Volume 1, Number 1 *2004*

Allied Academies
International Conference

New Orleans, Louisiana
April 7-10, 2004

Academy of Production and Operations Management

PROCEEDINGS

Volume 1, Number 1 *2004*

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THE CASE FOR MEASURING SUPPLIER SATISFACTION

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ABSTRACT

Many organizations struggle in their efforts to establish supplier partnerships, and many such partnerships fail to live up to their potential. This paper examines why partnerships do not deliver the hoped for results, and proposes supplier satisfaction surveys as a possible remedy to this situation. Drawing upon empirical studies in the supply chain management literature, the paper establishes that (i) successful partnerships require trust to develop between organizations; (ii) such trust requires open, two-way communication; and (iii) despite the recognition of the importance of communication, a significant and persistent perception gap exists between buyers and suppliers within many such partnerships. The cause of this perception gap is then traced to a communication imbalance between buyers and suppliers. While buyers generally communicate expectations and provide feedback to suppliers, there is little evidence that expectations and feedback flow the other direction (i.e., from suppliers to buyers). The paper makes the case that buyers can use supplier satisfaction surveys to correct this imbalance and eliminate the perception gap impeding the development of effective buyer-supplier partnerships.

PROJECT MANAGEMENT: USING EARNED VALUED ANALYSIS (EVA) TO MONITOR A PROJECT PROGRESS

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ABSTRACT

This case will provide participants a good real-life problem and practical experience with project monitoring concept using Earned Value Analysis (EVA) concept. It is intended to provide project monitoring tools and skills to present and future project managers in construction and other related fields through an example and hands on exercise.

A small federal government contractor, Environmental Services (not the real name), located in the Tidewater area of the Virginia has lost money on several projects due to poor cost and schedule overrun. The company is executing 10-30 small to medium size projects at any given point of time. The company is growing and wishes to find a way to cut its losses due to cost and schedule overruns. These cost and schedule overrun occur due several internal factors like loss of personnel, improper supervision, skill mismatch, etc. Similarly, external factors like vendor delays, quality of supplies, poor understanding of the scope of the project, unclear designs, weather and other natural delays, etc. causes project to miss an established deadline or cost more than the budgeted amount. The company largely relies on the experience of the project manager to make a decision based on his experience whenever problems arise. There is no system in the company currently to keep track of impact of cost and schedule overruns on the project. The company only knows about the profit or loss once project is completed and final profit analysis is performed.

The company gave the task to establish procedure to better monitor the project to outside consultants. The consultants looked into the several old projects and presented an analysis to the company. It was suggested that company establish a proper mechanism of recording cost and budget details during the project life. Furthermore, use earned value analysis (EVA) to monitor the cost and schedule overruns and adjust project tasks, schedules and resources accordingly.

RATE OF TRANSFER OF QUALITY CONCEPTS INTO THE SERVICE SECTOR

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ABSTRACT

Over the past thirty years, America has migrated from an economy based upon industrial and manufacturing activity toward an economy, to great extent, based upon information, technology and service. The economic shift away from manufacturing toward service is well documented with various statistics regarding the declining balance of manufacturing exports-to-imports, declining manufacturing employment and declining direct labor content within goods. Perhaps even more persuasive evidence is found within the Dow Jones "Industrial" Average; the Average is now significantly based upon service corporations, with Disney, McDonalds, Wal-Mart, AT&T, J. P Morgan Chase, Microsoft, Home Depot and American Express among its thirty component corporations. With similar perspective, Fortune magazine stopped distinguishing between manufacturing and service within its Fortune 500 list during the 1990's. The production/operations management discipline, however, has been slow to respond to this economic shift toward service. During the 1980's, much of the significant service operations research was conducted within the discipline of marketing. Since 1992, only the smallest percentage of academic articles in the leading production/operations management journals have been devoted to the topic of service operations. Emphasis on service content within production/operations textbooks only began in the mid 1990's. Only in 2003 did a market-leading production/operations textbook adopt a predominant service theme. This slow response leads to the hypothesis that basic quality concepts embedded within the production/operations management body of knowledge—concepts with which "factory management" are generally familiar—have also been slow to transfer into the service production environment.

This study is based upon a convenience sample of 126 service corporations across 32 industries. One individual, in most cases an individual with some degree of managerial experience, was surveyed within each corporation. With minimal exception, the corporations surveyed have national presence. The survey employed nine-point Likert-style scales to capture self-reported degrees of knowledge regarding 24 major quality discipline concepts. An extremely high response rate, 92%, was achieved through face-to-face survey distribution and collection. The results of the survey indicate the overall degree of knowledge in the service sector is very low. None of the 24 quality concepts measured resulted in a mean above the median of the Likert scale; many of the means placed within the lowest quartile of the scale. Significant differences were found regarding

the degree of knowledge between certain quality concepts. Areas for future research include replicating the survey process within the manufacturing sector in order to formally test for significant difference in the degree of knowledge between the manufacturing and service sectors.

OPTIMIZING THE SCHEDULING OF THE MILITARY POLICE: A STUDY IN EFFICIENCY IMPROVEMENT IN THE U.S. ARMY

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ABSTRACT

Although the United States military is responsible for the generation of numerous technological innovations in the development of its weapon systems, the use of technology to improve operational efficiency has not been as widespread. A case in point is the scheduling of military police at a large military installation in the southeastern United States. Currently, each hand-derived monthly schedule can require nearly three weeks of preparation. The system is prone to errors, does not take into account squad and platoon integrity, produces substantial soldier fatigue through non-controlled rotating shift assignments, and does not account for special duty assignments of personnel. The objective of this research was the development of an automated model that allows commanders to achieve a balance between ensuring public safety, increasing soldier morale and sustaining military readiness. Using linear and goal programming techniques, this model significantly reduces schedule generation time, improves staffing efficiency, allows for rapid corrections after the schedule is created, and decreases schedule errors. The result is improved assessments of the best policies for deploying military police officers. Additionally, the model generates solutions that consider the human factors of work scheduling, providing a boost to the quality of life of soldiers and their families.

INTRODUCTION

The events of September 11, 2001 and the subsequent wars in Afghanistan and Iraq, combined with the campaign against terrorism, have put significant pressure on the United States military's ability to make maximum use of available resources and personnel. The addition of high profile military and political sites within the boundaries of the United States to the list of potential terrorism targets has further stretched its capabilities. At the same time, the nature of the war on terrorism has required that the military increase its readiness to allow for rapid deployment. The aggregate effect of these requirements is additional emphasis on the efficient use of personnel, equipment, and funds allocated to the military.

A key factor in the security of potential domestic targets and military bases, as well as foreign sites requiring a military presence, is the role of the United States Military Police. The Military Police (MP) provide law enforcement and tactical support to the main arm of the military. The addition of guard and foreign law enforcement duties to the responsibilities of some members of the regular armed forces also requires the use of MPs for training and organization. These

expanding responsibilities have put additional focus on the need to make optimal use of the limited ranks of MPs.

To evaluate the efficiency of the use of MPs, an investigation of the scheduling activities was made at a major military installation in the southeastern United States. This installation has a population of approximately 75,000 soldiers, family members, and civilian employees with one MP battalion numbering approximately 500. The battalion is organized into a law and order detachment, a headquarters detachment, and three military police companies which rotate through a three-cycle time management system: one company in training, one company conducting law enforcement, and one company in installation support. The headquarters detachment supports the daily operations of the organization while the law and order detachment performs the administrative duties at the station and conducts specialized law enforcement support such as traffic enforcement, crime prevention, and bicycle patrols. Each cycle is approximately one month in length. Police and investigative services are provided by the MPs on three shifts, 24-hours a day.

In the scheduling of the MPs, battalion commanders strive to achieve a balance between maintenance of sufficient personnel on duty to ensure safety, continuation of readiness levels as prescribed by the Department of the Army, and preservation of a high level of morale among soldiers. Like many police departments, MP battalions commonly operate with schedules designed by hand. This manual method makes it difficult to ascertain if schedules are effective in achieving command objectives. In addition, it is difficult to evaluate alternative schedules as only some noncommissioned officers (NCOs) are skilled and effective at manually scheduling their soldiers.

The intention of this study is to design and measure the effectiveness of a computerized objective-oriented scheduling process in the achievement of goals outlined by commanders. While there is software in the market that addresses the scheduling needs of police, fire, and other emergency workers, these tools do not significantly address issues and variables unique to military organizations and commonly find a feasible solution rather than optimize potentially conflicting demands of commanders simultaneously. The remainder of the paper will provide a brief review of available literature, address the shortcomings in the current system, propose a linear and goal programming approach to the scheduling issue, and discuss the resulting performance achievements.

LITERATURE REVIEW

There is a relative dearth of articles addressing scheduling issues specifically within either the military or general law enforcement. In a non-military setting, Freeman (1992) outlined the development of a simulation that assisted with the deployment of police officers in counties in England and Wales. The intent of the study was to focus the deployments more effectively in areas of rising crime. Although the study had some success, no consideration was made for officer preferences or objectives outside of crime prevention. Human factors were considered in the analysis of the vacation scheduling of military flight crews (Chong & Strevell, 1985). Their research primarily focused on the objective of maximizing crew preferences by allowing crews to indicate preferences, informally negotiate, and bid on available vacation slots. Kress et al. (1994) used scheduling to improve military efficiency by minimizing the number of flights crews required at military bases. However, no consideration was made of human factors in that study. Tiron (2002)

notes the importance of improved efficiency in the scheduling of MPs as the lack of available soldiers has forced the use of private guards to protect military bases in some cases.

CURRENT SYSTEM

The current system by which MPs are scheduled is a manual process performed by NCOs. As there are no cost/budget constraints (the Department of the Army has centralized control over the management of personnel), command is only concerned with the development of a distribution plan/schedule that addresses both available manpower and the need for enforcement. The number of soldiers and supervisors required per day per shift is determined based on projections from historical data, but special events, operations, or enforcement activities may cause fluctuations in these requirements. A key consideration in the creation of a feasible schedule is supervisory requirements. Not all NCOs must act as supervisors, but all supervisors must be NCOs.

At the operational level, the creation of a schedule is a time consuming task, often requiring up to several weeks to prepare a schedule for the next month. It is not uncommon that an incorrect scheduling action is discovered only after the schedule is complete. The volatility of the requirements demands that considerable time is spent fine-tuning the schedule. Most units have a goal of publishing schedules one to two weeks in advance, but continual changes in conjunction with the time required for schedule modifications frequently make this goal unattainable. In an attempt to minimize the amount of time spent making adjustments, some NCOs have resorted to shorter term schedules, reducing predictability and planning capability.

In addition to the operational aspects, the current scheduling system does not take into account human factors that affect soldiers. For example, the shift arrangement worked by patrol personnel is a strong determinant of the level of soldier morale, job satisfaction, and effectiveness. Poorly designed rotational shifts create confusion, fatigue, and turmoil within the organization. Additionally, assignments often fail to accommodate soldiers with special circumstances such as court appearances. In summary, the current manual system is subject to errors, is time consuming to create, and causes significant soldier fatigue due to the inability to take into account human factors .

PROPOSED SOLUTION

The primary purpose of the optimization model was to create a daily schedule by shift for a given number of weeks while meeting personnel requirements for patrol and special deployments. These goals must be met separately for enlisted and noncommissioned officers. Additionally, the schedules must take into account nonrecurring requirements for court appearances, time off, and other issues that may remove a solider from participation in standard duties. Of the subset of available solutions for this schedule, preferences were to be given based on two secondary objectives of the model: the maximization of control and accountability through the maintenance of the integrity of unit assignments, and the maximization of factors related to the morale and quality of life of the soldiers. The integrity of a unit is defined as the degree to which a group of soldiers from the same unit work similar schedules or shifts under the same supervisor. Human and quality of life factors for soldiers include taking into account soldier schedule preferences, minimizing

weekend work, maximizing the use of five consecutive day workweeks with two subsequent days off (the military does not provide overtime pay or compensatory time for extra hours), and the minimization of schedule volatility within the planning horizon.

Upon further research, the individual objectives of the model were summarized as the extent to which the following conditions were met: assignments fulfill soldier schedule preferences; Monday through Friday schedules are utilized; schedules maintain consistent schedules within a squad; schedules maintain consistent shifts with a platoon; and excess enlisted soldiers are available for maintenance on Monday day shift. The overall objective of the model can be represented alternatively by the maximization of an aggregate of weighted measures of the model's ability to achieve these individual objectives or by a minimization of the maximum weighted deviation of the individual objectives from targets set by military command. Weights were introduced in each model to allow for commanders to set priorities among the individual objectives. Models were constructed to evaluate the differences in performance for these two approaches.

In order for the solution to the models to be considered feasible, certain constraints must be met. Scheduled personnel must meet or exceed specified personnel requirements for each day of the planning horizon. These requirements are broken down by enlisted and NCOs. In addition, the personnel available on a given day must take into account assignment of soldiers to special duties and absences due to vacations or training. The company in the law enforcement cycle must fill three 8-hour shifts every day, assigning one shift to each platoon. The platoon on installation support duty must work a regular Monday through Friday schedule during day shift. Each soldier must be assigned to a schedule even if they will not perform patrol duties. These soldiers are available for other tasks such as maintenance and training, and also work a regular Monday through Friday schedule during day shift.

Parameters for the model include the projected number of soldiers and NCOs required per day, indications of availability each day of the planning horizon for each soldier, a ranking of schedule preferences by soldier, the shift assigned to each platoon by command, the schedule assigned to each squad within the platoon by command, and the rank and unit of each soldier. The model was optimized using the Large-Scale LP Solver Engine available from Frontline Systems, Inc.

RESULTS

The performance of the model in achieving the objectives can be measured in multiple ways clearly related to its primary purpose. These can be classified under three basic concepts regarding the efficiency of the model, its ability to maintain accountability and control, and its ability to incorporate human factors.

Given that a schedule can be created, a measure of the efficiency of the model is the speed by which a solution can be generated and modifications can be made. Prior to the utilization of this model, the initial derivation of a schedule could takes upwards of two weeks and was rarely accomplished in less than a single day. As a direct result of the model, schedules can be generated in as short as one minute or less. It should be noted that time alone does not separate the solutions—the solution generated by the model takes into account many additional objectives beyond those considered in the manual model. Modifications to the parameters require similar time

to integrate into a new schedule. It is also possible to retain some aspects of the initial solution when a modification is incorporated. The solution provided by the model is free of errors except for those generated by the user such as typographical errors. An unexpected finding was the ability to significantly reduce the size of the battalion necessary to cover projected requirements. In many cases, an individual platoon was able to provide coverage at levels 33% or higher than necessary, allowing commanders additional personnel for external deployment if necessary. Similar results were recorded on both the single and multiple objective models, although the weighting chosen by command materially altered the days on which the excess coverage was available.

Although no historical records could be evaluated, results from the analysis of the integrity of squads and platoons from the schedule generated by the model were identified by military personnel as significantly improved. Performance was measured in terms of deviation from complete integrity, defined as when all platoon members (or squad members) have shifts (or schedules) that are in agreement. Typical results for a five week planning horizon showed platoon integrity varying from 0 to 17% deviation and squad integrity from 0 to 15% deviation. These results again did not materially vary between the single and multiple objective models for similar weightings and non-extreme targets.

In terms of human factors, results from the model were also impressive during the test period. 90% of the soldiers received either their 1st, 2nd, or 3rd preference for schedule. All soldiers were assigned schedules with five consecutive work days with no volatility in the schedule during the entire planning horizon. Moreover, 30% of the soldiers were scheduled on a Monday through Friday work week. All assignments for special duty or other circumstances were properly allocated without deviation.

CONCLUSIONS

This paper presents an effective means by which the military can increase its readiness and efficiency through the implementation of linear and goal programming models. The incorporation of both military objectives and human factors appears unique in the literature, with the resulting statistics indicating that both can be achieved despite the appearance of conflicting goals. The model generated by the research provides NCOs with a tool that will relieve a time-consuming error-prone manual system with an agile computerized system that takes into account factors that could not have been previously considered. In addition, the model will augment commanders' ability to make assessments of the best schedules and policies for deploying military police officers. The end result is hoped to increase the quality of life and morale of soldiers, improve the efficiency of military manpower utilization, and enhance the safety for soldiers, their families, and other individuals associated with the armed services of the United States.

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GOLDRATT'S THINKING PROCESS APPLIED TO A CONSTRUCTION PROJECT

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ABSTRACT

This research covers the application of Goldratt's Thinking Process (TP) to a construction project. Goldratt's TP is a common sense, step-by-step "roadmap" used to identify core problems and answer three key questions, what to change, what to change to, and how to cause the change, thus eliminating the core problem. To find the core problem, one lists Un-Desirable Effects (UDE's) and connects them through cause-effect analysis constructing the Current Reality Tree (CRT). Next, an Evaporative Cloud (EC) is developed, solutions found, and the Future Reality Tree (FRT) is developed. Initially, it was assumed the core problem would be long lead-times for the major equipment. It turned out to be the owner's unrealistic delivery promises. Goldratt predicts managers will search out solutions to UDE's, never solving core problems. Many steps were taken to prevent the long lead-time of equipment delivery, but these steps missed the real solution. Based on the outcome of the FRT, bringing the owner, engineer, and contractors together early on, will help alleviate many of the UDE's experienced on this project.

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