1	5	5	5	5		3	5	1	5	5	1	1	5	1
77	CPT	5	5	4	2	2	2	3	2	2	4	3	1	1	1	1		3	5	3	3	4	2	3	5	3
78	CPT	2	3	4	3	3	4	4	3	4	4	4	4	3	3	3		3	2	2	3	4	2	3	2	4
81	CPT	1	1	3	4	3	2	2	1	1	2	3	2	1	2	2		2	2	2	3	2	1	2	2	2
83	WO1	2	2	4	4	4	5	5	5	5	3	3	2	3	2	4		2	3	2	4	5	2	4	3	4
90	WO1	2	2	2	4	2	3	3	3	3	4	3	2	3	3	4		2	2	1	3	2	4	4	3	2
93	WO1	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2		3	3	3	2	2	2	2	2	2
96	WO1	3	3	4	4	1	3	2	4	4	4	3	3	3	2	3		4	4	3	2	5	2	3	2	3
98	CW2	5	3	4	5	2	3	3	4	4	1	1	5	3	4	5		3	3	3	3	2	1	1	1	3
100	CW2	4	4	2	4	5	2	4	2	2	2	4	3	2	4	3		5	3	2	2	3	1	1	2	4
110	CW2	3	5	4	3	3	4	5	4	4	5	4	3	3	4	3		3	5	2	4	5	3	4	4	2
111	CW2	4	3	5	5	3	5	5	5	5	4	3	3	4	4	5		3	4	3	5	4	4	2	4	4
113	CW2	3	3	4	5	3	4	3	3	3	3	2	3	4	3	3		4	4	3	4	4	5	4	3	3
114	CW2	3	4	2	3	2	3	3	2	3	3	3	3	2	4	3		2	2	3	2	4	2	3	2	4
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34	34	34
	Question Average	3.2	3.2	3.2	3.4	2.3	3.1	3.3	2.9	3.1	3.4	2.6	2.6	2.9	2.6	2.8		3.1	3.2	2.6	2.9	3.3	2.1	2.3	2.7	2.6
	Standard Deviation	1.1	1.0	1.2	1.3	1.1	1.1	1.1	1.1	1.2	1.3	1.2	1.2	1.1	1.3	1.3		1.0	1.1	1.1	1.1	1.3	1.1	1.1	1.1	1.1
						Section Average					3.0												Section Average		2.8		
						Standard Deviation					0.3												Standard Deviation		0.4		

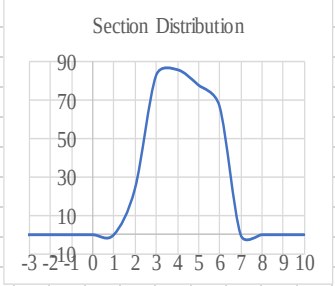


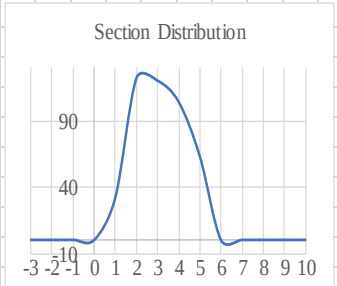


Section - 3: Project Execution Issues – Project Management Education

			Resource Issues														Scheduling Issues									
	Question Number>	26	27	31	33	35	37	44	46	47	48	28	29	30	32	34	36	38	39	40	41	42	43	45
Respondent	Rank																							
7	1LT	3	2	5	4	4	3	2	2	4	3	4	3	4	4	4	3	4	4	2	3	3	4	4
8	1LT	5	5	2	3	2	3	1	1	1	1	3	3	2	1	2	1	2	5	3	3	2	5	1
9	1LT	4	2	4	2	4	3	3	2	4	2	4	3	3	2	3	3	4	4	2	3	2	4	3
13	1LT	4	3	3	4	4	4	2	3	5	5	4	4	2	2	3	2	3	4	2	2	3	4	3
15	1LT	4	4	4	4	2	4	4	2	2	3	4	4	4	4	4	2	4	4	3	3	3	2	3
17	1LT	4	4	4	5	5	4	4		2	2	5	5	5	5	4	4	5	2	2		4	4	2
22	1LT	5	5	2	3	2	2	2	2	2	3	2	3	2	2	3	2	4	3	2	2	2	2	2
24	1LT	2	3	2	2	3	1	3	1	2	1	2	3	3	3	1	1	1	2	2	1	1	1	1
26	1LT	4	5	4	4	4	3	2	1	1	2	4	4	4	3	4	3	4	4	3	4	3	4	1
27	1LT	3	4	5	4	2	1	4	1	2	4	2	4	2	2	4	1	3	3	1	2	2	4	2
28	1LT	5	5	3	3	4	4	3	1	3	2	5	4	3	1	4	3	4	4	2	2	4	2	2
29	1LT	3	3	3	2	3	2	3	2	2	3	2	3	3	3	3	3	3	3	2	2	3	2	3
33	1LT	5	5	1	5	5	3	5	2	4	5	3	5	2	3	2	1	3	3	2	5	3	2	5
38	CPT	5	4	3	3	3	3	3	2	2	3	4	3	3	3	2	2	4	4	3	2	4	2	3
44	CPT	2	3	4	2	2	2	3	4	4	1	1	2	2	3	2	1	5	4	1	2	3	3	1
62	CPT	3	3	3	2	3	3	4	2	4	2	3	3	2	2	3	3	1	5	4	3	2	5	3
66	CPT	4	4	5	4	2	2	2	2	5	3	2	2	4	2	2	4	5	4	2	2	3	2	2
68	CPT	5	4	4	2	2	4	1	3	4	3	2	3	3	3	3	2	3	4	3	2	2	2	2
69	CPT	5	5	2	2	2	2	4	3	3	3	1	2	1	2	2	2	2	2	1	3	2	2	4
71	CPT	4	3	5	2	5	4	4	2	2	5	5	5	5	3	2	3	4	5	5	5	4	4	2
76	CPT	5	3	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5	5	2	4	4	1
77	CPT	5	5	4	2	4	2	1	1	1	1	5	5	4	2	4	1	4	3	1	2	3	3	1
78	CPT	4	3	3	3	4	2	4	1	3	4	3	2	3	5	3	2	3	4	3	2	4	3	3
81	CPT	2	2	3	2	4	3	3	4	3	3	3	2	2	4	3	3	2	2	3	2	3	2	4
83	WO1	5	5	5	5	5	4	5	5	5	1	5	5	5	5	5	3	5	5	4	3	4	4	3
90	WO1	3	4	3	3	3	2	2	3	3	4	3	4	4	2	2	4	4	3	3	4	4	3	4
93	WO1	4	2	3	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2
96	WO1	4	5	5	3	4	3	2	2	1	4	5	4	4	2	3	2	3	4	2	5	4	3	3
98	CW2	5	5	2	4	4	4	3	2	2	2	3	3	1	4	5	1	2	3	2	4	3	2	3
100	CW2	2	3	3	3	5	3	1	2	3	4	5	3	2	1	4	2	5	5	4	5	2	4	2
110	CW2	5	5	5	5	4	5	5	3	4	4	4	5	4	4	5	5	4	4	4	5	4	4	4
111	CW2	5	5	4	5	4	3	3	3	5	5	4	5	4	3	5	2	5	4	5	4	4	3	4
113	CW2	5	5	5	5	3	1	3	4	3	3	5	5	5	3	3	1	5	5	3	5	5	3	5
114	CW2	3	4	4	2	4	3	3	2	5	3	3	3	3	3	2	3	4	4	3	2	3	4	3
	Number of Respondents	34	34	34	34	34	34	34	33	34	34	34	34	34	34	34	34	34	34	34	33	34	34	34
	Average	4.0	3.9	3.6	3.3	3.5	2.9	2.9	2.3	3.0	3.0	3.4	3.6	3.1	2.9	3.1	2.4	3.6	3.7	2.7	3.0	3.1	3.1	2.7
	Standard Deviation	1.0	1.1	1.1	1.2	1.1	1.1	1.2	1.1	1.3	1.3	1.3	1.1	1.2	1.1	1.2	1.1	1.2	1.0	1.1	1.2	0.9	1.0	1.1

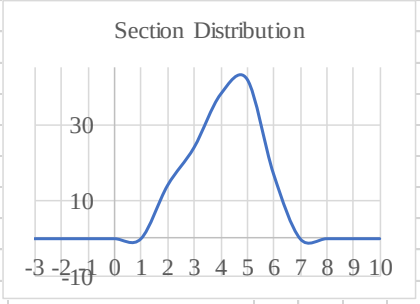
		Section Average			3.2											Section Average			3.1							
		Standard Deviation			0.5											Standard Deviation			0.4							

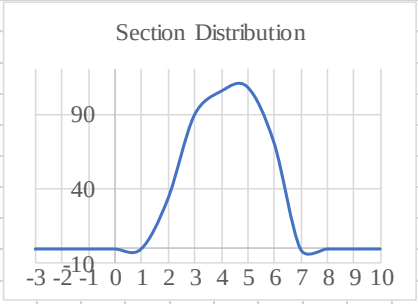




Section - 4: Project Completion Issues – Project Management Education

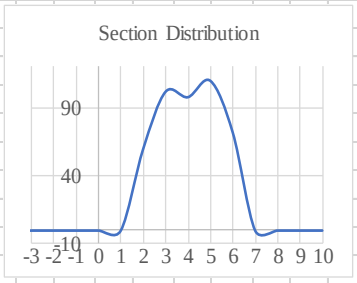
		Resource Issues										Scheduling Issues						
	Question Number>	52	55	57	61		49	50	51	53	54	56	58	59	60	62	63	64
Respondent	Rank																	
7	1LT	3	4	4	4		3	3	2	3	2	4	3	3	4	4	4	4
8	1LT	1	4	4	4		4	5	3	1	1	4	1	1	2	4	3	3
9	1LT	1	3	3	3		3	3	2	1	3	3	3	3	4	3	3	3
13	1LT	2	4	4	4		4	3	4	2	4	4	3	2	4	4	5	5
15	1LT	4	4	4	2		5	5	4	4	3	4	3	2	3	4	4	4
17	1LT	2	4	4	4		4	4	4	4	2	4	4	4	4	5	5	4
22	1LT	4	2	2	4		5	5	4	4	3	3	2	2	4	4	2	2
24	1LT	1	4	1	1		2	2	1	1	4	4	2	2	1	5	1	3
26	1LT	5	3	4	4		4	5	3	5	3	4	3	3	3	2	3	4
27	1LT	4	2	2	1		5	5	5	5	5	4	2	2	4	5	3	2
28	1LT	3	3	3	3		4	4	3	2	2	3	2	3	2	2	2	3
29	1LT	3	3	3	3		3	2	3	3	2	3	3	3	2	2	3	3
33	1LT	5	3	1	1		3	5	5	2	1	4	1	1	2	3	5	5
38	CPT		4	4	2		3	4	3			4	2	2	3	2	3	3
44	CPT	4	3	4	3		3	3	3	4	2	4	2	2	2	3	1	1
62	CPT	1	3	2	3		4	4	3	4	3	3	1	1	2	3	3	5
66	CPT	4	1	3	5		5	5	2	5	4	5	1	1	3	5	3	5
68	CPT	3	3	2	3		3	3	4	4	4	4	4	2	3	3	2	2
69	CPT	5	3	3	2		4	4	1	4	2	3	2	2	1	2	1	1
71	CPT	3	5	3	4		4	5	2	5	5	5	5	5	2	4	2	2
76	CPT	4	1	1	2		1	1	1	5	5	5	1	3	4	5	1	1
77	CPT	5	4	4	4		4	4	5	5	1	4	2	4	4	2	2	4
78	CPT	3	4	5	2		4	2	3	2	4	4	4	3	3	4	4	2
81	CPT	2	2	2	2		3	2	3	2	2	2	2	2	3	3	2	2
83	WO1	5	5	5	5		5	5	5	5	4	5	4	3	3	5	1	5
90	WO1	4	3	4	4		4	4	3	3	3	4	3	2	3	3	3	3
93	WO1	1	2	1	2		2	1	2	1	3	2	1	2	2	2	2	2
96	WO1	2	4	4	3		5	3	4	3	2	5	3	2	4	5	4	5
98	CW2	2	3	3	2		3	5	4	3	2	3	2	2	2	2	2	2
100	CW2	3	5	5	4		3	5	4	4	4	5	3	3	5	4	4	5
110	CW2	5	4	5	5		5	5	5	5	3	5	4	4	4	4	4	3
111	CW2	3	2	3	2		3	4	5	4	2	5	4	3	4	4	4	5
113	CW2	5	4	4	3		5	4	3	5	3	4	2	5	4	5	5	5
114	CW2	3	4	3	3		4	4	3	4	4	4	2	2	3	3	2	3
	Number of Respondents	34	34	34	34		34	34	34	34	34	34	34	34	34	34	34	34
	Average	3.2	3.3	3.2	3.0		3.7	3.8	3.3	3.5	2.9	3.9	2.5	2.5	3.0	3.5	2.9	3.3
	Standard Deviation	1.4	1.0	1.2	1.1		1.0	1.2	1.2	1.4	1.1	0.8	1.1	1.0	1.0	1.1	1.2	1.3
				Section Average	3.2							Section Average	3.2					
				Standard Deviation	0.1							Standard Deviation	0.5					

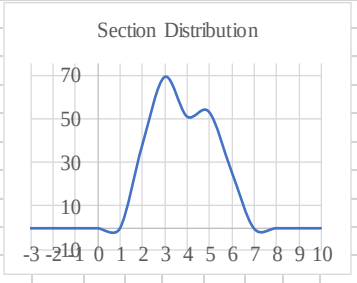




Section – 5: Project Solutions - Project Management Education

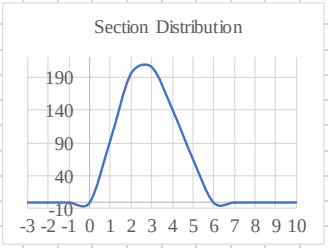
							CPM											CCPM					
	Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83		66	67	68	76	79	81	84
Respondent	Rank																					
7	1LT	4	4	1	5	3	5	3	4	3	3	5	4	1		4	3	2	4	2	3	1
8	1LT	5	2	1	3	1	3	4	3	4	3	3	3	1		3	5	3	4	3	1	1
9	1LT	4	4	3	3	3	4	3	4	3	4	3	3	3		3	3	2	4	2	3	2
13	1LT	3	2	2	4	1	2	4	2	4	2	4	5	4		2	4	4	4	4	2	1
15	1LT	2	2	3	2	2	2	4	2	2	4	2	4	4		4	2	3	2	3	2	5
17	1LT	5	3	1	4	4	4	2	4	2	4	4	2	4		4	5	2	4	4	5	5
22	1LT	5	4	1	5	1	5	3	4	3	3	3	4	4		1	3	1	3	3	1	2
24	1LT	5	5	3	5	2	5	1	5	1	1	5	4	1		1	5	1	4	1	2	1
26	1LT	2	1	2	3	2	1	1	3	3	4	4	2	1		2	3	5	2	4	3	2
27	1LT	5	5	1	5	2	5	5	4	4	5	5	4	1		4	4	2	2	5	2	1
28	1LT	3	3	1	3	1	3	4	3	2	2	3	3	2		2	4	2	4	4	3	2
29	1LT	3	3	2	3	2	3	2	3	3	2	3	3	2		2	2	2	2	2	2	3
33	1LT	5	1	1	5	1	3	1	3	5	1	1	5	1		2	4	1	2	3	2	4
38	CPT	4	2	1	4	2	3	4	4	4	2	2	4	1		3	3	2	3	2		2
44	CPT	5	5	4	4	2	4	1	1	2	4	5	2	4		1	3	2	1	2	3	1
62	CPT	2	3	3	5	3	5	2	1	3	3	5	5	2		2	3	3	2	3	4	5
66	CPT	5	1	3	5	1	5	1	3	3	2	5	5	1		2	5	5	5	3	3	1
68	CPT	4	4	2	2	2	2	2	4	4	3	4	4	1		3	3	2	3	2	4	2
69	CPT	1	4	1	2	2	2	1	3	1	1	2	3	4		1	5	1	3	2	2	2
71	CPT	5	4	1	3	1	5	5	5	3	3	5	2	3		2	5	1	5	1	4	3
76	CPT	1	5	5	5	5	1	4	2	4	2	4	5	5		4	4	1	4	2	1	1
77	CPT	4	4	2	4	2	2	4	4	3	2	4	4	4		3	4	2	3	4	2	2
78	CPT	4	2	2	4	1	3	4	2	4	4	5	2	3		2	4	4	3	4	3	1
81	CPT	2	2	2	4	1	2	2	1	4	4	3	3	3		3	2	2	5	3	5	1
83	WO1	5	3	3	4	2	4	4	3	5	4	5	2	2		3	5	4	5	3	5	3
90	WO1	2	4	2	3	3	4	2	3	2	1	1	2	2		4	3	3	4	1	2	1
93	WO1	4	2	2	2	2	2	2	2	2	2	2	2	2		1	4	2	2	2	2	2
96	WO1	4	5	2	4	2	4	3	3	3	4	4	5	2		2	5	4	4	2	3	1
98	CW2	5	3	4	4	4	3	4	5	5	3	3	2	2		4	4	1	3	1	4	2
100	CW2	3	3	2	5	1	4	4	5	4	4	4	5	5		2	5	5	4	1	4	1
110	CW2	5	4	3	5	3	4	4	4	4	3	4	3	5		3	4	3	5	4	2	5
111	CW2	5	3	1	4	2	2	3	5	3	4	2	5	3		2	4	1	3	1	3	4
113	CW2	5	3	1	1	1	3	5	4	5	1	3	1	1		4	4	2	4	2	3	1
114	CW2	2	2	4	3	5	3	2	2	3	4	2	4	3		4	1	5	2	4	2	4
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34
	Average	3.8	3.1	2.1	3.7	2.1	3.3	2.9	3.2	3.2	2.9	3.5	3.4	2.6		2.6	3.7	2.5	3.4	2.6	2.8	2.2
	Standard Deviation	1.3	1.2	1.1	1.1	1.1	1.2	1.3	1.2	1.1	1.1	1.2	1.2	1.4		1.0	1.1	1.3	1.1	1.1	1.1	1.4
				Section Average					3.1									Section Average			2.8	
				Standard Deviation					0.5									Standard Deviation			0.5	

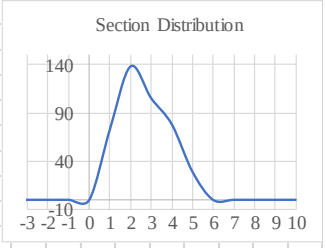




Section - 3: Project Planning Issues – Project Management Experience

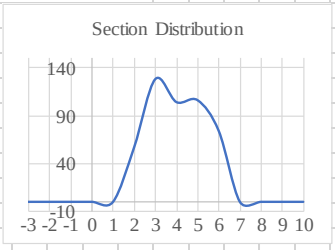
					Resource Issues														Scheduling Issues								
	Question Number>	1	2	6	8	9	10	13	14	15	16	17	21	22	24	25		3	4	5	7	11	12	18	19	23
Respondent	Rank																									
2	1LT	4	5	4	4	2	3	2	2	4	5	2	3	2	4	3		4	2	2	2	2	4	4	5	4
5	1LT	3	3	5	5	1	3	3	4	4	3	2	2	3	3	5		4	5	4	4	4	1	1	2	2
8	1LT	4	5	4	5	1	2	3	3	5	3	2	2	2	1	2		3	3	4	3	2	2	2	1	2
13	1LT	3	3	2	5	2	3	4	3	3	4	5	4	2	4	4		4	4	4	3	4	2	4	2	2
14	1LT	3	2	2	4	2	3	3	1	2	3	1	5	2	4	2		1	1	1	1	4	2	3	1	1
16	1LT	1	2	2	1	2	3	4	2	3	3	2	1	1	1	1		4	5	2	5	2	4	4	3	1
17	1LT	5	4	5	5	2	3	5	4	1	4	4	2	4	4	4		5	5	5	3	5	1	4	2	4
18	1LT	3	3	3	3	3	4	4	3	4	4	2	2	2	3	4		2	3	4	2	4	3	2	3	3
21	1LT	2	3	1	3	4	3	4	3	4	1	1	1	2	1	1		2	2	1	1	4	2	2	3	3
22	1LT	4	3	3	4	2	2	3	3	3	3	5	2	2	2	2		3	4	3	3	2	2	2	3	3
23	1LT	3	3	3	4	2	4	4	4	5	3	3	4	2	2	3		3	3	4	2	4	2	3	2	4
27	1LT	3	5	2	1	1	3	4	4	2	3	1	1	5	2	4		4	5	2	2	2	1	3	2	2
29	1LT	2	3	4	4	3	4	3	3	3	3	3	2	3	2	2		3	3	4	3	2	2	2	3	3
30	1LT	5	3	3	4	1	1	5	5	5	5	2	4	2	1	1		3	4	2	1	4	1	1	1	1
33	1LT	5	2	1	4	1	2	3	5	3	2	2	2	2	2	2		2	4	1	1	5	2	1	3	5
36	CPT	4	4	5	5	2	5	5	4	5	3	5	4	3	3	4		5	5	3	3	5	2	2	4	3
62	CPT	3	3	1	2	2	2	2	1	2	5	2	4	4	2	2		3	2	1	1	4	4	1	4	3
68	CPT	5	4	4	3	2	4	4	3	3	3	2	2	4	3	3		3	2	2	3	3	3	2	3	2
69	CPT	1	2	2	1	1	1	2	1	1	1	1	1	1	1	1		2	2	1	1	1	1	1	1	1
71	CPT	4	2	4	4	2	5	4	4	2	5	2	3	4	1	5		2	2	5	4	5	2	4	5	1
72	CPT	3	2	2	3	3	2	3	2	2	1	2	1	2	2	2		1	3	2	1	2	3	2	2	1
80	CPT	1	1	2	5	1	4	2	3	3	1	1	1	1	1	3		3	3	1	4	5	1	1	4	1
84	WO1	2	2	3	3	3	2	2	3	3	2	3	3	3	2	3		2	2	3	2	2	3	3	3	3
85	WO1	2	3	2	4	1	2	5	3	5	4	1	4	4	1	3		2	4	4	4	4	1	1	4	1
87	WO1	4	2	4	4	4	4	3	2	2	3	3	3	2	2	4		4	4	4	3	3	3	2	3	2
89	WO1	4	3	2	3	2	2	2	2	2	4	3	2	1	1	1		2	2	3	1	4	1	2	1	1
92	WO1	3	3	2	3	3	3	3	3	3	2	2	3	2	1	3		2	2	2	2	2	2	2	2	2
93	WO1	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2		3	3	3	2	2	2	2	2	2
94	WO1	3	3	1	4	1	3	4	1	4	3	2	1	1	1	1		2	2	3	2	3	3	1	1	3
96	WO1	3	3	4	4	1	3	2	4	4	4	3	3	3	2	3		4	4	3	2	5	2	3	2	3
97	WO1	4	5	2	3	3	2	4	2	2	1	2	2	1	1	2		4	3	2	3	2	2	2	1	2
96	WO1	3	3	4	4	1	3	2	4	4	4	3	3	3	2	3		4	4	3	2	5	2	3	2	3
97	WO1	4	5	2	3	3	2	4	2	2	1	2	2	1	1	2		4	3	2	3	2	2	2	1	2
98	CW2	5	3	4	5	2	3	3	4	4	1	1	5	3	4	5		3	3	3	3	2	1	1	1	3
99	CW2	2	3	5	4	1	3	3	4	1	1	2	2	1	3	2		2	3	4	3	3	1	1	4	2
100	CW2	4	4	2	4	5	2	4	2	2	2	4	3	2	4	3		5	3	2	2	3	1	1	2	4
101	CW2	2	2	1	1	2	5	2	1	4	5	2	2	4	2	2		2	2	3	3	3	4	3	4	3
103	CW2	3	4	1	4	1	5	4	4	5	5	3	3	3	3	3		4	3	5	1	2	1	1	5	3
106	CW2	3	4	3	4	2	3	3	3	3	3	2	5	3	3	2		3	2	2	3	4	3	4	2	2
107	CW2	5	3	2	1	1	3	2	2	4	3	3	2	2	3	2		4	5	2	2	5	1	3	1	3
108	CW2	4	4	4	4	1	5	5	2	5	4	3	3	3	4	3		3	1	1	2	3	1	4	2	3
110	CW2	3	5	4	3	3	4	5	4	4	5	4	3	3	4	3		3	5	2	4	5	3	4	4	2
113	CW2	3	3	4	5	3	4	3	3	3	3	2	3	4	3	3		4	4	3	4	4	5	4	3	3
114	CW2	3	4	2	3	2	3	3	2	3	3	3	3	2	4	3		2	2	3	2	4	2	3	2	4
116	CW2	2	4	4	3	2	2	3	4	2	2	4	2	2	5	2		2	2	2	2	3	2	4	2	2
117	CW2	3	3	1	2	2	3	2	1	3	2	3	2	1	1	1		2	2	1	1	2	2	1	1	1
119	CW3	2	3	4	3	1	5	5	4	4	3	4	5	3	3	2		2	3	2	4	4	1	5	3	1
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34	34	34
	Number of Respondents	3.2	3.2	2.8	3.4	2.0	3.1	3.3	2.9	3.2	3.0	2.5	2.6	2.4	2.4	2.6		3.0	3.1	2.7	2.4	3.3	2.1	2.4	2.5	2.4
	Number of Respondents	1.1	1.0	1.3	1.2	1.0	1.1	1.0	1.1	1.2	1.3	1.1	1.2	1.0	1.2	1.1		1.0	1.1	1.2	1.1	1.2	1.0	1.2	1.2	1.0
							Section Average				2.8										Section Average		2.7			
							Standard Deviation				0.4										Standard Deviation		0.4			

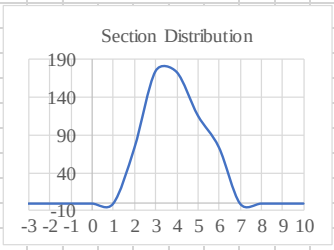




Section - 3: Project Execution Issues – Project Management Experience

			Resource Issues										Scheduling Issues												
	Question Number>	26	27	31	33	35	37	44	46	47	48		28	29	30	32	34	36	38	39	40	41	42	43	45
Respondent	Rank																								
2	1LT	5	3	4	2	2	2	4	4	2	2		2	2	3	5	2	3	4	4	3	2	4	3	4
5	1LT	4	4	3	4	3	5	2	1	2	5		3	4	3	2	3	1	3	3	2	3	3	3	2
8	1LT	5	5	2	3	2	3	1	1	1	1		3	3	2	1	2	1	2	5	3	3	2	5	1
13	1LT	4	3	3	4	4	4	2	3	5	5		4	4	2	2	3	2	3	4	2	2	3	4	3
14	1LT	2	4	1	2	2	5	1	4	2	3		2	2	1	4	1	4	4	5	4	4	2	4	1
16	1LT	1	1	5	3	4	4	5	3	3	3		1	5	4	5	3	4	5	3	4	4	2	4	4
17	1LT	4	4	4	5	5	4	4		2	2		5	5	5	5	4	4	5	2	2		4	4	2
18	1LT	4	4	3	3	2	4	1	2	3	3		3	4	3	3	2	3	4	2	3	2	2	3	2
21	1LT	2	3	3	1	3	2	2	2	4	1		3	3	4	1	1	1	3	2	3	2	3	3	3
22	1LT	5	5	2	3	2	2	2	2	2	3		2	3	2	2	3	2	4	3	2	2	2	2	2
23	1LT	3	3	4	3	4	4	4	5	3	3		4	3	4	5	3	4	4	3	2	2	2	4	4
27	1LT	3	4	5	4	2	1	4	1	2	4		2	4	2	2	4	1	3	3	1	2	2	4	2
29	1LT	3	3	3	2	3	2	3	2	2	3		2	3	3	3	3	3	3	3	2	2	3	2	3
30	1LT	5	5	5	1	4	1	2	1	1	4		4	3	4	1	1	1	3	4	2	1	1	3	1
33	1LT	5	5	1	5	5	3	5	2	4	5		3	5	2	3	2	1	3	3	2	5	3	2	5
36	CPT	4	4	5	5	5	5	2	2	5	5		5	5	4	3	5	1	4	5	3	5	3	5	2
62	CPT	3	3	3	2	3	3	4	2	4	2		3	3	2	2	3	3	1	5	4	3	2	5	3
68	CPT	5	4	4	2	2	4	1	3	4	3		2	3	3	3	3	2	3	4	3	2	2	2	2
69	CPT	5	5	2	2	2	2	4	3	3	3		1	2	1	2	2	2	2	2	1	3	2	2	4
71	CPT	4	3	5	2	5	4	4	2	2	5		5	5	5	3	2	3	4	5	5	5	4	4	2
72	CPT	2	3	1	2	2	1	2	1	2	2		2	1	1	2	1	2	1	2	2	3	1	1	2
80	CPT	1	1	3	4	2	1	3	1	1	1		1	1	2	3	2	1	2	1	1	1	3	3	1
84	WO1	1	2	3	2	3	3	2	3	3	2		3	3	3	2	3	2	2	2	4	3	2	3	3
85	WO1	4	3	4	1	2	5	5	3	4	5		4	2	5	5	5	4	4	3	4	4	5	4	4
87	WO1	4	4	5	4	4	4	5	5	3	5		4	4	3	4	5	5	3	3	5	3	4	3	3
89	WO1	3	2	3	1	1	1	1	2	1	1		2	2	1	1	3	1	2	1	2	2	2	4	1
92	WO1	4	4	4	5	4	4	5	3	4	4		3	4	3	3	3	4	3	3	4	3	4	4	4
93	WO1	4	2	3	2	2	2	2	2	2	2		2	2	2	2	1	2	2	2	2	2	2	2	2
94	WO1	3	3	4	3	4	3	3	4	3	1		2	3	2	1	5	1	4	3	3	4	4	2	1
96	WO1	4	5	5	3	4	3	2	2	1	4		5	4	4	2	3	2	3	4	2	5	4	3	3
97	WO1	5	5	2	2	4	2	1	1	2	2		4	4	2	1	2	2	5	4	1	2	2	3	1
96	WO1	4	5	5	3	4	3	2	2	1	4		5	4	4	2	3	2	3	4	2	5	4	3	3
97	WO1	5	5	2	2	4	2	1	1	2	2		4	4	2	1	2	2	5	4	1	2	2	3	1
98	CW2	5	5	2	4	4	4	3	2	2	2		3	3	1	4	5	1	2	3	2	4	3	2	3
99	CW2	2	3	2	4	2	4	5	5	5	2		2	2	3	2	5	4	4	5	2	1	5	3	2
100	CW2	2	3	3	3	5	3	1	2	3	4		5	3	2	1	4	2	5	5	4	5	2	4	2
101	CW2	2	2	4	2	4	2	4	2	2	2		2	2	2	3	2	3	2	3	2	3	4	3	3
103	CW2	4	4	5	4	1	3	5	2	3	3		3	3	2	5	5	3	5	4	5	1	4	1	3
106	CW2	4	4	2	2	3	1	3	4	3	3		3	3	2	3	1	1	2	5	2	4	3	3	2
107	CW2	4	4	3	2	2	3	1	1	1	3		3	5	3	2	1	2	4	3	2	2	2	1	2
108	CW2	4	4	3	3	4	4	2	3	2	2		4	4	3	4	4	5	3	5	3	2	4	3	3
110	CW2	5	5	5	5	4	5	5	3	4	4		4	5	4	4	5	5	4	4	4	5	4	4	4
113	CW2	5	5	5	5	3	1	3	4	3	3		5	5	5	3	3	1	5	5	3	5	5	3	5
114	CW2	3	4	4	2	4	3	3	2	5	3		3	3	3	3	2	3	4	4	3	2	3	4	3
116	CW2	1	1	3	2	2	2	3	2	4	2		1	2	3	2	2	3	2	3	2	2	2	3	2
117	CW2	2	2	1	2	2	1	2	1	4	1		3	3	1	3	1	1	1	2	1	2	2	3	1
119	CW3	2	2	3	4	5	2	4	2	3	2		3	3	4	5	2	1	3	5	3	2	4	3	1
	Number of Respondents	34	34	34	34	34	34	34	33	34	34		34	34	34	34	34	34	34	34	34	33	34	34	34
	Average	3.5	3.6	3.3	2.9	3.2	2.9	2.9	2.4	2.7	2.9		3.1	3.3	2.8	2.8	2.8	2.4	3.2	3.4	2.6	2.9	2.9	3.1	2.5
	Standard Deviation	1.3	1.2	1.3	1.2	1.2	1.3	1.4	1.1	1.2	1.3		1.2	1.1	1.2	1.3	1.3	1.3	1.1	1.2	1.1	1.3	1.1	1.0	1.1
		Section Average				3.0										Section Average				2.9					
		Standard Deviation				0.4										Standard Deviation				0.3					

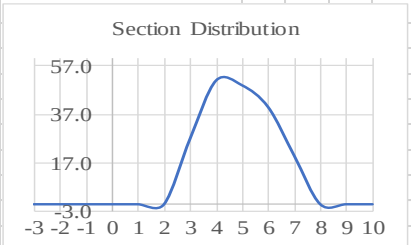


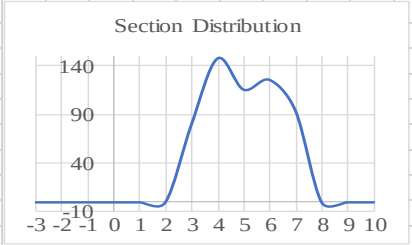


Section - 4: Project Completion Issues – Project Management Experience

	Resource Issues									Scheduling Issues							
	Question Number>	52	55	57	61	49	50	51	53	54	56	58	59	60	62	63	64
Respondent	Rank																
2	1LT	4	2	2	4	2	2	1	2	4	3	4	2	5	4	2	2
5	1LT	3	4	3	2	4	4	4	2	3	3	2	2	3	2	2	2
8	1LT	1	4	4	4	4	5	3	1	1	4	1	1	2	4	3	3
13	1LT	2	4	4	4	4	3	4	2	4	4	3	2	4	4	5	5
14	1LT	1	3	2	1	2	1	3	1	1	1	1	1	2	1	1	2
16	1LT	1	2	1	3	5	5	5	2	5	5	4	2	2	3	2	3
17	1LT	2	4	4	4	4	4	4	4	2	4	4	4	4	5	5	4
18	1LT	4	3	3	3	4	4	4	4	3	3	2	2	3	3	3	3
21	1LT	1	3	3	1	2	2	1	1	2	3	1	1	1	2	1	3
22	1LT	4	2	2	4	5	5	4	4	3	3	2	2	4	4	2	2
23	1LT	2	4	4	3	2	2	3	2	2	3	4	2	3	5	4	3
27	1LT	4	2	2	1	5	5	5	5	5	4	2	2	4	5	3	2
29	1LT	3	3	3	3	3	2	3	3	2	3	3	3	2	2	3	3
30	1LT	1	1	3	2	4	4	2	1	2	1	1	1	2	1	1	4
33	1LT	5	3	1	1	3	5	5	2	1	4	1	1	2	3	5	5
36	CPT	4	5	5	5	4	5	5	5	4	5	5	5	5	5	5	5
62	CPT	1	3	2	3	4	4	3	4	3	3	1	1	2	3	3	5
68	CPT	3	3	2	3	3	3	4	4	4	4	4	2	3	3	2	2
69	CPT	5	3	3	2	4	4	1	4	2	3	2	2	1	2	1	1
71	CPT	3	5	3	4	4	5	2	5	5	5	5	5	2	4	2	2
72	CPT	1	1	3	2	2	2	2	1	1	3	3	3	2	2	1	1
80	CPT	1	3	3	2	1	1	1	1	1	3	1	1	2	1	1	1
84	WO1	3	3	3	3	4	3	2	3	2	2	3	3	2	2	2	1
85	WO1	5	5	5	2	5	4	4	2	4	5	4	4	2	2	5	1
87	WO1		2	2	4	3	2	3	1	1	3	4	2	4	4	5	5
89	WO1	2	3	2	2	5	5	1	5	4	4	2	2	1	3	1	1
92	WO1	4	5	4	4	5	5	4	4	3	4	4	4	3	4	3	4
93	WO1	1	2	1	2	2	1	2	1	3	2	1	2	2	2	2	2
94	WO1	3	3	1	1	3	2	1	2	3	2	2	2	1	4	1	2
96	WO1	2	4	4	3	5	3	4	3	2	5	3	2	4	5	4	5
97	WO1	2	2	2	2	5	5	4	3	2	2	1	1	3	2	3	3
96	WO1	2	4	4	3	5	3	4	3	2	5	3	2	4	5	4	5
97	WO1	2	2	2	2	5	5	4	3	2	2	1	1	3	2	3	3
98	CW2	2	3	3	2	3	5	4	3	2	3	2	2	2	2	2	2
99	CW2	1	4	5	4	5	5	2	3	1	4	3	3	4	5	1	4
100	CW2	3	5	5	4	3	5	4	4	4	5	3	3	5	4	4	5
101	CW2	2	4	2	2	4	3	3	2	3	2	3	2	2	1	1	5
103	CW2	5	5	5	1	4	4	5	5	3	5	2	2	2	1	1	4
106	CW2	3	2	2	2	4	4	2	2	1	3	2	2	2	4	3	4
107	CW2	3	2	3	2	5	5	4	4	2	3	4	4	4	4	5	3
108	CW2	1	4	4	1	4	3	2	2	5	4	3	2	2	4	2	2
110	CW2	5	4	5	5	5	5	5	5	3	5	4	4	4	4	4	3
113	CW2	5	4	4	3	5	4	3	5	3	4	2	5	4	5	5	5
114	CW2	3	4	3	3	4	4	3	4	4	4	2	2	3	3	2	3
116	CW2	1	2	2	1	2	1	1	1	1	2	2	2	2	3	2	2
117	CW2	1	3	3	2	3	3	1	1	1	3	2	2	2	4	2	3
119	CW3	2	4	4	2	4	5	3	5	5	4	3	2	3	3	4	5
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
	Average	2.6	3.2	3.0	2.6	3.8	3.6	3.1	2.9	2.7	3.4	2.6	2.3	2.8	3.2	2.7	3.1
	Standard Deviation	1.4	1.1	1.2	1.1	1.1	1.3	1.3	1.4	1.3	1.1	1.2	1.1	1.1	1.3	1.4	1.4

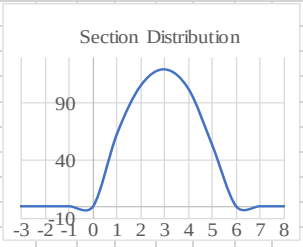
	Section Average	2.9		Section Average	3.0
	Standard Deviation	0.3		Standard Deviation	0.4

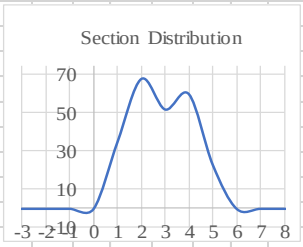




Section – 5: Project Solutions – Project Management Experience

							CPM												CCPM				
	Question Number>	65	69	70	71	72	73	74	75	77	78	80	82	83		66	67	68	76	79	81	84
Respondent	Rank																					
2	1LT	4	1	1	4	2	2	4	4	3	2	2	1	1		5	4	2	2	1	4	1
5	1LT	4	4	3	5	2	4	4	4	3	2	4	2	2		3	4	4	1	1	2	4
8	1LT	5	2	1	3	1	3	4	3	4	3	3	3	1		3	5	3	4	3	1	1
13	1LT	3	2	2	4	1	2	4	2	4	2	4	5	4		2	4	4	4	4	2	1
14	1LT	2	4	2	5	2	4	3	4	2	2	4	3	5		3	5	3	3	4	2	3
16	1LT	4	4	5	2	3	3	3	2	3	3	3	2	2		3	3	5	4	4	2	1
17	1LT	5	3	1	4	4	4	2	4	2	4	4	2	4		4	5	2	4	4	5	5
18	1LT	4	2	2	4	3	4	1	4	3	3	4	2	2		3	4	1	4	2	3	4
21	1LT	2	2	3	3	2	2	3	2	1	1	4	3	2		1	3	4	4	4	2	4
22	1LT	5	4	1	5	1	5	3	4	3	3	3	4	4		1	3	1	3	3	1	2
23	1LT	3	4	2	4	2	4	5	3	4	5	4	3	2		2	5	4	5	3	2	3
27	1LT	5	5	1	5	2	5	5	4	4	5	5	4	1		4	4	2	2	5	2	1
29	1LT	3	3	2	3	2	3	2	3	3	2	3	3	2		2	2	2	2	2	2	3
30	1LT	4	4	3	2	1	1	2	5	4	4	4	5	2		2	4	1	4	1	3	5
33	1LT	5	1	1	5	1	3	1	3	5	1	1	5	1		2	4	1	2	3	2	4
36	CPT	5	4	4	5	1	1	5	1	4	3	2	5	1		1	5	5	5	4	2	4
62	CPT	2	3	3	5	3	5	2	1	3	3	5	5	2		2	3	3	2	3	4	5
68	CPT	4	4	2	2	2	2	2	4	4	3	4	4	1		3	3	2	3	2	4	2
69	CPT	1	4	1	2	2	2	1	3	1	1	2	3	4		1	5	1	3	2	2	2
71	CPT	5	4	1	3	1	5	5	5	3	3	5	2	3		2	5	1	5	1	4	3
72	CPT	1	2	2	1	2	1	1	1	3	4	2	3	3		1	1	2	2	3	4	2
80	CPT	5	2	2	2	1	4	4	3	3	1	3	3	4		3	3	2	3	3	3	4
84	WO1	4	3	1	3	2	3	2	2	2	4	4	5	4		2	3	4	3	4	3	4
85	WO1	5	5	1	5	2	1	4	1	3	2	1	5	4		3	4	1	1	2	4	4
87	WO1	3	4	5	5	5	3	4	5	4	4	5	5	2		4	2	4	3	3	5	1
89	WO1	1	2	1	4	3	2	3	4	5	3	3	2	1		2	4	2	3	2	4	1
92	WO1	2	3	2	2	2	2	3	2	5	2	3	2	4		3	4	4	4	4	3	2
93	WO1	4	2	2	2	2	2	2	2	2	2	2	2	2		1	4	2	2	2	2	2
94	WO1	5	2	1	5	2	3	5	4	3	2	5	2	1		3	5	1	5	3	3	3
96	WO1	4	5	2	4	2	4	3	3	3	4	4	5	2		2	5	4	4	2	3	1
97	WO1	5	3	2	4	2	4	4	3	1	1	4	2	2		3	4	4	2	2	3	1
96	WO1	4	5	2	4	2	4	3	3	3	4	4	5	2		2	5	4	4	2	3	1
97	WO1	5	3	2	4	2	4	4	3	1	1	4	2	2		3	4	4	2	2	3	1
98	CW2	5	3	4	4	4	3	4	5	5	3	3	2	2		4	4	1	3	1	4	2
99	CW2	5	3	2	1	3	1	3	4	3	1	4	3	1		4	4	1	2	1	3	1
100	CW2	3	3	2	5	1	4	4	5	4	4	4	5	5		2	5	5	4	1	4	1
101	CW2	3	1	3	2	1	3	1	2	4	1	5	2	1		2	3	2	4	2	4	3
103	CW2	5	4	3	5	1	5	4	3	5	1	1	3	1		3	4	1	1	1	1	2
106	CW2	4	2	4	4	4	4	4	4	2	3	3	4	4		4	3	2	4	2	4	2
107	CW2	5	2	1	2	2	5	4	5	4	5	4	4	5		4	4	1	3	2	3	1
108	CW2	5	3	3	4	1	4	4	4	3	3	4	2	1		2	3	2	4	1	3	1
110	CW2	5	4	3	5	3	4	4	4	4	3	4	3	5		3	4	3	5	4	2	5
113	CW2	5	3	1	1	1	3	5	4	5	1	3	1	1		4	4	2	4	2	3	1
114	CW2	2	2	4	3	5	3	2	2	3	4	2	4	3		4	1	5	2	4	2	4
116	CW2	4	3	2	3	1	2	2	3	4	2	1	4	3		3	4	2	3	5	2	4
117	CW2	5	1	1	5	2	3	2	5	5	3	4	3	1		2	5	2	3	1	1	1
119	CW3	1	4	1	2	1	2	5	2	5	1	5	5	1		3	5	1	3	1	1	1
	Number of Respondents	34	34	34	34	34	34	34	34	34	34	34	34	34		34	34	34	34	34	34	34
	Average	3.8	3.0	2.1	3.5	2.1	3.1	3.2	3.3	3.3	2.6	3.4	3.3	2.4		2.7	3.9	2.5	3.2	2.5	2.8	2.4
	Standard Deviation	1.3	1.1	1.1	1.3	1.1	1.2	1.2	1.2	1.1	1.2	1.2	1.3	1.3		1.0	1.0	1.3	1.1	1.2	1.1	1.4
				Section Average					3.0									Section Average			2.8	
				Standard Deviation					0.5									Standard Deviation			0.5	

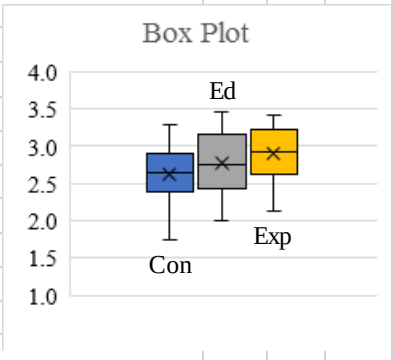




Appendix E: ANOVA of Experience and Education Groups

Section 2: Project Planning Issues – Control vs. Education and Experience

Question Number	Con	Ed	Exp
1	2.9	3.2	3.2
2	2.8	3.2	3.2
6	2.7	2.8	3.2
8	3.2	3.4	3.4
9	1.9	2.0	2.3
10	2.6	3.1	3.1
13	2.9	3.3	3.3
14	2.6	2.9	2.9
15	2.9	3.2	3.1
16	3.3	3.0	3.4
17	2.5	2.5	2.6
21	2.6	2.6	2.6
22	2.2	2.4	2.9
24	2.5	2.4	2.6
25	2.7	2.6	2.8
3	2.8	3.0	3.1
4	2.8	3.1	3.2
5	2.5	2.7	2.6
7	2.6	2.4	2.9
11	3.1	3.3	3.3
12	1.7	2.1	2.1
18	2.2	2.4	2.3
19	2.4	2.5	2.7
23	2.4	2.4	2.6



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	24	62.8104	2.6171	0.14027
Education	24	66.4681	2.7695	0.16512

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.279	1	0.2787	1.82528	0.183	4.052
Within Groups	7.024	46	0.1527			
Total	7.303	47				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	24	62.8104	2.6171	0.14027
Experience	24	69.5	2.8958	0.13532

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.932	1	0.9323	6.76566	0.012	4.052
Within Groups	6.339	46	0.1378			
Total	7.271	47				

Anova: Single Factor

SUMMARY

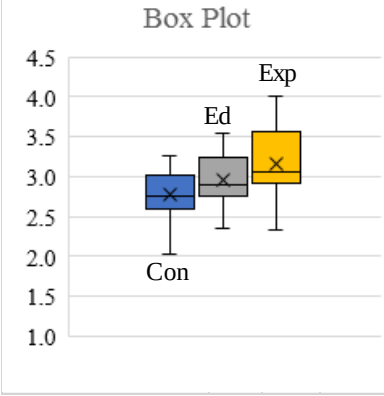
Groups	*Count*	*Sum*	*Average*	*Variance*
Education	24	66.4681	2.7695	0.16512
Experience	24	69.5	2.8958	0.13532

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.192	1	0.1915	1.27485	0.265	4.052
Within Groups	6.91	46	0.1502			
Total	7.102	47				

Section 3: Project Execution Issues – Control vs. Education and Experience

Question Number	Con	Ed	Exp
26	3.2	3.5	4.0
27	3.0	3.6	3.9
31	3.3	3.3	3.6
33	3.0	2.9	3.3
35	2.7	3.2	3.5
37	2.5	2.9	2.9
44	2.7	2.9	2.9
46	2.3	2.4	2.3
47	2.8	2.7	3.0
48	2.4	2.9	3.0
28	3.0	3.1	3.4
29	3.1	3.3	3.6
30	2.7	2.8	3.1
32	2.6	2.8	2.9
34	2.8	2.8	3.1
36	2.0	2.4	2.4
38	3.0	3.2	3.6
39	3.2	3.4	3.7
40	2.6	2.6	2.7
41	2.7	2.9	3.0
42	2.9	2.9	3.1
43	2.8	3.1	3.1
45	2.5	2.5	2.7



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	23	63.8596	2.7765	0.09329
Education	23	68.0486	2.9586	0.1117

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.381	1	0.3815	3.72157	0.06	4.062
Within Groups	4.51	44	0.1025			
Total	4.891	45				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	23	63.8596	2.7765	0.09329
Experience	23	72.6533	3.1588	0.19254

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.681	1	1.681	11.7626	0.001	4.062
Within Groups	6.288	44	0.1429			
Total	7.969	45				

Anova: Single Factor

SUMMARY

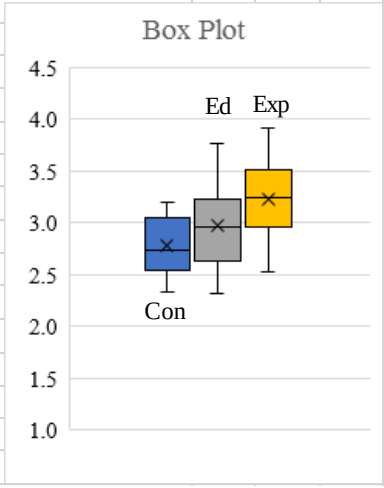
Groups	*Count*	*Sum*	*Average*	*Variance*
Education	23	68.0486	2.9586	0.1117
Experience	23	72.6533	3.1588	0.19254

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.461	1	0.4609	3.03014	0.089	4.062
Within Groups	6.693	44	0.1521			
Total	7.154	45				

Section 4: Project Completion Issues – Control vs. Education and Experience

Question Number	Con	Ed	Exp
52	2.5	2.6	3.2
55	3.1	3.2	3.3
57	3.1	3.0	3.2
61	2.6	2.6	3.0
49	3.0	3.8	3.7
50	3.1	3.6	3.8
51	2.8	3.1	3.3
53	2.5	2.9	3.5
54	2.5	2.7	2.9
56	3.2	3.4	3.9
58	2.3	2.6	2.5
59	2.7	2.3	2.5
60	2.6	2.8	3.0
62	2.9	3.2	3.5
63	2.6	2.7	2.9
64	2.9	3.1	3.3



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	16	44.386	2.7741	0.07066
Education	16	47.587	2.9742	0.16494

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.32	1	0.3202	2.71811	0.10965	4.171
Within Groups	3.534	30	0.1178			
Total	3.854	31				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	16	44.386	2.7741	0.07066
Experience	16	51.5169	3.2198	0.1595

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.589	1	1.5891	13.8086	0.000828	4.171
Within Groups	3.452	30	0.1151			
Total	5.041	31				

Anova: Single Factor

SUMMARY

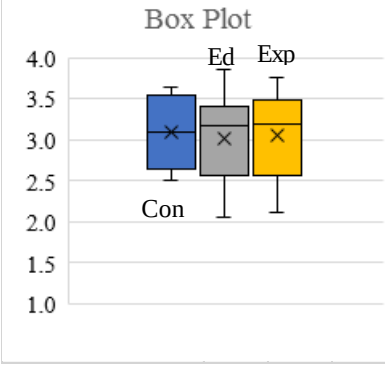
Groups	*Count*	*Sum*	*Average*	*Variance*
Education	16	47.587	2.9742	0.16494
Experience	16	51.5169	3.2198	0.1595

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.483	1	0.4826	2.9753	0.094835	4.171
Within Groups	4.867	30	0.1622			
Total	5.349	31				

Section 5: Project Solutions – Control vs. Education and Experience

Question Number	Con	Ed	Exp
65	3.6	3.8	3.8
69	3.0	3.0	3.1
70	2.6	2.1	2.1
71	3.6	3.5	3.7
72	2.8	2.1	2.1
73	3.2	3.1	3.3
74	2.9	3.2	2.9
75	3.3	3.3	3.2
77	3.6	3.3	3.2
78	2.5	2.6	2.9
80	3.6	3.4	3.5
82	3.2	3.3	3.4
83	2.6	2.4	2.6
66	2.6	2.7	2.6
67	3.5	3.9	3.7
68	2.8	2.5	2.5
76	3.4	3.2	3.4
79	2.6	2.5	2.6
81	2.9	2.8	2.8
84	2.2	2.4	2.2



Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	20	60.4342	3.0217	0.20375
Education	20	59.2128	2.9606	0.2773

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.037	1	0.0373	0.15507	0.696	4.098
Within Groups	9.14	38	0.2405			
Total	9.177	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	20	60.4342	3.0217	0.20375
Experience	20	59.7585	2.9879	0.2849

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.011	1	0.0114	0.04672	0.83	4.098
Within Groups	9.284	38	0.2443			
Total	9.296	39				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Education	20	59.2128	2.9606	0.2773
Experience	20	59.7585	2.9879	0.2849

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.007	1	0.0074	0.02648	0.872	4.098
Within Groups	10.68	38	0.2811			
Total	10.69	39				

References

Appelbaum, S. H., Fernandez, A., & Marchionni, A. (2008). The multi-tasking paradox: Perceptions, problems and strategies. *Management Decision, 46*(9), 1313- 1325.

Barnes, R., Dvir, D., & Raz, T. (2003). A critical cook at critical chain project management. *Project Management Journal*, *34*(4), pp. 24-32.

Cerveny, J. F., & Gallup, S. D. (2002). Critical chain project management holistic solution aligning quantitative and qualitative project management methods. *Production and Inventory Management Journal, 43*(3/4),55-64.

Cohen, I., Mandelbaum, A., & Shtub, A. (2004). Multi-project scheduling and control: A process-based comparative study of the critical chain methodology and some alternatives. *Project Management Journal, 35*(2), pp. 39-50.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage Publications, Inc.

Dash, S. (2015). PMP prep: Resource leveling and resource smoothing. *Microsoft Project User Group, Nov. 3, 2015.* Retrieved form http://www.mpug.com/articles

Gill, A. (2008). An effect-cause-effect analysis of project objectives and trade-off assumptions. *International Journal of Managing Projects in Business, 1*(4), 535.

Goldratt, E. (1997). *Critical chain.* Great Barrington, MA: North River Press Publishing Corporation.

Headquarters, Department of the Army. (2010). *Construction estimating. (Army doctrine publication No. TM 3-34.41).* Washington, DC: U.S. Government Printing Office.

Headquarters, Department of the Army. (2014). *Construction project management. (Army doctrine publication No. TM 3-34.42).* Washington, DC: U.S. Government Printing Office.

Herroelen, W., & Leus, R. (2005). Identification and illumination of popular misconceptions about project scheduling and time buffering in a resource-constrained environment. *Journal of the Operational Research Society. 56,* 102-109.

Leach, L., P. (1999). Critical chain project management improves project performance. *Project Management Journal. 30*(2), 39-51.

Leach, L., P. (2014). *Critical chain project management* (3rd ed.). Norwood, MA: Artech House.

Seider, R. (2006). Optimizing project portfolios. *Research Technology Management Journal, Sep.-Oct. 2006,* 43-48.

Shurrab, M. (2015). Traditional Critical Path Method versus Critical Chain Project Management: A comparative view. *International Journal of Economic Management Sciences, 4*(292).

Smith, D., G. (2012). *Theory of constraints project management: Improving cost, schedule, performance, and overall effectiveness.* (Doctoral dissertation). Retrieved from: ProQuest.

Sonawane, R. (2004). *Applying system dynamics and critical chain methods to develop a modern construction project management system.* (Master of Science Thesis). Retrieved from: ProQuest.

Trietsch, D. (2005). Why a critical path by any other name would smell less sweet? Towards a holistic approach to PERT/CPM. *Project Management Institute, 36*(1), 27-36.

Umble, M., & Umble, E. (2000). Manage your projects for success: An application of the theory of constraints. *Production and Inventory Management, 41*(2), 27-32.

Yang, J. (2007). How the critical chain scheduling method is working for construction. *Cost Engineering, 49*(A).

Walker, D. (2014, July 15). Trends in U.S. military spending. *Council on Foreign Relations.* Retrieved from: http://www.cfr.org/defense-budget/trends-us-military-spending/p28855