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An Empirical Analysis on Cognitive Conceptual Reference Model for Command and Control

INTRODUCTION

War has been for better or worse served as dependent variable throughout human civilization. The term ‘Command and Control (C2)’ is coined and sprung from the necessity of having to give an order and manage the troops in every combat situation. The Command and Control is without a doubt invariable constant that determines the outcome of otherwise center of gravity on the enemy.

In an age when a rapid convergence of various subjects and information breeds uncertainties upon complexity; thus a call for more effective and efficient solution to answer the current situation is imminent. Amongst the answers lies the element of agility. The task for the coming days as a scholar in this field would be successfully coming up with ways to define and integrate the factor of agility into the existing concept of Command and Control.

Previous studies in this field of C2 varied in its focus and vastness; however the lack of defined modeling and empirical analysis was evident. Especially regarding the effectiveness of C2 in conjunction with the element of agility. In addition, the recent study of C2 based on NCW (Network Centric Warfare) has to incorporate the factors such as amazing development of weapon system, information sharing as well as the critical Peer-to-Peer decision making process.

Hence, the need for a comprehensive research on how the element of agility plays in the effectiveness between the upper-level decision makers and whether this affects the overall outcome of the C2, became imminent.
PRIOR QUANTITATIVE RESEARCH

Thus, the following thesis seek to provide the following: First, provide a cognitive conceptual reference model by distinguishing each process of C2 based on the element of agility. In order to explain whether such model could serve as an alternative solution to ever more uncertain environment as well as to come up with various factors that affect the Command and Control. Second, by applying the given model to the perceived acceptance scale at the individual level by carrying out a sample survey in furtherance of providing implicating factors, and affects the C2 in general.

EMPRICAL ANALYSIS

Methodology for this research are as follows: First, define the term, "Agility"; use the inference process and concept of MECE as basis for deducting the factor of agility in terms of use of military power. Second, define the term, "Command", and "Control", both in literary and based on the Network-Centric Warfare tenets. Then using preceding researches to analyze the changes in the concept of C2 - to deduct the fundamental function of C2. Third, analyzing the different models of C2, especially the procedural aspects to find the common process within the C2. Fourth, utilizing the four models deducted from the earlier analysis, introduce the "Structural Model for Examining the Effectiveness of Command and Control." Fifth, analyzing the perceived acceptance scale of individuals to identify the factors that directly and indirectly affects the C2 effectiveness by using the above structural model.

DETAIL OF SURVEY
The details of the individual survey are as follows: in total of 518 people who answered the survey, 317 (61.2%) were military personnel, 201 (38.8%) were civilians. 237 (45.8%) were in their 40s, and 421(81.3%) were male. Although the age and sex were skewed however given the question and scope of the research it was appropriate. Also, 355 (68.5%) responded as "middle-class" economically, and 296 (57.1%) had lived in Capital or the vicinity of Capital. In terms of level of education, those with Masters of Arts degree made up 254, 49% making the demographic above average in education level. Due to the nature of the survey and the questions asked, out of 317 military personnel, Army made up 147 (28.4%) and 101 (31.5%) were a lieutenant colonel. As for civilians, 58 (11.2%) held the position of "section-chief."

INSIGHT OF EMPIRICAL ANALYSIS

To briefly summarize the findings: out of four factors that affect the effectiveness of C2; agility efficient coefficient (EC) were measured highest at 0.5702; common procedural EC at 0.2933; collaborative interaction at 0.2726 and unique function of C2 at 0.1372.

These results are broken down to these interpretations: First, the agility factor had the biggest ramification in terms of affecting the C2. Secondly, sharing and bettering of the common procedures in C2 should be used in educating and training in order to improve the collaborative interaction as well. Third, direct and indirect effectiveness of collaborative interaction has proven itself with EC at 0.2726 and another imperative factor in C2.

However, the unique function of command and control of lacks the effectiveness in both direct/indirect way to the betterment of the acceptance of C2. What this implies is that, the commander's duties of; situation awareness, establishment of
intention, sense of responsibility, delegation of authority, establishment of rules, set up limitation, control, evaluation, education and training is run idly. In particular, at independent level of evaluation; majority of those surveyed and interviewed answered that they had little awareness in terms of situational awareness, intention, education and training.

Hence, the difficulty in executing the plans and sharing the information on the situational analysis. In addition, commented that they had not received, a lack of, training/education on the unique function of command and control to carry out effective command and control. Thus, this research suggests that in order to improve the effectiveness of carrying out command and control, one would need comprehensive education on this matter.

RESULTS AND RECOMMENDATION

Thus, the conclusion of this research are as follows: First, those who have answered the survey are well aware of the need of 'C2' while affected by natural disasters and other crises. Second, in order to effectively achieve one's goals one could be trained and educated. On the four basic tenets that have been suggested by the 'Concept Reference Model' derived in this thesis along with 32 specified attributes that could be applied to any practical situation. Third, this paper lends theoretical background to assess and evaluate during training in order to enhance C2 capabilities. Fourth, the findings of this research used as a tool to further development of the theoretical and practical betterment in the subject of C2 studies both in and outside the country. Fifth, this paper could serve as a valuable asset (blueprint) for the currently ongoing development of software and design of the C2 and as supplementary information for practical application in due time. Sixth, this paper expanded the scope of research from the previous ones.
From the limited perspective to NC-based environment, approaching it by AHP method, to include verifiable way to prove the correlation of multi-criteria decision analysis (known as SEM methods). Thus, pave the way for future improvements on the subject.

On the note, the effort in reducing the errors in the sample data should be continued vigorously. As well as a hope that there will be many researches following the similar line of questioning for betterment hence put into more practical applicable use.
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