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ANALYSIS OF VIETNAMIZATION: SUMMARY
AND EVALUATION

William G. Prince

Bendix Corporation

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13. ABSTRACT This report is the summary of a two and one-half year study seeking quantitative measures of ARVN performance, descriptions of the war in Vietnam over time and across provinces, guidance for force mix between regular and territorial forces, evaluations of village development efforts, evaluations of the 1972 offensive impacts, and optimum levels of friendly initiative. Also included are a self-critique, some general conclusions regarding the utility of the methods employed, a list of references, and a comprehensive glossary. Volumes II and III of the report provide a detailed description of the data sources and definitions used in this work and a data abstract of the forty-odd variables found to be most valuable for study.			

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SUMMARY AND EVALUATION

Final Report
Volume I

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The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the Advanced Research Projects Agency or the U. S. Government.

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This final report is the condensation of a room full of formal reports, working papers, notes, and computer output produced during some 27 months of study. As principal investigator I accept the blame for any omission or misrepresentation and give credit for the day to day production to the members of the study team. Bendix employees John Adkins, Ron Bauer, Cris Candela, Phil Chase, Carol Hiroka, John MacDougal, Dave McCormick, Peggy Mobley, Mike Morris, and Bob Youngblood labored diligently on my notions and often found their own path of inquiry. Consultants Jeffrey Milstein and Raymond Tanter provided valuable assistance in planning and interpreting the work. Nguyen Thi Hien gave us all better insight into the Vietnamese nature. The active interest of Robert Komer has been especially useful and I apologize for not getting as far into the attitude data as he suggested. In the Office of the Assistant Secretary of Defense (Systems Analysis) I owe much to Thomas Thayer for helping to get the project started. Once under way much of the problem formulation was guided by the Vietnam operational and analytic experience offered by OASD/SA analysts Lt. W. J. Eddins, Maj. Wayne Downing, Maj. Bill Farnagle, and James Boginis. The interest and patience of Deputy Assistant Secretary C. E. McManaway is appreciated and I share his reservations over the limitations of our findings. I can only add that in spite of the limitations outlined in this report, any systematic effort to identify and learn from the observed regularities is better than none as long as these limits are understood. Finally, we all thank the Defense Advanced Research Projects Agency for its support of this opportunity to practice our trade.



W. G. Prince
Principal Investigator

Trời đã cho đất nước Việt-Nam chúng ta nhiều tài nguyên phong phú. Người dân Việt-Nam chúng ta năng động, can-đảm và chuyên cần. Một tương lai sáng lạn đang đợi chờ toàn thể quốc dân ta, nếu cuộc binh đao giữa người Việt-Nam không còn tiếp diễn mãi.

"Our country is very richly endowed by nature. Our people are dynamic, courageous, and hard working. The brightest future awaits the whole Vietnamese nation if only this long fratricidal war could be brought to an end. "

Nguyen Van Thieu
President of the Republic of Vietnam
Saigon, July 11, 1969

"It is a strange and it is almost an inexplicable situation, at least from our viewpoint. "

Dwight D. Eisenhower
President of the United States
Washington, D. C. , April 27, 1955

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SECTION I

SUMMARY

Objectives

The basic objectives of the Analysis of Vietnamization project have been:

- Systematic analysis of routinely reported Vietnam data in search of models applicable to policy-relevant questions concerning the withdrawal of U.S. combat forces.
- Evaluation of the data and the use of various quantitative analysis methods as aids to decision making.

The specific questions addressed by the analyses cover a wide range of issues including:

- Unit effectiveness (ARVN performance)
- Measures of conditions ("progress") and activity (description of the war)
- South Vietnamese mix of regular and territorial forces (RVNAF composition)
- Impact of socio-economic conditions on popular behavior and attitudes (village programs)
- Allocation of post cease fire development effort
- Attrition processes and impacts of the 1972 offensive on development
- Results of various levels of friendly initiative.

Approach

Evaluations of the situation in Vietnam and analyses seeking to explain the processes involved have been carried out from countless perspectives using every conceivable approach and source of information. The

scope of this work ranges from illustrating progress in terms of an upward trend in the percentage of population living in relatively secure and developed areas to first hand impressions of observed conditions and events in a single village. The amount of routine reports of numbers measuring these conditions and events is so great that a complete inventory of the available data may never be made. The approach followed in this project is based on a conviction that even though security, battles, and death are very personal matters to those involved:

- At least some of the aggregate numbers reported are valid measures of central elements in the processes at work.
- The different values represented by these numbers from time to time or place to place are not determined by chance alone, but also by various doctrines, conditions, and attributes of forces involved.

Nearly all doctrine and decisions taken in the war at every level are founded on such a belief that there are regularities in the occurrence of particular conditions and events. Most actions were taken with the expectation that in that situation the chances of a favorable outcome were greater for the action taken than for some other course of action. When unfavorable outcomes resulted it was likely that the situation had not really been what it was perceived as being so some random values will be present in the data, but there was probably even some regularity in misperception by either side. The basic approach followed in this project was to divide the observations into sets according to the situation and find those regularities in the data that could be translated into explicit decision rules or doctrines applicable to issues arising in the process of withdrawal of U.S. combat forces from the war.

Findings

ARVN Performance — The measures of effectiveness applied to divisions and independent regiments were in the form of a ratio of observed performance to expected performance. The expected performance was based on multiple regression models incorporating past performance, the combat environment, and unit employment to provide an empirical basis for rating units on a number of performance measures including:

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- Enemy eliminated on offensive operations
- ARVN offensive kill ratio
- Enemy offensive kill ratio
- Enemy initiated incidents

The results tended to show much less difference between units and less change over time than was indicated in the basic quarterly evaluations. The work also found that units which produce the highest body counts and best kill ratios did not rank highest according to what might be expected in each situation. This emphasized the importance of the means used to categorize the data into subsets according to some measure of the combat environment or nature of the war.

Description of the War - A series of descriptive analyses were conducted to find what data elements or combinations thereof best measure conditions and events as they vary from time to time and place to place. Even though thousands of data elements are reported, many of them may be indicative of variation in the same fundamental concept. For example, friendly battalion-days, contacts, contact-hours, friendly killed or wounded, weapons lost or captured, etc. are all strongly related to one another and can be said to measure the fundamental concept "friendly military initiative." It was found that approximately 75 percent of the variation over time present in some 300 data elements could be explained by less than 20 key indicators or composite indices of the following concepts or dimensions of the war:

- Military Dimensions
 - Friendly Presence - measured by regular maneuver battalion and territorial/para-military unit strengths.
 - Enemy Presence - measured by main force maneuver battalion and local unit strengths.
 - Friendly Activity (initiated) - measured by friendly killed on large unit operations and number of contacts on small unit operations.
 - Enemy Activity - measured by friendly killed in enemy initiated incidents and number of standoff attacks.

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- **Socio-Economic Dimensions**
 - **Social Benefits** - measured by an index derived from Hamlet Evaluation System (HES) question responses concerning availability of facilities and services.
 - **Economic Strength** - measured by an index derived from HES question responses concerning local market conditions.
- **Political Dimensions**
 - **Political Influence** - measured by indices derived from HES questions concerning cooperation with or participation in either GVN or VC programs.
 - **GVN Presence and Activity** - measured by indices derived from HES questions concerning the status of local administration, development programs, and information/psyops programs.
 - **Enemy Presence and Activity** - measured by the size of the VC infrastructure (VCI), number of political or coercive incidents, and an index derived from the HES question responses on the incidence of non-selective terrorism.

These were the basic measures used in the search for regularities between various conditions alternative military and development initiatives and measures of the battle outcomes and popular behavior. A by-product of this study of the variation over time was a recommendation for simplification of the HES from more than 100 questions to 34 questions organized into ten sub-models.

In the same manner the descriptive work examined similarities between provinces to determine if the cases (province-months) are 44 (or more) different situations or if there is some underlying structure that justifies categorization of the cases according to some criteria better than time or administrative divisions (military regions as is most commonly done). It was found that a two dimensional structure portraying the regular force and territorial force character of the war provides a strong basis for categorizing nearly all cases into one of four distinctive groups.

RVNAF Composition - This analysis was conducted in search of optimum levels for ARVN, RF, and PF strengths in order to maximize expected GVN control in each of four categories of cases. The categorization of cases was based on an earlier OASD identification of main force,

guerrilla, mixed and "other" provinces. The models obtained from the data analysis were generally weak and indicated that the optimum force mix did not exist within the range of the observed data.

Village Programs -- A large portion of the project effort was devoted to tests of the hypotheses underlying "revolutionary development" or pacification which generally state that:

- Village programs for social, economic, and administrative development have a positive impact on these three conditions.
- The resulting social/economic/administrative conditions are reflected in subsequent levels of cooperative behavior with the GVN and VC, e. g., political influence.
- The degree of impact is conditioned by security, military operations, and initial social/economic/administrative conditions.

Tests using both province and hamlet level data in both cross-sectional and time series analyses confirmed all three basic expectations. However, neither security nor measures of military activity emerged as strong components of the process in more than just a few provinces. For example, the effect of economic strength upon political influence was strongest in areas of relatively low security, but this could be an artifact of low economic strength being associated with low security and diminishing returns at high levels of economic strength. In any event, the conclusion to be drawn is not that security in itself is unimportant to political influence, but rather that in hamlets where security was good enough to allow reporting under the HES, the payoff of economic strength in terms of popular behavior was largely independent of security.

The relationships varied greatly from province to province in such a way that no single measure or combination of measures of the nature of the war; military presence and activity; or other social, economic, political, demographic, geographic, and temporal factors could explain in terms of a generally useful model. Even though these province to province differences could not be easily explained, they do offer a basis for distributing future development program efforts between the provinces. A set of recommendations for post cease-fire allocations was derived from 1972 conditions, trends, and the expected returns in GVN political influence.

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Impacts of the 1972 Offensive - A number of elements of the 1972 data were incorporated in the descriptive analyses as well as other efforts seeking to account for significant changes observed in pacification and security scores. Comparison of the variations in the style and intensity of the offensive with economic, social, and administrative conditions revealed that except for the extreme cases of Quang Tri and Binh Long, the only significant gains by the enemy were in poor and not especially well administered or controlled areas. Where GVN presence and control had been solid, it tended to remain so. With regard to long term impact of the offensive, the situation in October 1972 was fairly close to that in October 1971 -- pacification was set back approximately one year.

Less hopeful signs emerged from a brief study of possible objectives behind the scale and timing of the offensive. A possible interpretation of the offensive was that factional splits in the North Vietnamese leadership had forced those advocating a quick military victory in the south to make their move before more moderate interests gained an upper hand. Study of the open literature on North Vietnamese leaders and their views revealed no basis for the factional interpretation. The offensive seemed consistent with the expressed goals and strategies for fighting and negotiating. The goals appear unchanged and two opposing armies remain in the South.

Another approach to study of the offensive was attempted but was overtaken by events before the necessary data could be assembled. This effort sought to apply Lanchester attrition models to prediction of outcomes in the areas of major regular force engagement. Tests subsequent to the receipt of province level strength data for use in a curve fitting exercise yielded a set of assumptions and equations that accurately predict the friendly and enemy attrition associated with the initial GVN defense, loss of territory, counter-offensive, and eventual stalemate.

Friendly Initiative - Several revised research strategies were used in a continuation and expansion of the work on RVNAF composition. Friendly activities as well as strengths and combinations thereof were examined relative to several outcome measures under various threat conditions. One of the propositions tested was that for a given level or type of enemy threat there is an optimum level of friendly initiative which is a minimum for total friendly battle costs. Placing all available friendly effort on offensive operations would yield high costs during the operations, but zero effort on offense would also enable the enemy to inflict high costs at his initiative at some future time. The expectation was that the sum of friendly costs due

to current friendly initiative and future enemy initiative versus the level of current friendly initiative has some minimum value. No strong evidence could be found to confirm this expectation. Total friendly costs are almost entirely dependent on the level of friendly initiative.

This negative finding is obvious in view of the additional finding that the several measures of enemy initiative analyzed are essentially unrelated to any measures of friendly strength or activity in the current month or one, two, or three previous months. The reverse is found to be the more likely case - that levels of friendly strength and activity are reactions to enemy initiative. In the study of individual provinces it was found that:

- Terrorism, standoff attacks, and friendly KIA in enemy incidents are negatively related to prior friendly initiative in only 2, 6, and 7 provinces respectively.
- Conversely, these three measures of enemy activity are positively related to subsequent friendly initiative in 6, 7, and 5 provinces respectively.
- Moreover, an adverse or positive relationship between prior friendly initiative and terrorism, standoff attacks, and friendly KIA in enemy incidents existed in 11, 7, and 8 provinces respectively.

Similar negative results were found in looking at the probabilities for a better than average (favorable) score on abstract, composite outcome index for various levels of 16 measures of friendly strength or activity using 6 different measures of threat to partition the data into subsets. The conclusion drawn was that some additional measure such as enemy intentions must be incorporated in the analysis to screen out the cases where enemy activity is deliberately held down.

Evaluation

The second basic objective of this project was to evaluate the use of the aggregate data and quantitative methods as decision aids. Aside from the subjective value any of the foregoing analysis findings may have had for the appraisal of the situation, allocating resources to alternative programs, or learning from the experience, there are at least five basic questions that need to be asked:

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- Did the data actually represent the substantive concepts being examined?
- Did the methods employed accurately disclose the relationships in a useful form?
- Did the interpretation of results bring clarity to an admittedly complex phenomenon?
- Did the effort to clarify complexity conceal any significant limitations or sensitivity of the analysis?
- Did the level of detail examined strike an appropriate balance between the complexity of the problem and the time available to produce results?

An unqualified affirmative response cannot be given to any of these questions. In general, the data and methods probably have a more important role in learning from the experience than they had in support of any particular policy decisions. Many of the findings were that relationships implicit in the doctrine were not found to exist in the data. The positive results that were found emerged as less than convincing. This evaluation faces a dilemma in trying to explain what happened. On one hand there is a need to bring attention to all the findings by setting aside any reservations and going directly to a set of positive and assertive policy recommendations. On the other hand there is an awareness of how "soft" some of the data is, the analytical assumptions that were "bent" along the way, and where different approaches could have been followed given two years of hindsight.

The redundancy and inconsistency in the data were time consuming problems, but they also allow a great deal of confidence in the numbers that were eventually analyzed. The most significant defect in the data is not unique to this project. This is the lack of a single, generally valid measure of success or failure. Perhaps it is best to recognize that this episodic war involves complex issues and processes and that the relative importance of factors such as strength, security, attrition, and development will be continually changing over time and space.

The data problems were also responsible for making some relationships difficult to translate into useful forms. In the study of village program effectiveness the essential decisions to be made were for funding specific activities or projects, but the HES data represents only categorical

information at best. Better, more direct results might have been obtained from an analysis of village conditions and behavior in relation to the time and funds expended on specific activities or projects reported by the agencies concerned. In the same vein, it is hard to translate the results of a study of friendly initiative when that initiative was best measured by friendly KIA. It would be better to say that under given conditions the lowest expected battle costs will be for a certain percentage of available effort on offensive missions rather than the level of offense that gives a loss rate of 3 to 5 men per thousand.

A natural problem in this type of work is the need for clear and concise statements of analysis results and their implications. Yet there is also a need to present sufficient detail regarding the origins of the data and procedures employed to prove the credibility of the work. This is especially true in those situations where the results obtained are not intuitively pleasing. A very detailed discussion of the data, method, and findings for a single correlation might require several pages of text and tables in a technical journal. During the course of this project something in excess of a hundred thousand correlations or regression models were considered. The seventy pages of text in the following section can therefore be no more than the essential elements of the purposes, data base, methods, and results of the work undertaken.

The particular nature of the available data and the large size of the data base combine to produce the most important defect in the utility of the data and analysis methods as quantitative decision aids. Very few decisions with respect to issues considered in this project need to be made in three months, six months or a year. Most seem to have a time frame of a week or two at most (and some were "needed yesterday"). The work on this project has shown that a three month response time is hard to meet and when the time is not taken to carefully review all the data and check the various manipulations of that data, errors creep in.

Conclusions and Recommendations

The experience with the Analysis of Vietnamization project did not produce any simple formulas for data needs, data collection, data analysis, or interpretation of analysis results to say nothing of formulas for the conduct of the war. The project began as a fishing expedition into the sea of readily available Vietnam data. A number of descriptive analyses were undertaken to find the most useful elements of that data. Studies of the data thought to be important to several policy issues were carried out. The products produced were:

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- Simplification and refinement of a generalized Vietnam data base.
- Categorization of the war by province-month according to its regular and territorial force characteristics.
- Identification of linear and non-linear relationships between military, administrative, social-economic, and political dimensions of the conflict.
- Application of those relationships to the problem of allocating development efforts in the post cease-fire period.
- Identification of a workable means for using attrition models to major regular force offensives in Vietnam.
- Identification of the absence of general strong relationships between friendly military strength and activity and enemy military initiative.
- Demonstration of the opportunities and limitations of aggregate data and quantitative methods as aids to decision making.

That the products of this research found only limited usefulness for predicting results of decisions can be attributed to:

- The object of a particular decision not being well measured in the readily available data.
- Errors in interpreting the problem at hand.
- The need for proof that the future will resemble past experience.
- The need for compromise between a prolonged systematic research strategy and a quick and dirty test with respect to problem definition, data acquisition, and choice of method.

Even though direct U.S. involvement in combat and development activities in Vietnam has ended and a repeat of the 1965-1972 experience is not believed possible, a potentially explosive and sporadically intense war continues in Vietnam and Cambodia and there may be a serious need to re-examine doctrine and policies for all levels of involvement in these and other situations. This re-examination as well as planning of support and advice for our clients in Southeast Asia and elsewhere would benefit from:

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- Updating the work on village program effectiveness using HES data and replication using data for specific development activities and programs from AID and GVN Ministry of Revolutionary Development sources.
- Independent replication of the analyses showing only weak and possibly adverse relationships between friendly and enemy initiative.
- Application of the attrition models to possible future offensives and alternative GVN defensive deployments.
- Application of the various war type and threat categorizations to other studies of specific operational and weapons system concepts that were employed in Vietnam.

Overall, it should be recognized that the data base on Vietnam was explored in only a very general way. Sources of data on popular attitudes and specific construction or development activity was barely touched. Military initiative was usually treated as a single measure and found to play little role in the political process. More detailed analysis of this and other topics could account for the surprizes found here. In the end, it is believed that the work on this project provides the Government, as well as other students of Vietnam with a strong foundation for systematic learning from the experience.

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SECTION II

RESEARCH

Introduction

The essential elements of each major research topic and some incidental by-products of the Analysis of Vietnamization project are presented in this section of the final report. The presentation takes up each topic in the order in which the work was done. The project started by examining various measures of ARVN performance. This effort ended short of its original objective of developing new battalion level evaluations. This work did point up a need for a means of categorizing the nature of the war as it differs from province to province. This need was satisfied with a series of two forms of analyses yielding a description of the war. Variation over time in a large number of data elements was analyzed to determine the basic patterns of variance in terms of statistically and substantively independent concepts. Key indicator variables or composite indices measuring these concepts were identified for use in planning subsequent analyses. The descriptive analyses also produced several ways for categorization of the war across provinces. These were analyses seeking to cluster the provinces into relatively homogeneous groups according to similarities in military presence, activity, and direct results (e. g., combat deaths). In an effort parallel to the descriptive work several non-linear models of the relationship between RVNAF composition and AVN control were tested. During the second year of the project a major part of the work was devoted to several approaches to determining the effectiveness of village programs. At the same time events in Vietnam made it important to examine various impacts of the 1972 offensive. Finally, several approaches were tried in a search for regularities between measures of outcome and levels of friendly initiative as well as strength or force mix.

Each research topic described in this section begins with a brief statement of the problem or research question. The basic research strategy followed is described in terms of the data sources, variable selection, and analysis

methods employed. The basic findings of the research are presented in the form of summary tables and listings of major conclusions. In some instances where summarization fails to portray the full complexity or uniqueness of the results, examples of typical cases are given. The work on these research topics has also been documented in detail in one or more technical reports and working papers (depending on the degree of "success") and appropriate references are included here. Additional background information is provided in the following discussion of prior research of the Vietnam War.

Prior Work

The analysis of Vietnamization project was planned to build upon prior analysis of the war and to use data already being routinely collected. Numerous reports of this prior work were reviewed both during the planning for this project and during the conduct of the actual research. A relatively small number of these projects employed the data sources and analysis methods that were used in the work contained in this report. The prior work which will be briefly reviewed here can be divided into three categories. The first category consists of the various attempts to evaluate the effectiveness of operational concepts for the military forces. A second category studies deals with the processes of political and economic development in an attempt to evaluate progress in the "other war." The third category of work examines relationships between the military aspects of the war and various social, economic, and political conditions. In this latter group, it is assumed that a better understanding of these relationships will produce better means of determining how the political struggle is progressing and identifying mutually supporting military and socio-economic policies.

Effectiveness of Operational Concepts - A military activity frequently studied is the small unit action where the small unit has been variously defined as any force smaller than three companies downward to a single squad. The actions of interest are usually classed as skirmishes, ambushes, sieges and patrols. In South Vietnam such actions may involve a mix of troops (ARVN, CIDG, PF, RF, US, etc.). They might be reinforced, take place at night or in the daytime, and may be initiated or disengaged at will.

A study by M. B. Schaffer¹ compares observed small unit outcomes with those derived from a general theory on military engagements. Schaffer applied data on selected small unit actions in Vietnam to Lanchester equations he² and Deitchman³ derived. Schaffer found that Lanchester theory could be validly applied to small unit actions, but a non-linear model had to be used instead of the linear Lanchester law (mutual area fire). Predictions

of aggregate enemy losses were limited by a lack of reliable data for enemy strength involved in the actions during a time period of observation. Development of a generally valid set of deterministic equations would provide a very powerful means for examining the military effectiveness of various types of forces, the use of reinforcements, the factors of night and day, and type of operation or force mission. Predicted and actual losses could be compared and coefficients such as exchange ratio or commitment ratio could be determined by curve fitting to gain insight into the effectiveness and staying power of the units involved.

Another effort to develop predictive models for military operations in Vietnam found that small unit actions appear to be more effective than large unit operations in terms of both GVN control and enemy activity. Raymond Tanter⁴ used linear regression techniques in this work at the RAND Corporation. He found that only small unit actions were significantly related to various measures of outcome. A difficulty encountered here is in the definition of small and large units. The nature of the war was such that much of the data under the heading of large unit operations would simply be an aggregation of small unit operations. Because the definition centered on who was in command (i. e., reporting the action) of how many troops the distinction between large and small tends to be administrative rather than truly descriptive of the action.

The interest in large unit actions is similar to that for small unit actions. The analyst seeks knowledge of effective tactics that accomplish near-term military goals and of a more lasting effort in terms of city and hamlet control, in terms of city and hamlet control, and in damage to the VC infrastructure.

An important problem is to show how the large unit is congruent with some model, such as Lanchester's. A large unit action is defined as a military operation of one or more battalions (or three companies operating under a single commander), which also includes supporting action for other units. Analysis of large unit actions has not led to any accurate predictions of KIA. Niskanen's paper⁵ is representative of the analyses in which only a weak relationship is found between military operations and casualties. The principal problems of this paper are the failure to account for feedback among the various operations, lack of control for trend effects in the measures over time, and failure to separate size of operations. It should be noted that data of similar quality to that used by Schaffer on small unit actions is not readily available because the beginning and end of the large

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unit actions are not always distinct; because some large unit actions are really small unit actions loosely tied together, and because units from several field commands involved in the same action may report redundantly.

In two papers, Schwartz⁶ analyzes VC incident patterns and finds that there are definite patterns of geographical location. The incidents are not random, but appear to be highly regulated and perhaps habitual. His second paper adds the TET offensive to the first paper and finds similar patterns. These papers are a landmark effort, geared to the tactical user in the field, to better predict trouble spots in a province. They do not go into overall strategic aspects nor suggest what the overall enemy incident pattern tells about his strategic intentions or capabilities. The study does not relate the findings to force levels, to friendly activity or to the population control as measured by the Hamlet Evaluation System (HES).

The previous discussion of actions, large and small, tend to deal with the effectiveness of the type of action while it was in process. Schaffer indicates which types of small unit actions are most effective but there is no study of similar quality for large unit actions. Another approach to military effectiveness analysis is to study operations of a military force over a prolonged time period.

Niskanen's study is one representative analysis of military effectiveness over long periods time. Types of operations are not identified, but their outcomes are distinguished in terms of casualties. Another study by Johnson and Anello⁷ measures progress in terms of proportion of the population under control of both sides, changes of control, and rates of change. They use data aggregated by Corps Tactical Zone and apply significance tests. This technique could help determine "progress", estimate force requirements, and forecast future trends. Another popularly suggested measure of progress is attrition of enemy fighting personnel. Opposed to this approach is the contention that enemy attrition and "kill ratios" have very little meaning and that surrender rates best index who is winning.⁸

Periodic reviews of progress, including some measures of military effectiveness, were accomplished quarterly by each service component command in South Vietnam and their major subordinate commands. These evaluations attempt to measure progress in terms of goals specified in a combined campaign plan. These reports contain substantial amounts of supporting data, however, the evaluations are based primarily on field observation and hunch rather than by careful analysis of the data. The

consolidated quarterly report issued by CINCPAC "Measurements of Progress in Southeast Asia," RCS 3100-4, appears to provide a valuable complement to aggregate data analysis. Our review of numerous issues of quarterly MACV reports convinced us that they were inadequate to assess the effects of Vietnamization. There was a strong bias toward optimistic interpretation of trends. For example, an increase in ARVN losses might be termed "improved aggressiveness" while in another report a decline is indicative of "improved use and control of supporting arms."

Still another approach to using Lanchester models was used by Voevodsky⁹ in a long time frame study of aggregate attrition data. He found a wave effect in cumulative casualties for wars and campaigns. When this curve begins to flatten a crisis is reached where that side must add more forces or take greater percentage losses (increase commitment) or withdraw from the contest. Application of this approach to Vietnam data on a countrywide basis clearly shows how major decision points for both sides might have been anticipated. The method can also be applied to major campaigns as will be illustrated later in a curve fitting examination of attrition trends during the 1972 offensive.

A very early work seeking to model the course of a limited war was carried out by Charles Wolf, Jr.¹⁰ He simulated the outcome of alternative military assistance concepts for Iran and South Vietnam. The alternatives which correspond to the regular-territorial dichotomy used in our work each have merit, but his depends on the correct choice of potential threat and, of course, the potential opponent then has the option of using the means for which the defender is least prepared. Overall, the simulation outcomes were dominated by factors which could not be changed for alternative strategies, namely: the terrain, the existing road net, distance of major junctions from the border, loyalty of population, etc.

An example of very detailed simulation of ground combat is the work by Lind, et. al. at the RAND Corporation.¹¹ They stop just short of modeling the individual rifleman in their comparison of a simulation and after action data for an actual firefight. The use of correlation and regression to evaluate performance of ground units was attempted by an IBM analysis group supporting OASD/SA.¹² The unexpected findings from analysis of the Vietnam data used in our work may have ended further inquiry along this line. They found that if one controls for the size and number of operations conducted, ARVN units tend to look better than US units in terms of enemy killed. Neither air support nor force mission appear to make much difference in unit performance.

The use of military resources is often aggregated by special types of operational forces, such as bombing, and the interdiction of border crossings or supply lines external to SVN. These studies¹³ have a limited analytical objective and use only secondary indicators of effectiveness. While they shed light on specialized problem, they are not by themselves broad enough to serve the purpose of studying "control" in SVN.

In conclusion, analysis of military effectiveness has been used to try to answer a variety of questions. The questions are different, the criteria distinct and the results often conflicting. It could be that no single military effectiveness measure is satisfactory and even that no combination of measures exists which is satisfactory over an extended period as an indicator of establishing and maintaining government control of the population over time and space.

Effectiveness of Political and Economic Development - A common but complex concept is that of the "other war," the war to win the "hearts and minds" of people. A single word, "pacification," has come by usage to represent the gaining of allegiance of the population. Yet pacification, as we shall illustrate, has several components and meanings according to the type of program being employed and the methods proposed for its achievement.

Hickey¹⁴ analyzed the somewhat informal political structure of the rural and urban groups in South Vietnam and suggested that combining their interdependence can lead to a "kind of solidarity." Pacification in this case was equated to accommodation of the central government with the social and political groups, such as FULRO (Front Unifeide Lutte des Races Opprinces), or the Cao Dai and Hoa Hao religious sects.

The central government can accommodate groups by supporting the leadership through encouraging them to consolidate, increase their communication and internal structure, and continue recruitment. New and old groups should be given more prerogatives over territories and regions in which they predominate. Finally, they should be given strong representation and voice in the central government.

In short, Hickey's pacification is the accommodation by the central government with socio-political groups to gain their allegiance through democratic processes. He suggested that rural and urban groups are becoming stronger and the possibility exists for such a process. Some of the variables for this assessment might be party or group membership, recruitment rate (net), frequency and attendance at meetings, and the like.

While Hickey's work was not supported by extensive data (ethnic and religious group membership is the extent of his data), other analyses approach Hickey concern from the other end, i. e. , recruitment by the Viet Cong. Denton¹⁵ has analyzed interviews of captured or defected VC as to why they joined the VC. Only data from the captured or defected VC draftees were used by Denton as the non-volunteer portion of his sample. There were three general categories of non-volunteers: (1) those joining the ARVN; (2) those drafted by the VC; (3) those not joining either side. Denton found that the following characteristics formed the volunteer background:

- Zero or large land holdings
- Greater education
- Greater intelligence
- Real or imagined grievances against the government
- Couldn't get along with society
- Lost one or more parents
- Relatives in VC (or no relatives in government)
- Local villagers favored VC
- Complaints about life under government.

The support by Benton's analysis of Hickey's suggestions is readily seen from the latter three causes in the listing above; however, Hickey did not mention reducing government-created grievances. We should suppose that improved treatment of the population is a form of accommodation consonant with Hickey's suggestions.

A second definition of pacification is extent of the government's "control" of the population. In a sense, operationalizing the two definitions can lead to contradictions. Strong military control can easily produce grievances against the government which may turn into more volunteers for the VC. However, in one view of pacification, the proportion of the population under control is assumed to measure effectiveness for that side. Analyses employing

data limited merely to military control are not of great value because long term effects may be ignored. To be effective, control must be transformed into allegiance.

A broader investigation of pacification is needed to determine the degree of government control accounted for by economic, social, topographic, and ethnic factors. Mitchell's regression analysis¹⁶ relates these factors to government control. Mitchell's finding, that greater land inequality accounts for greater government control was given wide circulation in the policy community. Mitchell suggests that poor peasants are too apathetic to respond to the blandishments of the VC. However, another investigator, Russo,¹⁷ conducted a much sounder analysis across 94 hamlets as well as the 26 provinces and found that those provinces having high land inequality also had higher levels of food production and less poverty. In other words, the poorer, landless peasant in the provinces having unequal land ownership is probably still better off than a good portion of the peasants owning land in the poorer provinces. Thus, Russo found that hunger and land distribution are very powerful in predicting VC control — a contradiction of Mitchell.

The basic point about the analysis of government (or insurgent control) made by Russo and Mitchell is that non-military factors can be shown to explain approximately 75% of variance in control. These factors usually change slowly over time but not necessarily across areal units of analysis. They are, generally, not easily or rapidly changed by governments or insurgents. Even land redistribution takes time, and religion, language, real income, and productivity are also not quickly responsive to the instruments of U.S. foreign policy or to action by the government or insurgents.

Mitchell also used regression analysis on the Hukbalahap Rebellion in Central Luzon.¹⁸ With an unusual application of a multiplicative model, he was able to explain 86% of variance in Huk control across 57 municipalities in terms of language, proportional of population who were farmers, land tenancy, percent sugar cane grown, topography, and adjacent Huk control. Note that only the last two independent variables are "military" and that topography is not subject to military manipulation. Mitchell's economic "theory" upon which he purportedly builds his model is not represented by his choice of variables. Nevertheless, his analysis is another convincing demonstration of the need to include non-military factors in any study which deals with political control in an insurgency.

Because both Russo and Mitchell used the Hamlet Evaluation System data to measure government control, it is important to digress at this point to consider some studies of the HES as a source of data.

- Progress Indicators for the Conflict of Southeast Asia, WSEG Report 130, Serendipity Associates, Inc.

This study made internal consistency checks of the HES data and is the best around for that purpose. (Murray Kamrass of IDA is reported to have published a similar report of less depth but not dissimilar findings.)

- The Hamlet Evaluation System in the Republic of Vietnam, RAC Report TP-308 (FOV) October 1968 by D.K. Clark and C. Wyman.

This paper provides one of the most complete documentations on the development of the Hamlet Evaluation System (HES). It is must reading for anyone using HES for analysis. While it is weak in analyzing the reliability and validity of HES ratings, it does a good job of laying out data problems, such as the difficulty of obtaining a complete GVN hamlet roster. The authors headed the contract team which devised the HES concept and wrote the computer programs to implement it.

- "Preliminary Examination of the Hamlet Evaluation System--A Methodological Study," an undated draft manuscript by C. Marshall at IDA.

Marshall used Schwartz's geographical methodology to correlate HES scores with local VC incident rates. It is a good first step in developing a usable method but it does not include enough variables (e.g., friendly presence, friendly activity rates, local territorial security forces, etc.) to validate HES ratings.

- "Pacification Measurement in Vietnam: The Hamlet Evaluation System," paper prepared for SEATO Internal Security Seminar, Manila, June 3-10, 1969, by Col. E. R. Brigham, MACV.

This paper summarizes most of the available literature regarding the Hamlet Evaluation System (HES), gives an historical account of the evaluation of pacification, describes the HES in detail and

provides the rules for scoring hamlets. The paper claims that confidence in the HES increased sharply after the February 1968 TET offensive because HES faithfully reported the situation in February.

A problem with the paper, however, is that it ignores the negative aspects of critiques which have been done by outside agencies, such as the "Hamlet Evaluation System," a report prepared by the Simulmatics Corporation, Cambridge, Mass., May 1, 1968, and "A Probabilistic Evaluation of Pacification Indicators," a report prepared by Pacific Technical Analysts for ARPA, March 15, 1968.

Another example of the application of HES data is in Schaffer's¹⁵ attempt to explain VC control with it. He uses three independent variables; US bombing, US large unit actions and US small unit actions and found small unit actions effective, large unit actions having no effect, and bombing obliterating the hamlet.

The report of a seminar¹⁹ to improve communication between analysts and field operations personnel contains a number of interesting observations on the meaning and importance of pacification. The papers presented at this seminar ranged from restatement for the "domino theory" to some systematic analysis of patterns found in the data including:

- "Field Work with MACV" by R. Behnke of PTA, Inc. described a methodology for data collection and analysis (a Bayesian approach to developing evaluation index measures). Lack of data was not a difficulty, but data defined and collected before first stating the problem for which the data is collected will be of limited value.
- "Pacification Information Systems," by Major L. Dworsniak of MACV CORD-ORD presented the logic for improving the HES in 1969.
- "A Method for Anticipating Characteristics of Enemy-Initiated Incidents in South Vietnam," by A.I. Schwartz of IDA reported a careful analysis of daily SITREPS for the 1964-1968 period. He found that, "...from early 1964 through... 1968 the locales in which large numbers of incidents were clustered did not change materially... 25% of all enemy-initiated incidents took place in 1% of SVN..."

- "Force Requirements in a Counter-Guerrilla End Game," by R. Rhyne of Johnson Research Associates found that aggregate numbers of the opposing forces in an area are not vital. It is the sizes of units likely to make contact that will determine the military outcome.

In summary, a number of analyses have appeared focusing on the social and economic variables of South Vietnam (Denton, Mitchell, Russo, the HES analyses). Some have been related to military aspects, such as VC incident patterns (Marshall) and US action effectiveness (Schaffer, 1968). The interaction of military and socio/political variables, although treated in these reports, has not been as well organized as is possible or desirable. In the remainder of our discussion of prior work we will consider studies that attempt to relate a larger number of variables.

Effectiveness of Military and Development Strategies Combined -
There have been a few studies of the relationship of military effectiveness measures to socio-political variables. The possible combinations increase beyond sensible bound without some careful examination of data limitations and theoretical structure. There is much data of varied quality, and there are a few attempts at combination of "hard and soft" data to predict outcomes of apparent military or political significance in South Vietnam. Conceivably one needs three types of models that can accept the data. The first model combines military effectiveness with important social variables. Niskanen, Johnson and Anello have developed this type of model which deals with military and population control at the province level. Although the model may not be easily understood by potential users and suffers from an excess of data without interpretation, it represents a useful background analysis.

The second type of analysis is the one that examines socio-political variables with apparently significant military effectiveness measures introduced. Some appropriate models have appeared in which the social, ethnic, and topographical characteristics are correlated with military security. Their purpose is to predict to future situations; but they have not included (1) types of guerrilla activity, (2) combinations of the activity with the social data and (3) predictions.

The third type of analytical model should be able to add political variables, to examine sequential interaction between both sides, to predict to the future, and to relate the findings to policy in a simple, understanding fashion.

Work by J.S. Milstein²⁰ was concerned with the problem of why the Vietnam war escalated. He focused upon how the models of the relationships between what was said and done by each side were related to the actual combat operations and other behaviors. Using unclassified DOD data from January 1965 through December 1967, Milstein postulated and tested models of the conflict held by policy makers on both sides in the war.

An empirical model was developed using a mediated stimulus-response concept to better predict the action-reaction patterns, including the publicly stated preferences and perceptions of policy makers regarding the war. Milstein also used indicators of political support, such as U.S. public opinion polls, numbers of Viet Cong and North Vietnamese defectors, and the black market value of the Piaster. In addition, he employed measures of force commitments, bombing, sorties, and damage.

The empirically derived model was compared with the various policy makers' models of the Vietnam war using a method developed by William Charles Mitchell of Stanford University. On the basis of the empirical models, Milstein and Mitchell developed a computer simulation which forecasts more than a year into the future on variables of interest, e.g., killed in action, using simultaneous multiple regression equations.

The techniques explored by Milstein and Mitchell make an important contribution to foreign and military policy making in two ways. First, they provide a means of evaluating the reliability and validity of the policy maker's models upon which ongoing policy is based. Secondly, they provide a means of testing probable outcomes of alternative policies through computer simulations. These simulations are based upon simultaneous multiple regression equations, in which crosslagged correlation is used to infer the causal relationship between variables.

Some of the findings reported by Milstein and Mitchell are:

- Escalation of the bombing of North Vietnam provoked a subsequent counter-escalation of North Vietnamese troop commitments.

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- Bombing de-escalation, on the other hand, led to increased North Vietnamese and Viet Cong willingness to negotiate.
- While sustained bombing inflicts physical damage on the Communists and did impede their troop and supply movements, the increases in bombing rate provoked increases in infiltration by North Vietnamese.
- The greater the rate of U.S. troop commitments, the higher the rate of increase in U.S. casualties.
- Changes in popular support for President Johnson were related to the "hawk" and "dove" policy statements made by the administration: The public reacted negatively to "Hawkish" statements and positively to "dovish" ones.
- The public reacted favorably when there was evidence, for example, in the number of South Vietnamese troops killed that the South Vietnamese were taking over more of the fighting in support of their own country.
- There is clear evidence that the American people wanted a de-Americanization of the Vietnam war.

The implications of Milstein's and Mitchell's work is that policy makers may be operating under a needless handicap, for they have available such tools as data on the war, multivariate analytical techniques, and computer simulation which can be used to evaluate ongoing policy. Once a valid model of the conflict is developed, it can be used to make forecasts, as long as the relationships among variables remain as they have been in the past. Such a model would enable planners to experiment on the computer with alternative strategies without actually implementing them on the battle fields or at the negotiating table.

There is a need, however, to develop more comprehensive models of the Vietnam war. There seems to have been a change in the system of relationships of the variables at the time of the TET offensive of 1968. Several models may be needed to explain and predict the outcomes and behaviors over the period 1965 to 1969. In addition, Milstein's and Mitchell's work is based upon country-wide data. Clearly, the relationships that they talk about should be tested across smaller spaces within Vietnam, e.g., at the province, corps, V.C. military district level, and hamlet level.

Examples of this level of detail in an analysis include another of Schaffer's RAND studies,²¹ a project of Henry Peskin's at IDA,²² and a very comprehensive project at RAC.²³ Schaffer obtained and interpreted correlations for province level HES and military operations data for the 15 month time series from January 1967 through March 1968. The strong upward trend in HES evaluations by advisors (which they were then) was not strongly related to activity in the military realm. The enemy may have been disengaging militarily at the local level, but was clearly not giving up as the TET 1968 actions revealed. Looking back at old data is always more revealing than the slight changes from last month to the current month's data. The other two studies are also interesting in view of the findings reported here. Peskin's use of discriminate function analysis found that friendly military operations were apparently beyond the point of diminishing returns with respect to pacification scores. This probably was not a very popular discovery for the period of maximum U.S. military activity in Vietnam. The analysts at RAC could not believe the adverse relationship found between U.S. strength and GVN control so this bit of information remained buried back in the seventh appendix of their final report. Perhaps it was not just an artifact of the analysis method?

ARVN Performance²⁴

Problem – At the start of the Analysis of Vietnamization project a problem facing the Department of Defense and the GVN was the cost of the war. One way of lowering the cost might be a reduction of ARVN strength, the most expensive component of the Republic of Vietnam Armed Forces (RVNAF) as compared with Regional Forces (RF), Popular Forces (PF), or Peoples Self Defense Forces (PSDF). If ARVN were to be reduced by ten battalions, it would be best to select the ten least effective battalions. Thus, the problem was to develop a means of rank ordering ARVN battalions on the basis of their combat effectiveness or observed combat performance.

This was nothing new. U.S. advisors had been making evaluations of ARVN battalion combat effectiveness, leadership, training, morale, etc. for several years. Battalion, regiment, and division performance evaluations were being published quarterly by the U.S. Military Assistance Command,

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Vietnam (MACV) on the basis of data reported under the System for Evaluating the Effectiveness of the Armed Forces of the Republic of Vietnam (SEER). Because the evaluations reflect the judgment of individual advisors, the tendency would be for the evaluations to be made in terms of the advisor's own experience or what he would expect from a U.S. unit in the same circumstances. While a U.S. unit might be a very good standard, the circumstances were usually quite different (the one year tour to name one). Thus, the research question included the avoidance of comparison to U.S. units as part of the problem.

Approach — Along with the basic statistics, the MACV quarterly evaluations contain a narrative explaining unusually high or low scores on performance criteria such as enemy killed, kill ratio, use of combat support, etc. While waiting for the full data set from OASD (SA), the Bendix study used the MACV quarterly evaluation report data on divisions and independent regiments to carry out a few preliminary tests to see if the factors cited by MACV actually did account for variation in unit performance. If strong multiple regression models could be developed from these factors, it would be relatively easy to compute the "expected" performance of the "average" ARVN unit under various circumstances. Then the ratio of observed to expected performance could be a relatively simple means of ranking ARVN units while taking their different missions and combat situations into account.

Data — The data were extracted from the MACV quarterly evaluations for 1969 and 1970. To compensate for variation in assigned strength these data were expressed in terms of events or actions per standard battalion. The basic data elements included order of battle, activity, outcome, and evaluation measures organized as follows:

• Order of Battle

- | | |
|-----------------------|------------------------------------|
| • Maneuver Battalions | • Force Density (troops/sq. km.) |
| ARVN/VNMC | Total Friendly |
| US/FWMF | Total Enemy |
| NVA | • Force Ratio |
| VC Main Force | Total Friendly/Total Enemy |
| VC Local | • Force Mix |
| VC Sapper | ARVN/VNMC % of Total Friendly |
| | NVA/VC Main Force % of Total Enemy |

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• Activity

- Friendly Mission Allocation
 - Offense
 - Combat Operations
 - Active Pacification
 - Defense
 - Security
 - Static Pacification
 - Reserve, Training, or Rehabilitation
- Friendly Combat Support
 - Artillery Rounds
 - Tactical Air/Gunship Sorties
 - Air Lift/MeDEVAC/Resupply Sorties
- Enemy Initiated Action
 - Ground Assaults
 - Ambushes
 - Attacks by Fire
 - Incidents against Civilians

• Outcome

- Friendly KIA
 - Ground Assaults
 - Ambushes
 - Attacks by Fire
 - Terrorism
 - Mines and Booby Traps
 - On Friendly Offense
 - Total
- Pacification Scores (population)
 - ABC
 - DE & Other
 - VC Controlled
- Enemy KIA
 - Ground Assaults
 - Ambushes
 - On Friendly Offense
 - Total
- Civilians
 - Killed
 - Wounded
 - Abducted

• Evaluation

- Operational Effectiveness
- Personnel/Morale
- Training
- Leadership

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Results — Respectable multiple regression models (both linear and non-linear) were obtained and the ratio of observed to expected values computed for the following measures of effectiveness:

- Enemy eliminated on offensive operations
- ARVN offensive KIA ratio
- Enemy offensive KIA ratio
- Total enemy initiated incidents
- Enemy incidents against civilians
- Artillery rounds per enemy eliminated
- Gunship/tactical air sorties per enemy eliminated
- Operational effectiveness ratings
- Leadership ratings

Three factors ended this effort with the first briefing and working paper. One was a lack of credibility because the ratios revealed less difference between units and less change over time than expected on the basis of the MACV reports. The other was the finding that while country-wide models were generally weak, strong models were obtained by partitioning the data into subsets according to whether the nature of the war could be categorized as main force, guerilla, or mixed. This finding was responsible for re-direction along the lines of inquiry followed in the descriptive analyses. Finally, the SEER reporting system ended in 1970 so the same level of detail was no longer available for application of the technique at the battalion level. In retrospect, this attempt to model ARVN performance may not have been so incredible, so two examples are included in this report.

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Examples -

Enemy Eliminated per Battalion on Offensive Operations

The models (by war categorization) developed for this performance measure make the expected value a function of:

- Probability of contact including -
 - Enemy force density
 - ARVN density
- ARVN Percent of Effort on Offense
- ARVN Strength
- War Categorization (combat environment)

The average scores for the 1969-1970 period are:

Unit	Raw Score (Rank)	Index Scores (Rank)	
		Country-Wide Model	War Category Models
5th Div	18.5 (11)	0.69 (12)	0.84 (12)
18th Div	14.2 (12)	0.73 (11)	1.23 (1)
21st Div	49.0 (5)	1.18 (3)	0.99 (7)
23rd Div	10.9 (13)	0.64 (13)	0.86 (11)
Guerilla War Category Averages			
	23.2	0.81	1.00
1st Div	46.0 (6)	1.07 (5)	1.18 (2)
25th Div	59.5 (2)	1.13 (4)	1.02 (4)
22nd Div	35.0 (9)	0.94 (8)	0.96 (8)
42nd Regt	38.0 (8)	0.74 (10)	0.73 (13)
Main Force War Category Averages			
	47.6	0.99	1.00
2nd Div	96.2 (1)	1.60 (1)	1.17 (3)
7th Div	51.7 (4)	1.31 (2)	0.86 (10)
9th Div	43.6 (7)	0.98 (6)	1.02 (5)
22nd Div	24.0 (10)	0.89 (9)	0.89 (9)
51st Regt	57.7 (3)	0.96 (7)	1.00 (6)
Mixed War Category Averages			
	57.1	1.17	1.00
Country-Wide	52.4	1.00	1.00

ARVN Offensive KIA Ratio

The models (again by war categorization) developed for this performance measure make the expected value a function of:

- Force Ratio
- Enemy Force Mix
- ARVN Percent of Effort on Offense
- Combat Support
- War Categorization (combat environment)

The average scores for the 1969-1970 period are:

Unit	Raw Score (Rank)	Index Scores (Rank)	
		Country-Wide Model	War Category Models
5th Div	6.39:1 (7)	0.94 (8)	0.99 (7)
18th Div	8.30:1 (5)	1.14 (5)	1.19 (3)
21st Div	5.91:1 (9)	0.88 (9)	0.93 (9)
23rd Div	5.26:1 (12)	0.83 (12)	0.88 (11)
Guerilla War Category Averages			
	6.51:1	0.95	1.00
1st Div	8.92:1 (3)	1.30 (2)	1.18 (4)
25th Div	11.11:1 (1)	1.12 (4)	1.00 (6)
22nd Div	8.92:1 (4)	1.34 (1)	1.22 (2)
42nd Regt	3.56:1 (13)	0.78 (13)	0.66 (13)
Main Force War Category Averages			
	8.24:1	1.12	1.00
2nd Div	9.30:1 (2)	1.21 (3)	1.24 (1)
7th Div	6.24:1 (8)	0.96 (7)	0.99 (8)
9th Div	5.85:1 (10)	0.88 (10)	0.92 (10)
22nd Div	7.76:1 (6)	1.01 (6)	1.04 (5)
51st Regt	5.37:1 (11)	0.83 (11)	0.86 (12)
Mixed War Category Averages			
	6.78:1	0.97	1.00
Country-Wide	7.06:1	1.00	1.00

Description of the War²⁵

Problem - The Southeast Asia Province file (SEAPR) was the first large data set obtained from OASD (SA). It contains more than 250 data elements. The SEER data files (two different sets for 1968 and 1969-70) and a Territorial Forces Evaluation System (TFES) summary file were soon added. After a means for merging the two versions of SEET data was found and pertinent extracts were selected from the TFES data, another 150 data elements were available to describe the war. Some 70 more data elements were acquired by weighting the responses to HES/70 questions contained in a HES Question file (QHES). While all this data could be said to describe the war, it is not very efficient or manageable for analysis purposes. Thus, one aspect of the description problem was to achieve some parsimony. Do all the nearly 500 data elements measure substantially and statistically independent concepts in terms of variation over time, or can the description be reduced to a more manageable set of key indicators or composite indices? The other aspect to the description problem was to develop a means of categorizing province-months as to the nature of the war. The main force, guerrilla, and mixed war categories used in the work on ARVN performance had two shortcomings. It was based on an OASD (SA) paper on the nature of the war in late 1970. Secondly, only 15 of the provinces were assigned to the three categories leaving 29 provinces in a sort of non-descript "other" category.

Approach - Factor analysis was the basic analytic method employed along two lines - one for each aspect of the problem. To achieve parsimony and identify the most useful data elements or combinations of data elements a series of factor analysis of the variance over time were carried out - initially on each data source separately and eventually on elements of all data sets for various time periods. In addition to testing to determine if the same results are obtained for different periods of the war (1967-70, 1969-70, 1967-71, and 1969-72), tests were conducted on data from which the overall trends and seasonal variations had been removed. Province to province variation was removed in all cases by subtracting province mean values from the observations at the onset. These tests revealed that the basic pattern of variance over time are rather stable with regard to both the different stages or campaigns since 1967 and the known seasonal fluctuations in intensity. For further analysis this concept definition work meant that different sets of key indicators or indices are not needed to describe pre Tet, post Tet, 1969 accelerated pacification, the 1972 offensive, wet or dry seasons.

In order to categorize province-months several iterations of a factor analysis across provinces were carried out. The first simply sought annual categorizations for 1967 through 1970 on the basis of some 27 measures of military resources, activity, and direct results. This effort to develop province cluster "profiles" also used the OASD (SA) main force, guerrilla, mixed, and other categorization as the theoretical structure to provide a familiar frame of reference. Review of this work led to a change from annual aggregations to analysis at six month intervals, April-September and October-March, to capture seasonal changes. Still another revision of the approach involved elimination of the US/FWMF - ARVN distinction and use of a 22 variable data set making friendly-enemy, large unit - small unit, and regular-territorial/local distinctions. While the four category basis for defining province clusters yielded rather interesting results that were credible, these groupings of the provinces were not especially useful as an analytic device. There was still the problem of more than half the provinces falling into the "other" category which was not necessarily unimportant even if nondescript. Nor were the categories mutually exclusive - a feature desired for any basis of data set partitioning. These problems led to the use of a two factor (dimension) solution which could be named regular and territorial according to the province cluster profiles.

Data - The concept definition work (analysis over time) eventually incorporated more than 300 of the available data elements. Those not used were excluded because of obvious redundancy or general absence of variance (less than ten percent non-zero observations). A complete listing would be excessive for this summary report, however, the essence is as follows:

- Resources (units and/or strengths)

Friendly	Enemy
ARVN/VNMC	NVA
US/FWMF	VC Main Force
RF	VC Local
PF	Local Guerrillas
Police	VC Infrastructure
PSDF (HES questions)	Main Force
Regular	Local
Territorial	Total
Total	

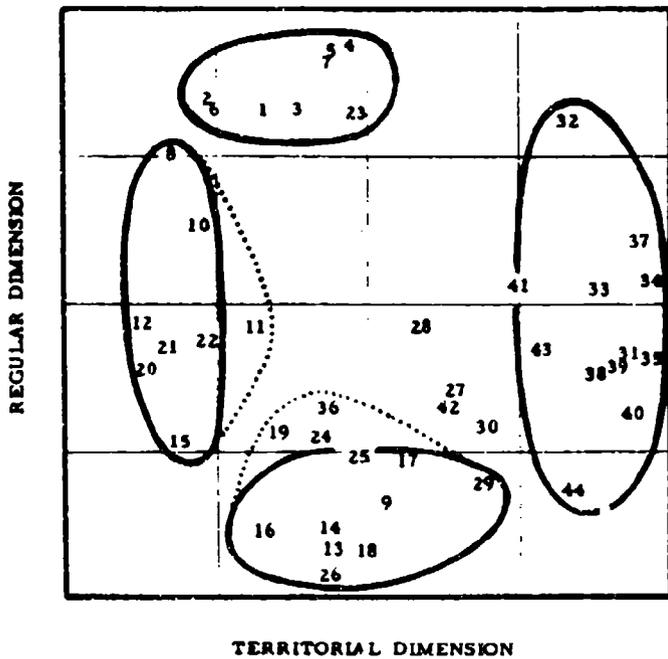
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- **Activities (mission days and/or events)**
 - **Friendly (by force)**
 - Large or Small
 - Offense or Defense
 - Day or Night
 - Short or Sustained
 - Contacts
 - Contact Duration
 - **Enemy (by target)**
 - Ground Assaults
 - Standoff Attacks
 - Harassment
 - Coercion
 - Terrorism (HES questions)
 - Propaganda (HES questions)
- **Direct Results (by force, target, mission, and/or event)**
 - Personnel Killed, Wounded, Missing, Captured, or Rallied
 - Weapons Captured or Lost
 - Arms/Food Caches Discovered
 - Property Damage (HES questions)
- **Social-Economic Conditions (HES questions)**
 - Availability and Use of
 - Health Facilities
 - Education Facilities
 - Local Market Conditions
 - Size and Area Served
 - Variety of Goods Available
 - Quantity of Goods Available
 - Local Agriculture
- **GVN Administration (HES questions)**
 - Hamlet & Village Officials
 - Presence and Activity
 - Training
 - Election
 - Law Enforcement
 - Corruption
- **GVN Social-Economic-Information Activity (HES questions)**
 - Health Services
 - Self Development
 - Land Reform
 - Technical/RD Cadre
 - Information Cadre
 - Movies/Cultural Drama Terms

- Political Mobilization/Popular Behavior (HES questions)
 - Cooperation with Either Side
 - Tax Payment
 - Labor/Self Development Participation
 - Family Member in Service
 - Attendance at meetings

Results — The basic patterns of variance over time found through analysis of these data sets can be represented by less than 20 key indicators and composite indices. Specific questions will naturally dictate some modification and disaggregation or additions, but for a general description of what was happening the following measures are sufficient:

- Military Dimensions
 - Friendly Presence
 - Regular Maneuver Battalion Strength
 - Territorial/Para-Military Strength
 - Enemy Presence
 - Main Force Maneuver Battalion Strength
 - Local Force Strength
 - Friendly Activity
 - Friendly Killed on Large Unit Offensive
 - Contacts on Small Unit Offense
 - Enemy Activity
 - Friendly Killed in Enemy Initiated Action
 - Standoff Attacks
- Social-Economic Dimensions
 - Social Benefits Index
 - Economic Strength Index
- Political Dimensions
 - Political Influence Indices (popular behavior)
 - GVN Presence and Activity
 - Administrative Presence Index
 - Economic Stimulation Index
 - Information/Psyops Activity
 - Enemy Presence and Activity
 - VC Infrastructure
 - Security Index (non-selective terrorism)
 - Coercive/Political Activity



(a) Subset Partitions

(b) Geographic Distribution

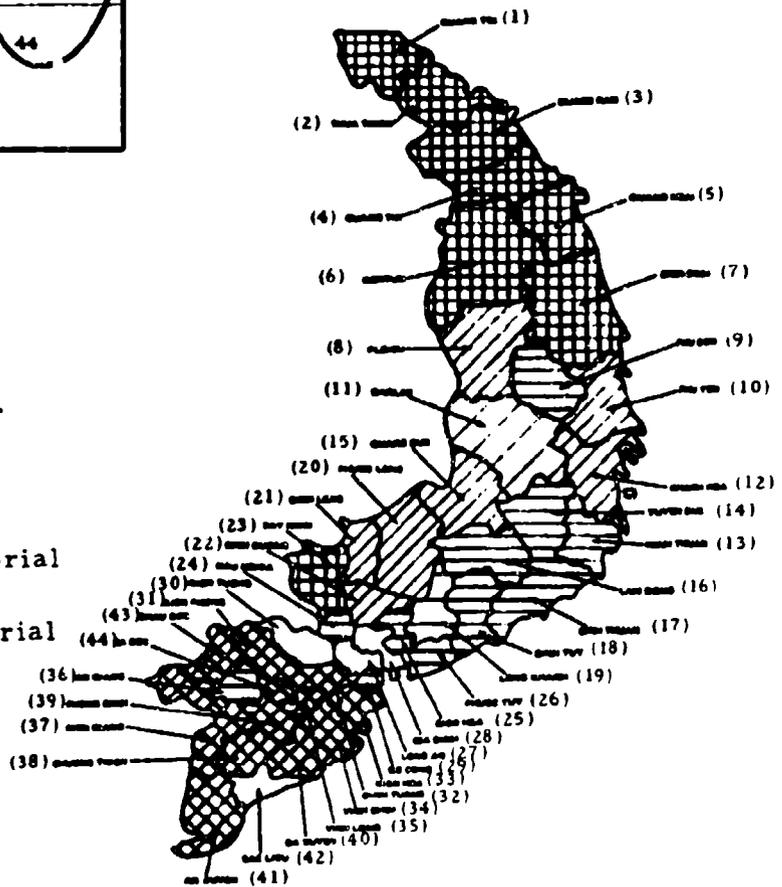
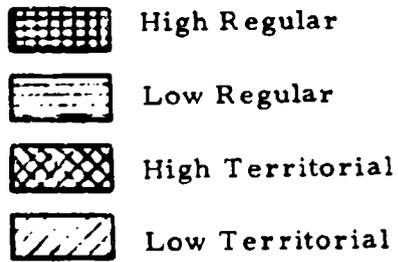


Figure II-1

Average Province Clusters, 4/67 - 9/72

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Data — The final version of the analysis across provinces covered the April, 1967, through September, 1972, time period using the following variables derived from the SEAPR data and aggregated at six month intervals:

- Friendly Deaths on Friendly Initiated Action
- Total Friendly Deaths
- Total War Deaths
- Enemy Initiated Incidents
- Enemy Personnel Strength
- Friendly Personnel Strength
- Total VCI Strength
- Large Operation Percent of Friendly Regular KIA
- Friendly Regular Percent of Total Deaths
- Percent of Enemy Attacks Against Military Targets
- NVA Unit Personnel Strength
- VC Unit Percent of Enemy Strength
- Regular Unit Percent of Friendly Strength
- Friendly Large Unit Operations
- Small Operation Percent of Friendly Regular KIA
- RF/PF Percent of Total Friendly Deaths
- Small Unit Operations with Contact
- RF/PF Percent of Small Unit Operations with Contact
- VC Local Strength
- RF/PF Strength
- RF/PF Percent of Total Deaths
- Percent of Enemy Incidents Against Civilian Targets

Results — The categorization of provinces according to their location on two statistically independent dimensions was noted during the discussion of the research approach as being the most useful result of this effort. The characteristics of the high ends of these dimensions led to terminology "regular" and "territorial". This two dimensional structure yielded a very strong explanation of the variance across provinces in all eleven of the six-month time slices. Figure II-1(a) is a plot of the average solution in this two dimensional sample space. The province number key (1-44) and geographic distribution of the "high" and "low" province clusters are shown in Figure II-1(b). Any four of the provinces do not clearly belong to one of the clusters. One is an understandable special case, Gia Dinh. The other three lay between high territorial and low regular and this too could be reasonable for Long An, Kien Tuong, and Bac Lieu.

The distinctive characteristics of the mutually exclusive province clusters illustrated in Figure II-1 are found in the variables describing total war deaths, various categories of personnel strength, and activities. These are summarized in Table II-1 below:

TABLE II-1

PROVINCE CLUSTER CHARACTERISTIC SUMMARY

<u>Indicator</u>	<u>Regular Dimension</u>		<u>Territorial Dimension</u>	
	<u>Low Cluster</u>	<u>High Cluster</u>	<u>High Cluster</u>	<u>Low Cluster</u>
Total War Deaths	Low	High	Average	Low
Total Enemy Strength	Low	High	Average	Low
NVA Unit Strength	Low	High	Low	Average
VC Local Strength	Low	High	Average	Low
Total VCI Strength	Low	High	High	Low
Total Friendly Strength	Low	High	Average	Low
RF/PF Strength	Low	High	High	Low
Total Enemy Incidents	Low	High	Average	Low
Friendly Large Operations	Low	High	Average	Low
Friendly Small Operations	Low	High	Low	Low
RF/PF % of Friendly KLA	High	Low	High	Average

A final example of the results obtained from the regular-territorial categorization of the provinces is in the form of selected plots of the trends over the eleven time periods. These data for cluster average values are both illustrative of cluster characteristics and interesting for the insight they offer as to "progress" in the war. Figures II-2 and II-3 present the trends for the distinctive characteristics of the high and low clusters on the regular and territorial dimensions respectively. Figure II-4 shows the trends of cluster means for overall force ratio by war category. An index measure of initiative can be represented by the ratio of friendly killed in friendly initiated action to friendly killed in enemy initiated action as shown in Figure II-5. Two other ways of looking at the deadliness of the war are the plots of friendly and enemy killed per 1000 men assigned as plotted in Figures II-6 and II-7 respectively.

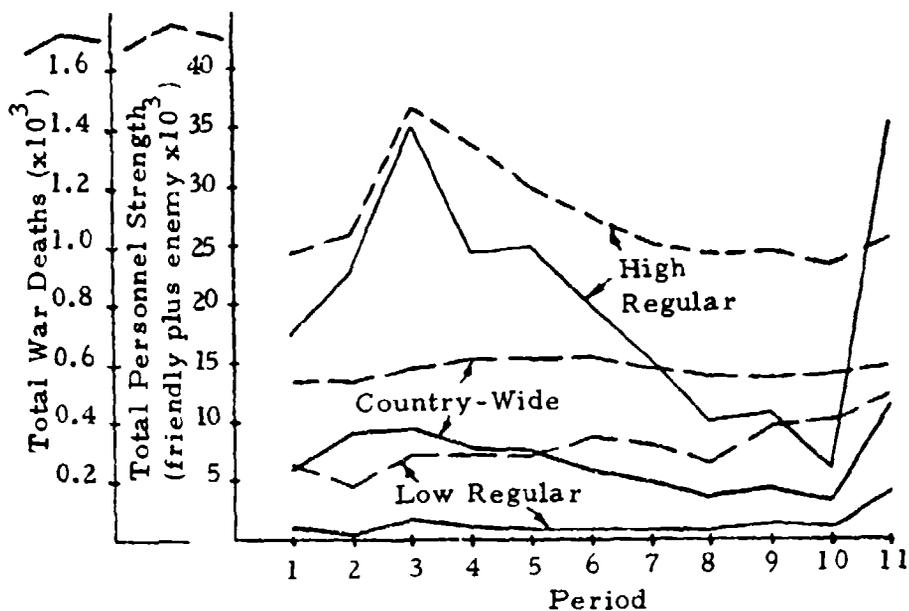


Figure II-2

Distinctive Characteristics of High and Low Regular Province Clusters

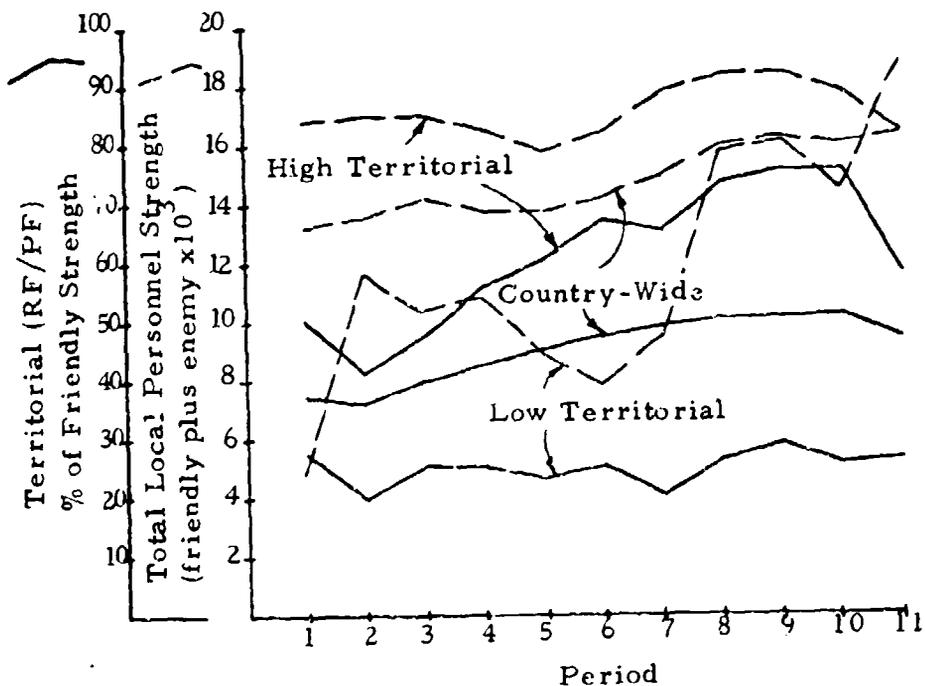


Figure II-3

Distinctive Characteristics of High and Low Territorial Province Clusters

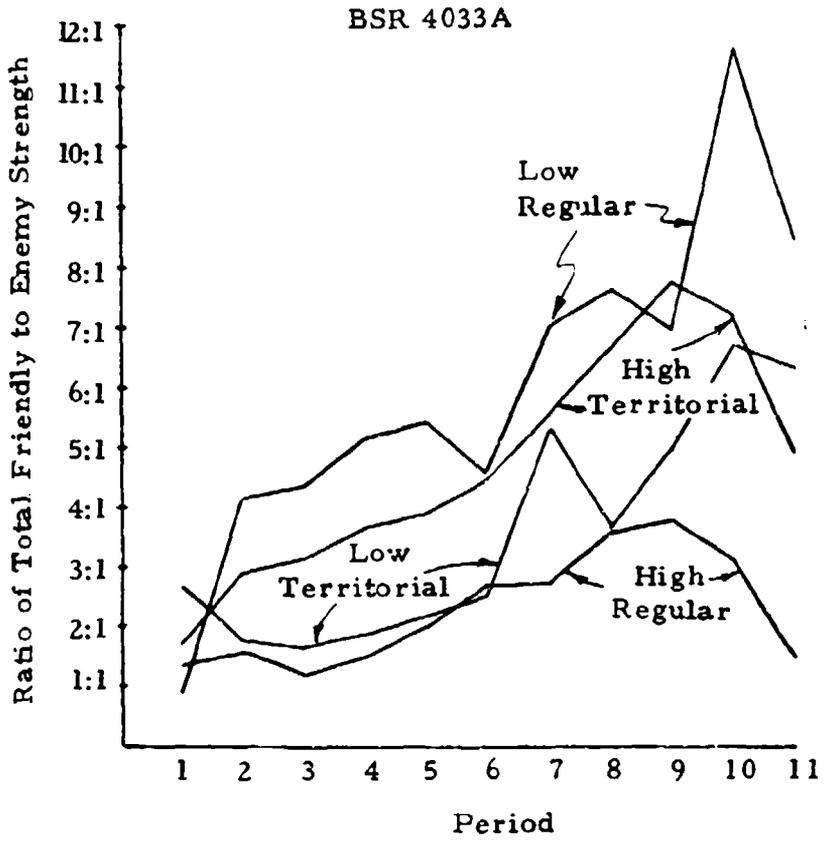


Figure II-4
Overall Force Ratio

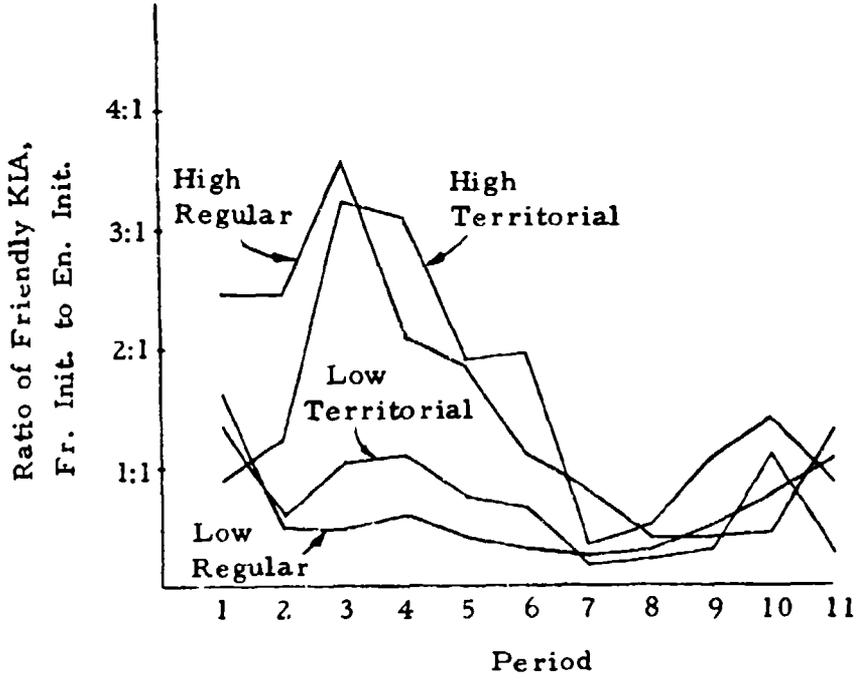


Figure II-5
Friendly to Enemy "Initiative" Ratio
II- 28

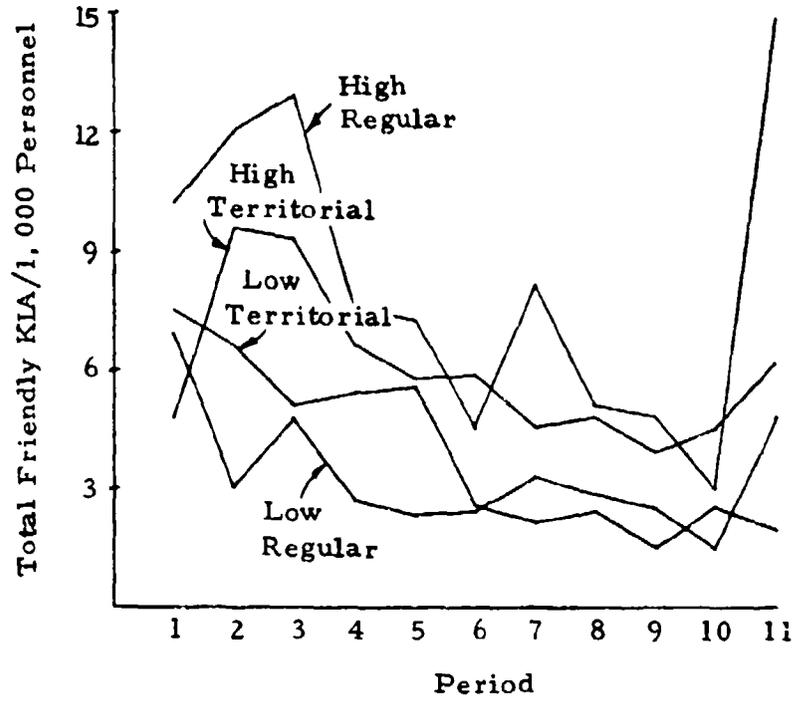


Figure II-6
Friendly KIA Rate

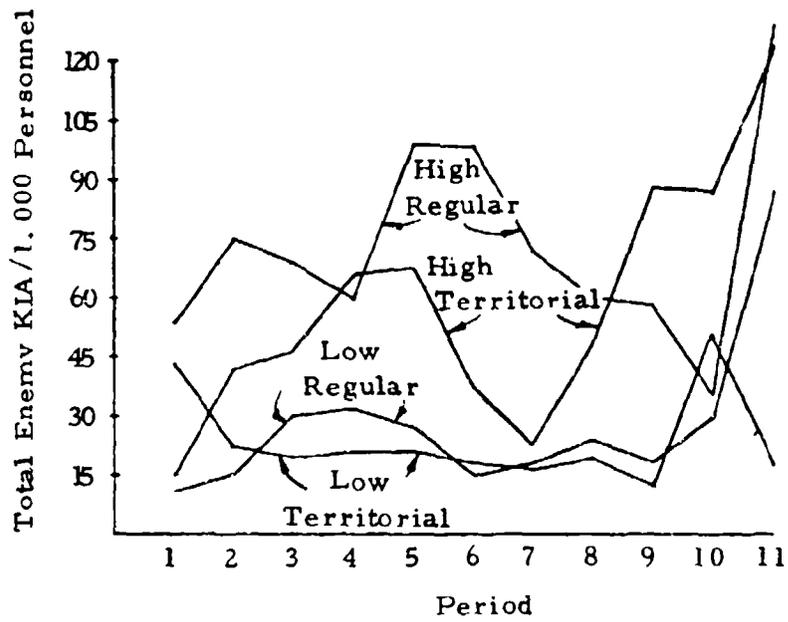


Figure II-7
Enemy KIA Rate

RVNAF Composition²⁶

Problem -- That the war is a mix of various levels of enemy threat and combat environments has been long understood and was clearly demonstrated in the descriptive work. Given the problem of building, deploying, and supporting several types of armed forces, it is desirable to have a size and mix of these forces appropriate to the various threats and environments. An appropriate force mix would be the one which gives a maximum for the expected population under GVN control.

Approach -- Variation of enemy threat and combat environment was represented by the OASD (SA) categorization of provinces as main force, guerrilla, mixed, and other. By assuming that the interactions between ARVN, RF, and PF strength are multiplicative, it was possible to specify a multiple regression model in the form:

$$\begin{aligned} \text{Expected GVN Control} = & C_0 + C_1 \text{ ARVN} + C_2 \text{ RF} + C_3 \text{ PF} + \\ & C_4 \text{ ARVN} \cdot \text{RF} + C_5 \text{ ARVN} \cdot \text{PF} + C_6 \text{ RF} \cdot \text{PF} + \\ & C_7 \text{ ARVN}^2 + C_8 \text{ RF}^2 + C_9 \text{ PF}^2 \end{aligned}$$

An optimum mix (if the point maximizes expected GVN control) is found where:

$$\begin{aligned} 2C_7 \text{ ARVN} + C_4 \text{ RF} + C_5 \text{ PF} + C_1 &= 0, \\ C_4 \text{ ARVN} + 2C_8 \text{ RF} + C_6 \text{ PF} + C_2 &= 0, \\ \text{and } C_5 \text{ ARVN} + C_6 \text{ RF} + 2C_9 \text{ PF} + C_3 &= 0 \end{aligned}$$

Data -- All data elements were obtained from the SEAPR file for 1969 and 1970. In addition to assigned strength for ARVN, RF, and PF, a fourth independent variable was created to represent the effect of Vietnamization. This Vietnamization "balance" was the sum of ARVN, RF, and PF strengths minus US assigned strength. The withdrawal of US forces would increase the balance. Therefore, it could be interpreted that Vietnamization was working if a strong positive relationship was found between the "balance" and GVN control.

Results -- In general, the results showed strong positive relationships for only PF strength. While no strong adverse relationships came out of the analysis, neither did any optimum solutions for force mix. The effect of ARVN strength was difficult to interpret because the strongest pattern emerging with regard to ARVN strength was increases that follow declines of GVN control. Numerous sensitivity curves were plotted which, when applied to specific province situations, allow identification of problems and likely implication of force mix changes. A typical set of these curves is presented in Figure II-8.

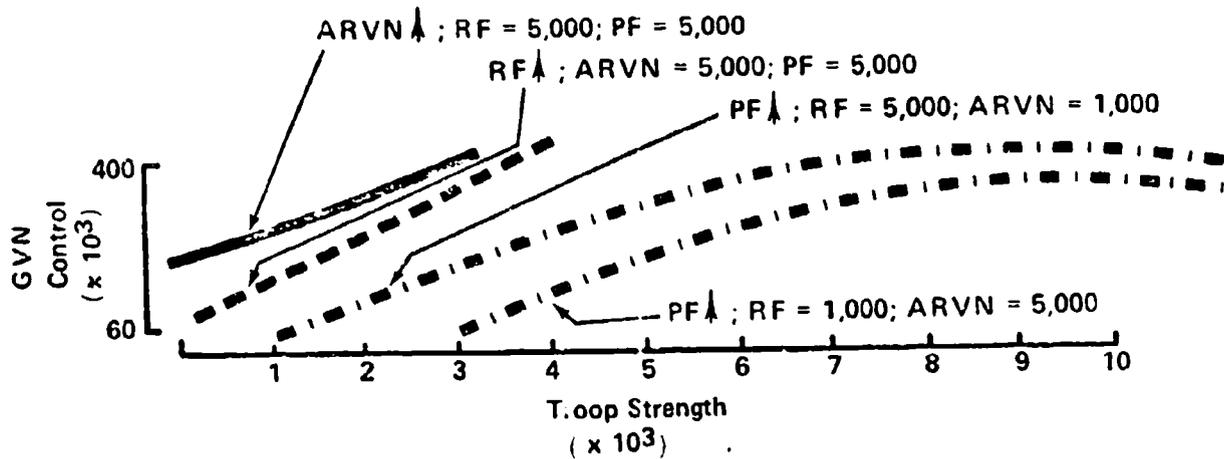


Figure II-8

Guerrilla War Sensitivity Curves

Additional research along this line was planned in which percent GVN control and measures of enemy activity were to be used as dependent variables. A shift of attention to the implications of the 1972 offensive along with data problems delayed this additional work until late in the program. As a consequence there is very little connection between either the problem addressed on the research strategies followed here and in the study of friendly initiated discussed at the end of this section.

Village Programs²⁷

Problem - This study topic was an investigation of the side of Vietnam operations sometimes called the "other war". The original study problem was to determine the effectiveness of village programs in terms of GVN control, security, economic conditions, and local government viability. The village programs in Vietnam were carried out with the expectation that emphasis on local involvement in development efforts would have favorable impacts on the village socio-political-economic framework and the relationships between the village structure and the district, province, and national administrative

networks. The research problem was to identify programs that have been either a waste of resources or identified with substantial improvements. As the work progressed through various approaches and generally positive findings for all measures of village program effort, it became clear that the impacts of village programs varied widely across the country. Although no satisfactory generalized model was developed to account for the province to province differences, these differences themselves could be the basis for planning future village program efforts. So the final problem became one of applying the analysis findings to the development of a plan for the post cease-fire situation.

Approach — The first step was to review the current GVN Community Defense/Local Development (CDLD) Plan to obtain an understanding of what kinds of activities are included in village programs. It was found that the village program efforts are widely varied, ranging from rather large public works projects to assistance for individual families. The common aspect of these efforts is that the initiative and planning take place at the hamlet and village levels, hopefully with a high degree of public participation. This emphasis on local involvement in the development of the countryside was given the name Village Self Help (VSH) and was applied to all villages under GVN control as part of the 1969 Accelerated Pacification Campaign. While some highly detailed reporting systems are specified in the CDLD Plan, it was decided that there was sufficient information in the responses to individual HES questions to allow use of this more readily available and consistent data source.

The choice of the HES as a source of data representing village program efforts as well as socio-political-economic conditions was partly motivated by the fact that some relevant work using province level aggregations of the HES question responses had already been started. This analysis of some 53 HES questions, including 11 describing aspects of VSH effort, became the basis for a broader research design for the use of hamlet level data. It also indicated that for a country-wide model:

- Programs to provide education and health benefits are strongly related to social/economic conditions and popular compliance with the GVN in a favorable sense.
- Programs to improve the economy appeared to be associated with the presence or absence of local officials (GVN and VC) and their activity.

- Enemy military activity and measures of insecurity seemed to be independent of social, economic, and administrative conditions.
- Information activity by the GVN is favorably related to participation in GVN sponsored programs.
- No adverse impacts of village programs were apparent.

The analysis of hamlet level data began with tests using data from all hamlets in four sample provinces for the October 1969 - March 1970 period. The provinces Quang Tin, Phu Bon, Long Khanh, and Kien Hoa were selected to obtain an example from each province cluster for that period. The tests used both product-moment and rank-order correlation techniques with virtually identical findings. The data tested included 79 HES questions (39 measuring development efforts) and 8 indices combining several questions. These tests of relationships across hamlets were repeated on a country wide scale using a sample of the hamlets created by random selection of one hamlet out of 20 for the months March 1970, March 1972, and June 1972. Conceptually, there were two levels of dependent variables considered in this cross-sectional work. Popular behavior compliant with either the GVN or VC (political influence) was examined for its relationship to social, economic, administrative, security, and GVN control indices. Then the relationships between the social, economic and administrative conditions and measures of development activity were studied. In addition, GVN control, security, economic strength, social benefits, administration, hamlet age and accessibility as well as various popular attitudes were introduced as intervening variables. This work revealed that in the process of building or eroding political influence:

- Political influence of either side is only weakly related to that of the opponent. A loss for one party does not leave a void automatically filled by the other nor does a gain necessarily mean the other side loses.
- There is evidence of VC political influence being negatively related to economic conditions, but only under conditions of above average economic strength and administrative presence.
- The negative relationship does not vary with security conditions or level of effort to stimulate the economy.

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- Political influence of the GVN also varies with economic conditions. The relationship is nonlinear and subject to saturation in individual hamlets.
- Economic stimulation efforts by the GVN (village self help programs) relate similarly to GVN influence and to economic conditions in that the relationship is positive and nonlinear.
- Social benefits are negatively related to VC political influence and this relationship is strongly influenced by the nature of the war, security, GVN control, and economic conditions.
- Relationships between social benefits and GVN political influence are positive, relatively stronger than those with VC influence, and vary less with other conditions.
- The availability of social benefits and GVN administrative presence both are positively related to economic conditions themselves. These relationships also appear subject to saturation effects at higher levels of economic strength.
- The availability of social benefits is related positively to GVN economic stimulation, both of which vary with economic conditions. In contrast to the previous finding there is no evidence of saturation at higher levels of economic strength.
- The relationship between economic stimulation effort and economic strength is strongly influenced by local security conditions. Economic stimulation effort itself has tended to go to areas of high security, but its relationship to economic strength is stronger in areas of low security.
- Hamlets in High Regular war provinces appear to benefit the most from the currently employed programs to improve the economic strength index.
- In Low Territorial provinces the hamlets seem to benefit from programs to improve social benefits more than the provinces in the other three war types.
- Administrative programs appear to improve administration in the hamlets of provinces of all war types except the High Territorial provinces.

- In High Territorial provinces the hamlets appear to benefit less from programs to improve the economic strength, social benefits, and administrative indices.
- The low correlations found in the hamlets of the High Territorial provinces are the reflection of the already high benefit level in these hamlets.
- The programs which generally contribute significantly to improving the economic strength index are: land reform and public works projects which upgrade land and water access routes.
- The programs which generally contribute significantly to improving the social benefits index are: provision of dispensaries and maternity clinics, frequent health worker visits, primary schools, and secondary schools.
- The programs which generally contribute significantly to improving the administration index are: trained information/Chieu Hoi cadre, presentation movies and cultural drama team performances, information cadre (mobile) visits, static visual displays, and the presence of active land reform committees.

All of the work on a cross-sectional basis lacked the ability to demonstrate cause and effect. It only indicated that if a hamlet had development programs underway, adequate administration and good social benefits and/or economic strength, the probability was high that GVN political influence would be high and VC political influence would be low. It did not indicate whether the people cooperate because the GVN is there providing benefits or the people obtain the benefits as a result of cooperation. For the latter circumstance the process would be one in which good hamlets get better and poor ones get worse. Since the comparison of parametric and non-parametric results showed that the product moment correlations were reliable if carefully interpreted, an effort was made to develop some multiple regression models from the cross-lagged correlations from province level quarterly time series data. A number of very strong ($R^2 \geq 0.8$) models were found for each war category, but there were problems. There were too many interactions and interdependencies between the independent variables to be able to sort out the unique contribution of each element to political influence. Also at this time the problem of post cease-fire planning became significant and the validity of war type categorizations to the post cease-fire situation could not be shown.

The revised approach was to deal with each province separately to obtain and interpret the cross-lagged correlations from monthly data. This interpretation took on two aspects. For a basic description of the process

at work in each province, the autocorrelations of the two measures of political influence and cross-lagged correlations between 28 pairs of the 8 measures involved in the process were interpreted to identify the valid causal relationships. For the post cease-fire recommendations, the correlations between political influence and economic strength, social benefits, and administrative presence were weighted to obtain an index of the relative predictive value of the three conditions in each province. These values were further modified to reflect the relative need for improvement, the past experience in being able to change the conditions, the impact of the 1972 offensive, the initial recovery from that impact, and province size. The results were then expressed in terms of what proportion of the country-wide post cease-fire effort was recommended for each province and the within province distribution of that effort to programs intended to improve the economy, social benefits, or local administration.

Data - The reasoning behind and extent of the choice of HES data for this research has already been discussed. All of the data came from the 1970 and 71 versions of the HES. A weighting system for the various responses was used which initially extended from 1 to 9 with a weight of one on this scale meaning the best situation from the GVN perspective, a weight of nine meaning the best situation from the VC perspective, and a weight of five signifying a neutral interpretation of the response. The reasoning behind this 1 to 9 scale assumed that there was a zero sum proposition and that outcomes were essentially one dimensional. Subsequent analysis did not support such an assumption. A continuum does not exist to justify the 1 to 9 scale so eventually the data were recorded on a 0 to 4 scale where 0 was bad and 4 the best from the perspective implied by the definition or label (e. g., a score of 0 on the "security" index is bad and 4 is perfect security or no evidence of insecurity).

General definitions and some basic descriptive statistics for the ten variables employed in the province level time series analyses are:

- GVN Political Influence - An index based on average scores for 15 HES questions concerning degree of participation in GVN sponsored activity or organizations and other cooperative behavior. Scale: 0 to 4, Median = 2.5, Range: 1.7 to 3.1.
- VC Political Influence - An index based on average scores for 7 HES questions concerning degree of participation in VC sponsored organizations or activities and other cooperative behavior. Scale: 0 to 4, Median = 0.7, Range: 0 to 1.6.

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- Economic Strength - An index based on average scores for 3 HES questions concerning existence of local markets and the quantity and variety of products available. Scale: 0 to 4, Median = 2.5, Range: 1.4 to 3.9.
- Social Benefits - An index based on average scores for 9 HES questions concerning availability of education and public health facilities. Scale: 0 to 4, Median = 2.7, Range: 1.4 to 3.7.
- Administrative Presence - An index based on average scores for 7 HES questions dealing with presence, status, activity, and range of local government structure. Scale: 0 to 4, Median = 3.0, Range: 1.7 to 4.0.
- Economic Stimulation - An index based on average scores for 4 HES questions concerning GVN efforts to aid local economic development. Scale: 0 to 4, Median = 2.0, Range: 1.0 to 2.9.
- Security - An index based on incidence of non-selective terrorism, the best indicator of a "security" dimension defined by 11 HES questions concerning terrorism, civilian casualties and damage from enemy action, and impairment of normal activity due to insecurity. Scale: 0 to 4, Median = 3.8, Range: 2.9 to 4.0.
- Standoff Attacks - Number of enemy attacks and harassments by fire, the best indicator of an enemy low intensity activity dimension defined by analysis of some 70 HES and operational data elements. Scale: Interval, Median = 20, Mean = 22, Range: 0 to 245.
- Friendly Defense - Number of friendly troops killed in enemy-initiated incidents, the best indicator of an enemy high intensity dimension defined by analysis of some 70 HES and operational data elements. Scale: Interval, Median = 25, Mean = 29, Range: 0 to 608.
- Friendly Offense - Number of friendly troops killed in friendly initiated incidents, the best indicator of friendly initiative and large scale military operations. Scale: Interval, Median = 8, Mean = 19, Range: 0 to 727.

Table II-2 presents the identification of HES questions used in the composite indices for province and hamlet level analyses and used as separate data elements in hamlet level analyses.

TABLE II-2*

HES QUESTIONS USED IN VILLAGE PROGRAM ANALYSES

Dependent Variables:

- GVN Control
 - . VSSG GVN presence and control and VC control scores
 - . Index constructed from all 10 VSSG scores
- Security
 - . Security Index (HMB2, HMB5, HMB6, HMC4, HMD1, HMD2, HMD6, HMD7, VQD8, VQT6, HQC9, and HQR5)
 - . Local Security Situation Dimension (HMD1 and HMB6)
- Economic Development
 - . Economic Activity Index (VQL1, VQL2, VQL3, and HQL1)
 - . Social Benefits Index (VQP1, VQP2, VQP3, VQP4, HQP1, HQR1, VQR1, VQR2, VQR3, HQR3, HQR4 and HQS1)
- Local Government Viability
 - . Administrative Index (VQE1, VQE4, VQE5, VQF5, VQF6, VQF7, HQC5, HQD2, HQD3, HQE1, HQE2, HQE3, and HQE5)
 - . Political Influence Index (HQE1, VQE2, VQE3, VQE7, VQF1, VQF2, VQF3, VQF4, VQF7, VQN1, VQT7, HQC6, HQC7, HQF2, HQF3, HQF6, HQN1, and HQN2)
 - . VC Political Influence Index (HMB1, HQB1, VQB1, HMB6, HQE3, HQB2, HQF1, and HQB3)

Independent Variables:

- Village Program Effort (aggregate measure)
 - . Economic Stimulation Index (VQL5, VQN2, VQN3, VQN4, VQN5, and VQV3)
- Village Program Effort (individual questions)
 - . VQE6 - Village Official Training
 - . VQG1 - Use of Info/Chieu Hoi Cadre
 - . VQG2 - Movies, Cultural Drama, etc.
 - . VQG3 - Info Cadre Visits
 - . VQL5 - Skills Training
 - . VQN1 - Self Development Projects
 - . VQN2 - Technical Self-Development Retardation

TABLE II-2 (CONT.)

- . VQN3 - Resource Self-Development Retardation
- . VQN4 - Public Works Projects
- . VQP1 - Public Health Stations
- . VQP2 - Maternity Clinics
- . VQR1 - Secondary Schools
- . VQT5 - Land Redistribution Committee
- . VQT8 - Province Assistance with LTTT Program
- . VQT10 - LTTT Program Implementation
- . VQV3 - Agricultural Credit
- . VQT10 - Agricultural Credit
- . VQV7 - Irrigation Systems
- . VQV9 - Rural Organizations
- . VQV10 - Agriculture Cadre Visits
- . HQF4 - RD Cadre Activity
- . HQG2 - Static Information Displays
- . HQN3 - Self-Development Projects
- . HQP1 - Medical Services
- . HQP2 - Health Worker Visits
- . HQR1 - Primary Schools
- . HQS2 - Resettlement Allowances
- . HQS4 - Welfare Assistance
- . HQS5 - War Damage Assistance

Intervening Variables:

- GVN Control Measures
- Security Measures
- Economic Strength (economic development measures)
- Social Benefits
- Administrative Capabilities
- Hamlet Age
- Hamlet Accessibility
- Popular Attitudes
 - . Opinion of GVN Economic Programs
 - . Opinion of Local Government
 - . Opinion of GVN Military

* See Appendix A, BSR 4022, Analysis of Vietnamization: A Cross-Sectional Test of Village Program Effectiveness, Bendix Aerospace Systems Division, Ann Arbor, Michigan, April 1973;

Results — The essential findings from the province and hamlet level cross-sectional analyses have been listed during the discussion of the evolution of the research strategy. The time series analyses of both quarterly data organized in various subsets and monthly data by individual provinces generally confirmed the earlier findings. Overall, economic strength, social benefits, administrative presence, and economic stimulation were found to dominate the valid causal relationships found in most provinces or groupings of provinces. Table II-3 summarizes the number of provinces in which the various causal relationships were identified from the cross-lagged correlations.

The key to application of these findings to the problem of allocating future effort is the variation of the strength and direction of the relationships from province to province. Two examples of this variation are illustrated in Figures II-9 and II-10. Within province variation comparing hamlet scores for GVN political influence and economic strength in Kien Hoa in March, 1970, in the five maps of Figure II-9. The maps II-9(a) through II-9(c) show correspondence in ranking according to thirds in the country-wide distribution of scores. Maps II-9(d) and II-9(e) represent the other two possibilities. The rank order correlation (ρ) for this relationship was 0.51.

The across province variation in causal relationships is illustrated by Figure II-10 for three relationships involving economic strength. The recommendations for post cease-fire allocation of development effort in hamlets and villages are summarized in two displays. Figure II-11 categorizes the percent of the country-wide total recommended for each province from very low (0.7 to 1.1%) to very high (5.1 to 5.3%).

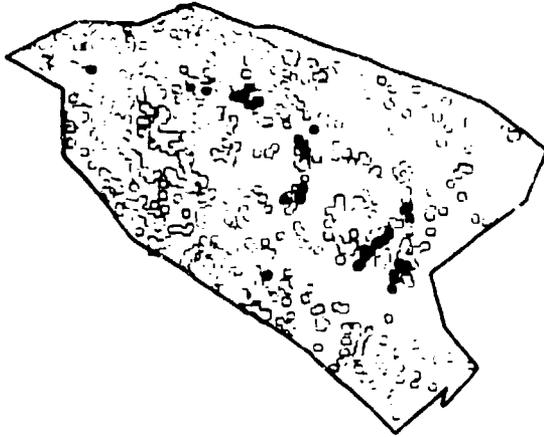
Table II-4 summarizes the percent of total effort (left hand column) and the within province distribution of that percentage to programs intended to improve economic, social, or administrative conditions. Also shown for comparison are the percentages of the GVN Rural Development funding authorized for 1972.

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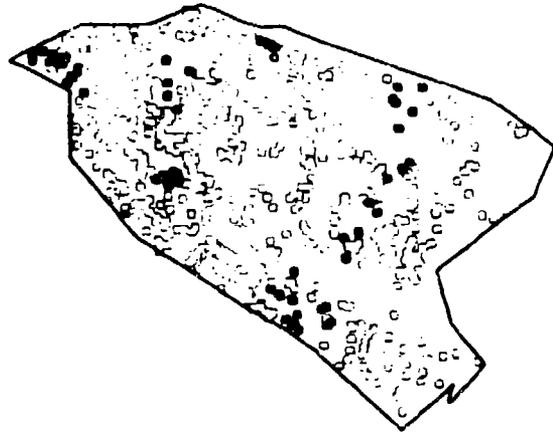
TABLE II-3

SUMMARY OF CAUSAL RELATIONSHIPS

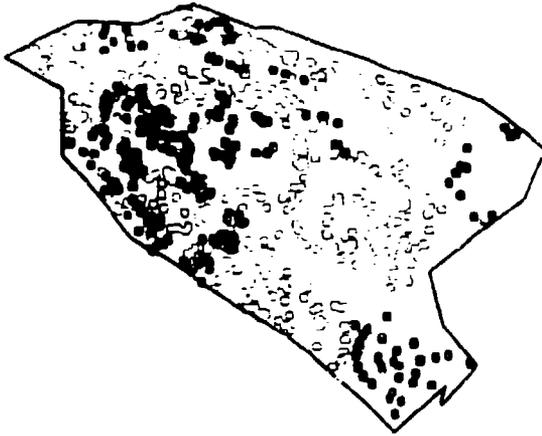
r is: and: where n is:	Number of Provinces in which --																													
	Expected												Unexpected																	
	Strong				Moderate				Moderate				Strong																	
	0	1	2	3	6	0	1	2	3	6	0	1	2	3	6	0	1	2	3	6										
$GVNPI(T_n) = f(ADMIN(T_o))$	4			1	6	12					5	3									2									
$VCPI(T_n) = f(ADMIN(T_o))$	5				9	8	1				2											1	1							
$ADMIN(T_n) = f(ECSTM(T_o))$	3				5	1					4	5										3	3							
$ADMIN(T_n) = f(SECUR(T_o))$					1	2					5	5	7									1	1							
$GVNPI(T_n) = f(ECSTR(T_o))$					6	10					3	6										2								
$VCPI(T_n) = f(ECSTR(T_o))$	1				6	9	1				5	5										2	5	1						
$ECSTR(T_n) = f(ECSTM(T_o))$	1				2	2	2				6	8										1	3					1		
$GVNPI(T_n) = f(SOCBN(T_o))$	2				9	9					2											1	1							
$VCPI(T_n) = f(SOCBN(T_o))$					7	11					1	1										4	3							
$SOCBN(T_n) = f(ECSTM(T_o))$	2				2	2					7	9										5					1			
$GVNPI(T_n) = f(ECSTM(T_o))$	2				4	2					3	7										2								
$VCPI(T_n) = f(ECSTM(T_o))$	1				5	5					3	6										5	3					1		
$GVNPI(T_n) = f(FROFF(T_o))$	1				2					1	3	3										4	3	4				1	1	
$VCPI(T_n) = f(FROFF(T_o))$											2	4										2	2	4	1	2				
$ECSTM(T_n) = f(SECUR(T_o))$	1				1					1	3	3										2	1							
$ECSTM(T_n) = f(STDOFF(T_o))$					3					1	5	3										1	1	2						
$ECSTM(T_n) = f(FRDEF(T_o))$											2	4										1	1							
$ECSTM(T_n) = f(FROFF(T_o))$											1	1										5	5	2				1	1	
$GVNPI(T_n) = f(SECUR(T_o))$	2				3					1	2	7										2	1							
$VCPI(T_n) = f(SECUR(T_o))$	1	1	1	1	1					2	6	6	7																	
$SECUR(T_n) = f(FROFF(T_o))$											1	1										6	5							
$FROFF(T_n) = f(SECUR(T_o))$	2										4											2	1							
$GVNPI(T_n) = f(STDOFF(T_o))$	1	2									1	4	5	3									1							
$VCPI(T_n) = f(STDOFF(T_o))$	1	3	2								4	3	6																	
$STDOFF(T_n) = f(FROFF(T_o))$											2	4										1	1	1				2	2	
$FROFF(T_n) = f(STDOFF(T_o))$											6	1																		
$GVNPI(T_n) = f(FRDEF(T_o))$	1										5	2	3										3							
$VCPI(T_n) = f(FRDEF(T_o))$											4	5	3																	
$FRDEF(T_n) = f(FROFF(T_o))$											1	2	4										1	3	3					
$FROFF(T_n) = f(FRDEF(T_o))$											4	1																		



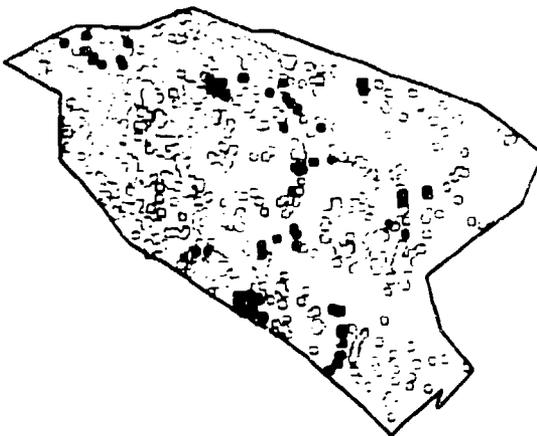
(a) GVN Political Influence and Economic Strength Both in Upper Third, March 1970



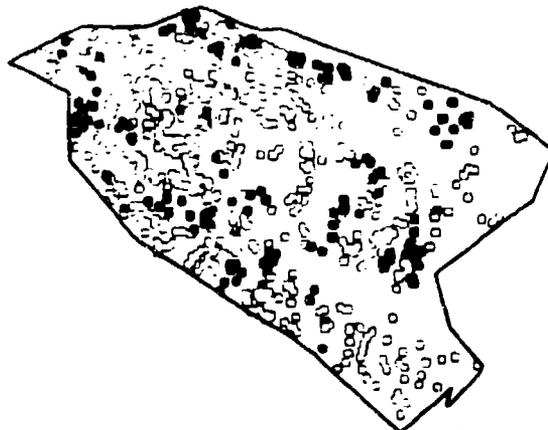
(b) GVN Political Influence and Economic Strength Both in Middle Third, March 1970



(c) GVN Political Influence and Economic Strength Both in Lower Third, March 1970



(d) GVN Political Influence Ranking Higher than Economic Strength, March 1970



(e) GVN Political Influence Ranking Lower than Economic Strength, March 1970

Figure II-9 GVN Political Influence and Economic Strength in Kien Hoa

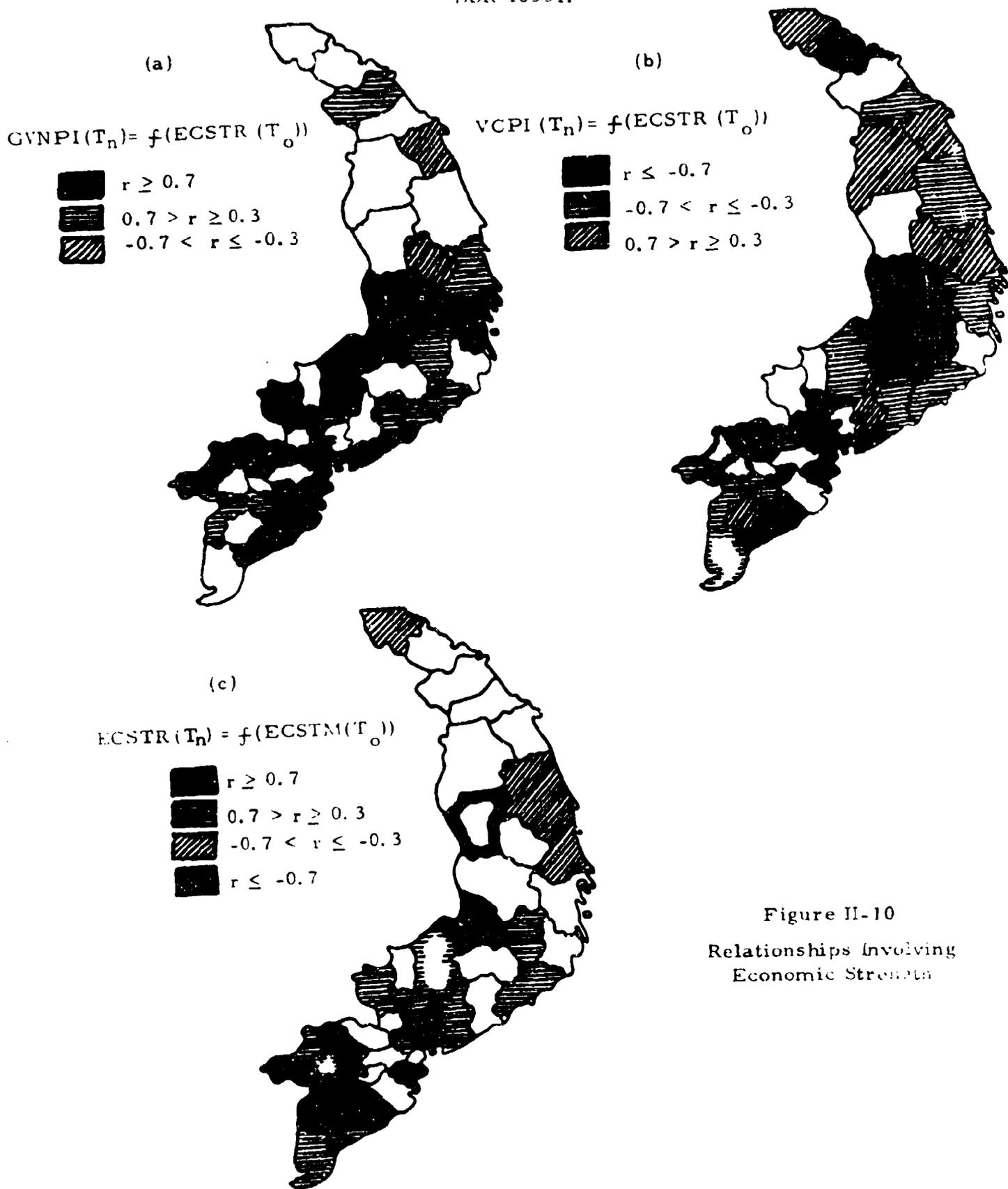


Figure II-10
 Relationships Involving
 Economic Strength

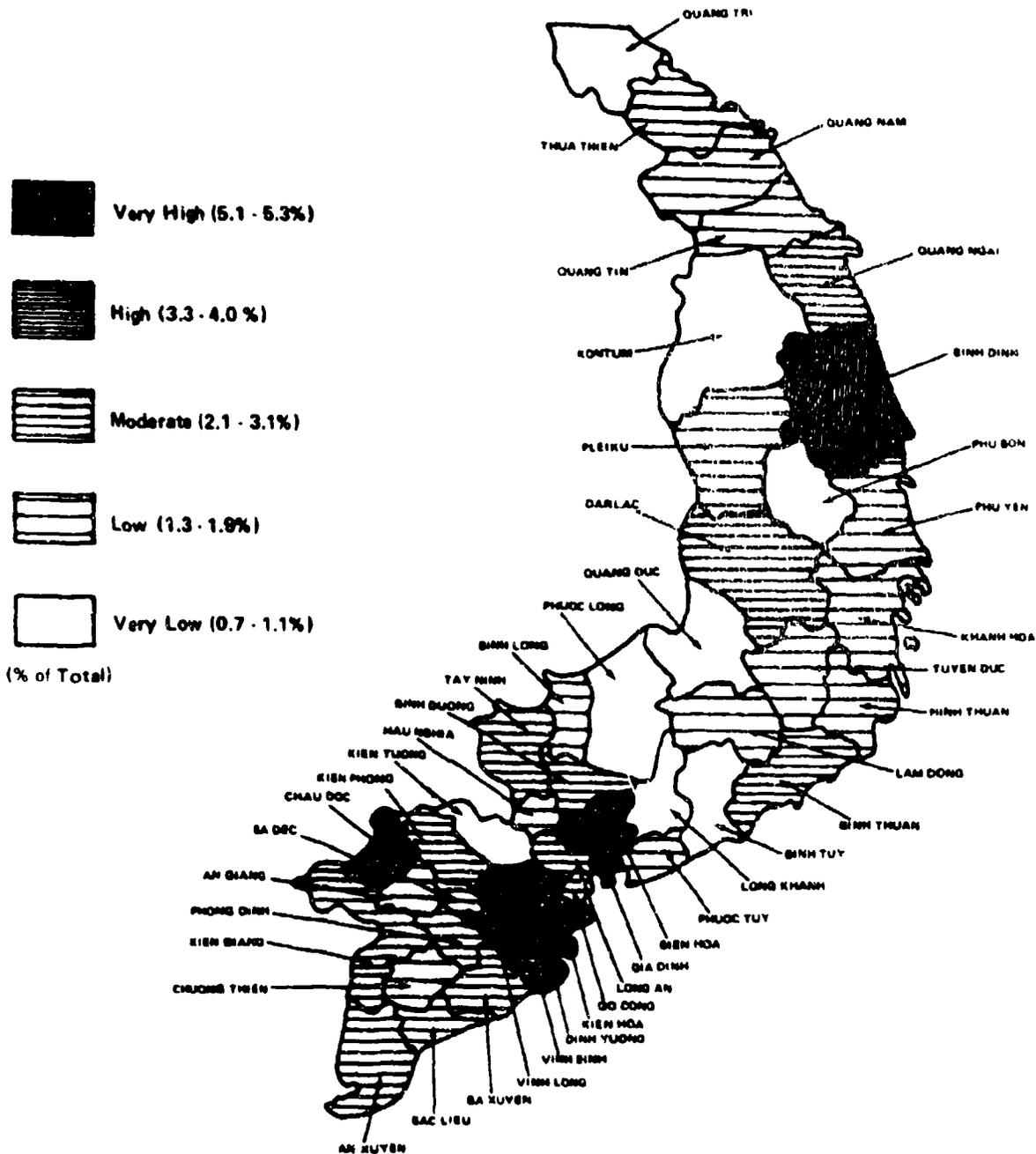


Figure II-11 Recommended Province Distribution of Past Cease-Fire Development Effort

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TABLE II-4
SUMMARY RECOMMENDATIONS

Province	Percent of Total	1972* RD Tasks	Within Province Distribution (Percent)		
			Economic	Social	Administrative
Quang Tri	1.0	3.0	47	17	37
Thua Thien	1.7	5.2	34	38	26
Quang Nam	1.6	4.4	33	25	42
Quang Tin	1.8	3.6	24	36	40
Quang Ngai	2.1	4.7	0	33	67
MR I	8.2	20.9	28	30	42
Kontum	1.0	1.0	53	0	47
Binh Dinh	5.3	3.6	31	40	29
Pleiku	1.7	1.3	30	26	44
Phu Bon	0.7	0.9	60	10	30
Phu Yen	1.4	4.6	41	12	46
Darlac	2.6	1.3	35	31	35
Khanh Hoa	1.9	2.5	57	43	0
Ninh Thuan	1.9	1.8	39	32	29
Tuyen Duc	1.4	1.2	45	24	31
Quang Duc	1.1	0.5	50	21	29
Lam Dong	1.4	0.9	49	24	27
Binh Thuan	2.1	1.7	35	32	32
MR II	22.5	21.3	44	25	32
Binh Tuy	1.0	2.1	48	19	32
Long Khanh	1.0	1.8	45	23	32
Phuoc Long	1.0	1.3	52	16	32
Binh Long	1.3	1.8	44	20	36
Binh Duong	2.2	3.6	36	35	29
Tay Ninh	2.7	3.1	39	29	32
Hau Nghia	1.6	2.5	37	27	37
Bien Hoa	3.3	2.9	35	28	37
Phuoc Tuy	1.5	3.0	39	22	33
Long An	2.7	13.6	37	36	27
Gia Dinh	5.1	6.6	32	37	31
MR III	23.4	42.3	40	27	33
Go Cong	2.1	-	39	34	27
Kien Tuong	1.1	-	50	22	28
Kien Phong	2.8	-	35	30	36
Dinh Tuong	4.0	-	31	34	35
Kien Hoa	5.1	-	29	36	35
Vinh Binh	3.6	-	32	38	30
Vinh Long	3.8	-	31	35	34
An Giang	1.5	5.1	5	68	27
Kien Giang	2.8	-	28	36	36
Chuong Thien	1.4	-	41	20	39
Phong Dinh	3.0	-	24	43	34
Ba Xuyen	3.1	3.3	33	34	33
An Xuyen	2.5	1.4	20	47	33
Bac Lieu	2.9	3.2	33	34	32
Chau Doc	3.8	2.5	24	38	37
Sa Dec	2.2	-	16	51	33
MR IV	45.7	15.5	29	38	33
Country-Wide	99.8		35.6	30.7	33.7

* Percent of the VN \$1,687,000,000 authorization prior to the offensive. Allocations for DaNang, Cam Ranh, Dalat, and Vung Tau are not included. Source: Vietnam Bulletin, Vol. VII, No. 6, March 30, 1972, Page 5.

1972 Offensive 28

Problem — The onset of the 1972 offensive by the NVA and VC raised a host of new questions, aside from making ongoing analysis oriented toward RVNAF reductions academic. During the battles in Quang Tri, Kontum, and Binh Long two important questions appeared to be suitable for the kind of systematic analysis of aggregate data being carried out in this project. One was the application of Lanchester attrition models to the main engagements for the purpose of assessing the situation and projecting outcomes for various levels of RVNAF and NVA commitment. The other question was more subjective and concerned NVA objectives and, therefore, the likely commitment ratios for use in the application of attrition models. One of the many theories to explain the scope and timing of the NVA offensive was based on the possibility of factional disputes in the North Vietnamese leadership. If a militant, hard-line faction was in control, but perceived some danger of losing that control to a more moderate faction, not delaying a major attempt at overt military conquest of the South until the U. S. had completely disengaged could be explained. This hypothesis could be tested by a review of the open literature on policy and strategy statements of the North Vietnamese leadership.

Other questions gradually emerging as the offensive and counter-offensive reached a staminate stage concerned the impact of that activity on both pacification and the nature of the war. Substantial declines in pacification were obvious in the half dozen or so provinces in which the bulk of the action took place, but what about the others? The regular-territorial categorization of the war had been found to be very stable over the nine periods from April 1967 through September 1971. The events of 1972 could have significantly altered that structure signifying a new and possibly decisive phase. If the research reflected such changes and decisive levels of commitment by the NVA, the plans for U. S. assistance to the GVN should be quite different than if only limited objectives and NVA commitment were disclosed.

Approach — The study of the attrition observed over the early stages of the 1972 offensive sought to make use of Lanchester's Equations to explain the process and forecast likely outcomes. These deterministic models of the attrition process are well-known and have been applied to the analysis of military engagements and protracted war in general, and Vietnam in particular, with varying degrees of success. The success appears to be related to how well the data can be partitioned to represent a specific set of circumstances. In Shaffer's analysis of small unit action the partitioning is achieved

by selection of a large number of incidents where time is not an independent variable.²⁹ Time is included in Voevodsky's analysis of time series analysis of protracted wars in which variation in the circumstances is smoothed out by aggregation of data at annual intervals.³⁰ In Engel's analysis of the Iwo Jima battle, partitioning is the best of all because of the island's isolation.³¹

The regular-territorial categorization of the province level Vietnam data developed during the Analysis of Vietnam project and the relatively clear temporal boundaries offered by the 1972 offensive and other prolonged (weeks and months in contrast to isolated battles) surges in the intensity of the Vietnam conflict (Tet '68, May '68, the Cambodian incursions, and Lam Son 719) seemed to offer an opportunity for successful application of Lancaster models to aggregate Vietnam data. Several approaches offered answers to questions about RVNAF performance, allocation of resources, and projections of outcome. The most urgent application involved the derivation of estimates for the exchange and commitment ratios and computing projections of friendly and enemy KIA per week in the battles going on Quang Tri-Thua Thien, Kontum-Binh Dinh-Quang Ngai, and Phouc Long-Binh Long-Tay Ninh-Binh Duong using a version of the models along the line followed by Voevodsky as follows:

$$\frac{dD}{dt} = \frac{J_c}{7} \left[1 - \frac{S_{ta}}{S_\infty} \right] S_{ta}$$

where:

$$J_c = \frac{\text{Fr. KIA/month (Apr \& May '72)} - \text{Fr. KIA/month (High Regular 1967-71)}}{\text{En. KIA/month (Apr \& May '72)} - \text{En. KIA/month (High Regular 1967-71)}}$$

dt = unity (time interval of observations),
the constant 7 is derived from past observations of the Vietnam ratio of total casualties to deaths,

$S_{ta} = \frac{S_t + S_{t+1}}{2}$, is the average effective strength over dt, and S_t is effective strength at time "t" found from -

$$S_t = \left[1 - (1 - S_0) e^{-\frac{J_c t}{3\lambda}} \right] S_\infty$$

where:

S_0 is strength at the start of the invasion,

S_∞ is the total strength available or committed to invasion or defense, and

λ is the commitment ratio of level of acceptable casualties to the total strength available or committed. Past experience shows that λ varies from 0.4 to 1.0 for protracted wars. Assuming that both sides considered the outcome of the offensive would be decisive in terms of the war, values of 1.0 were used in the first attempt to fit estimated to observed deaths per week.

If the initial assumptions yielded fairly close approximations to observed KIA, the results could be used to make projections of the time at which that particular model reaches the boundary condition at which one side or both sides must elect to either raise their commitment or disengage. On the other hand, a poor fit to the observed attrition could lead to examining the sensitivity of the model to the values assumed for J_c and λ . Working back from observed attrition to calculate these exchange and commitment ratios would yield useful assessments of both friendly and enemy objectives and performance. If the NVA disengage with the data indicating a λ of, say 0.5 or less, the interpretation should be that a decisive outcome is not to be expected. The implication for GVN strategy of such a finding is that holding territory might be less important than holding down RVNAF losses. Comparison with these parameters for the other surges in intensity noted earlier would provide additional insight relative to assessing the situation.

Turning from the attrition aspects of the 1972 offensive where the focus is on selected major battle areas, a country-wide assessment of the offensive was also undertaken. The most serious immediate impacts of the offensive were limited to Quang Tri, Quang Ngai, Kontum, Phouc Long, and Binh Long where the March to April decline in GVN control was greater than 40 percentage points. Many more provinces showed much less of an immediate impact and some even continued to improve. Taking a longer view of what happened to both GVN control and pacification scores did not reveal much more in the way of such large declines, but when considered in terms of size (in contrast to percentages), the offensive appeared to have a more widespread and possibly serious impact than reflected in country-wide or military region aggregate statistics. Just as there was considerable variation in the style, intensity, and impact of the offensive, the observed and expected recovery from that impact also varied in terms of degree and

speed. Several approaches were taken in the study of this variation. Ranking the provinces according to the different changes of GVN control or pacification and comparison of the military, political, social, economic, and demographic characteristics of best and worst quartiles or other logical groupings was the first approach. This was expanded into multiple regression models seeking to explain and predict both decline and recovery. Failing here, the one and three month differences in scores for pacification, political mobilization, GVN presence and activity, social-economic conditions, friendly military initiative, and enemy presence and activity were studied to assess the changes of 1972 in terms of the long term trends and seasonal fluctuations since 1967. Finally, the regular-territorial categorization was updated to include 1972 and the months April-September examined in detail for significant changes in the structure of the war. Comparisons with the 1968 period were made in search of useful parallels.

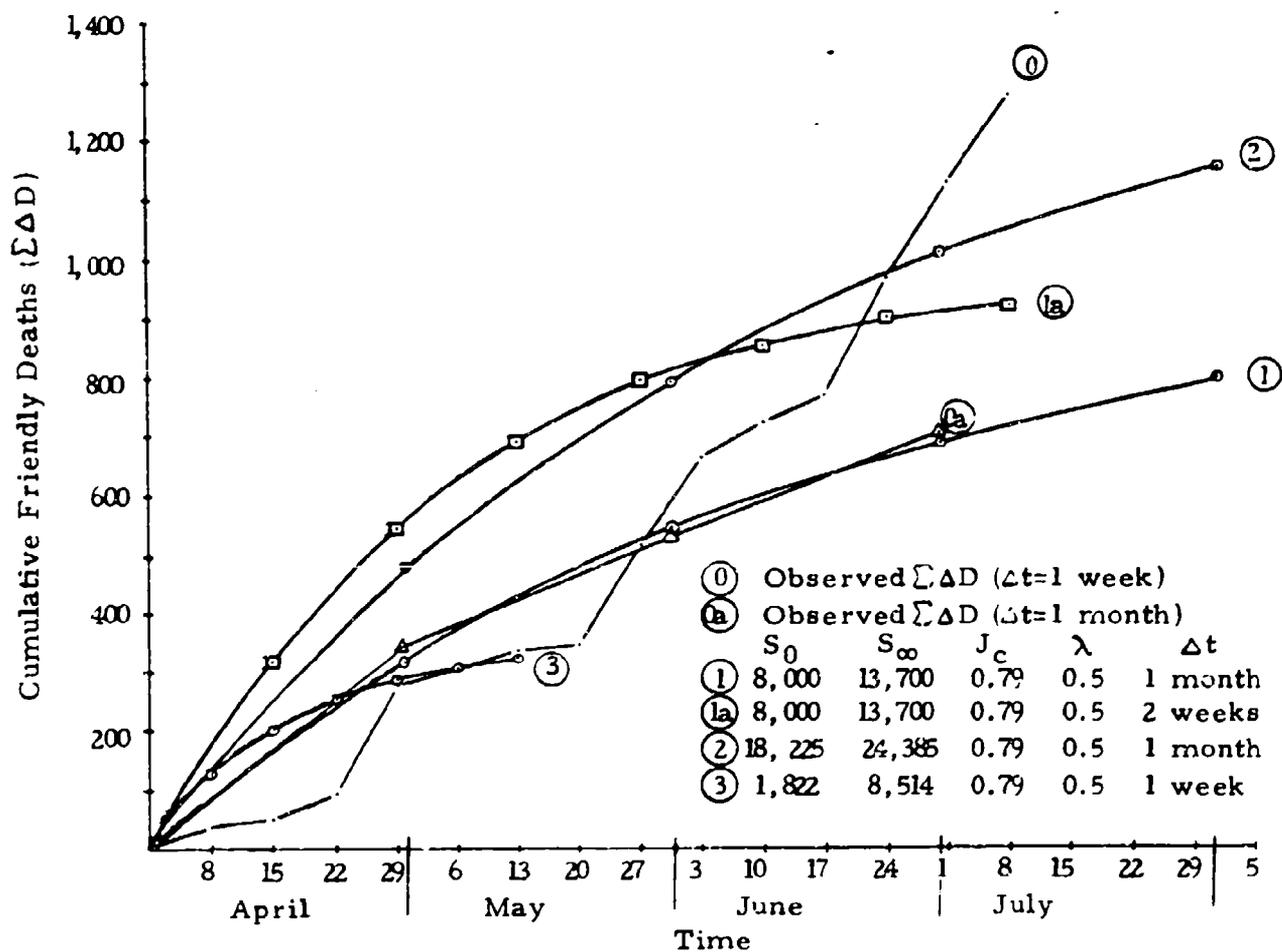
Data - Attrition Models - The strength and KIA data requirements for application of the attrition model to the 1972 offensive have already been noted. The first tests conducted in June, 1972 were based on data extracted from order of battle working notes and weekly listings of SEAPR data elements obtained from OASD(SA). Calculation of the constant J_c on the basis of the above average KIA ratio as planned yielded a unreasonably low figure in the 0.1 to 0.2 range depending on whether straight KIA or KIA per 1000 troops was used. This low figure led to consideration of what assumptions seemed logical about the proportions of friendly and enemy strength actually engaged in the attrition process at any given time. Because the friendly forces were defending essentially isolated base camps and fire bases which were being attacked one or two at a time, it was assumed that only one in ten friendly troops played a role in the attrition process. With enemy forces both concentrated for attack and subject to intensive aerial bombardment, the assumption that on the average one in two enemy troops were involved in the attrition process was made. These assumptions yielded a J_c of 0.79 when calculated from two rather different approaches using the following data:

	High Regular Province Cluster		
	1967-71 Mean	1967-71 Max	Apr-May '72 Max
Friendly KIA	153	----	389
Friendly KIA/1000 Troops	8.0	12.1	----
Enemy KIA	710	----	2193
Enemy KIA/1000 Troops	70	96	----

One other point should be made here concerning data needed to carry out the work with attrition models as well as updating the regular - territorial categorization of the provinces. Nearly all the study plans were based on working with monthly (some weekly) province level observations. Order of battle data for both sides were key elements needed at province level. This attempt to work at province level was a fatal flaw in a plan for work to produce timely and relevant outputs at three and six week intervals. Province level enemy strength data did not become available until February 1973. In the interim an effort was made to piece together a set of estimates based on selected intelligence estimates for "fronts" or military regions provided by OASD(SA), observed province level activity, and narrative reports of the "battles" found in open sources such as the New York Times, Washington Post, and Far Eastern Economic Review.

Results - Attrition Models - The initial testing of the attrition model approach was based on monthly, unverified friendly KIA data for Quang Tri, Kontum, and Binh Long provinces. This data included April, May, and most of June. Friendly strength was based on March numbers of ARVN/VNMC maneuver battalions for S_0 and narrative reports of force movement during April, May, and June for estimates of S_∞ . The J_c for J_c appeared to be consistent with the strength estimates and observed attrition. The results for Quang Tri and Kontum were attractive because serious difficulty was indicated for Quang Tri while the cumulative friendly death curve for Kontum was still increasing sharply. The curves for cumulative strengths, casualties, and deaths all are similar and tend to indicate a "crisis" when the curve flattens. At this stage of the battle the side with the flat curve will either quit, disengage, or increase its S_∞ , or commitment. There were two problems with these results, however. The strength estimates did not include RF and PF. Also when one follows the course of events in Quang Tri and compares the attrition estimates from the model with weekly observations, it is obvious that the GVN had come to at least two distinct crises during April and May. All this is illustrated in the curves plotted in Figure II-12.

Curves "0a" and "0" are plots based on the monthly, unverified reports and weekly, confirmed report data respectively. The initial test produced curves "1" and "1a". The fit between curves "0a" and "1" was very satisfying, but changing the time interval, " Δt ", to two weeks, curve "1a", did not improve the fit with the weekly data, curve "0". The weekly observations and the flat curve for the first three weeks in April reflect the fact that in Quang Tri the GVN was in a crisis from the onset. With perfect hind sight this seems consistent with the logic behind the assumptions for proportion of forces present that are actually engaged. The J_c for those three weeks was probably



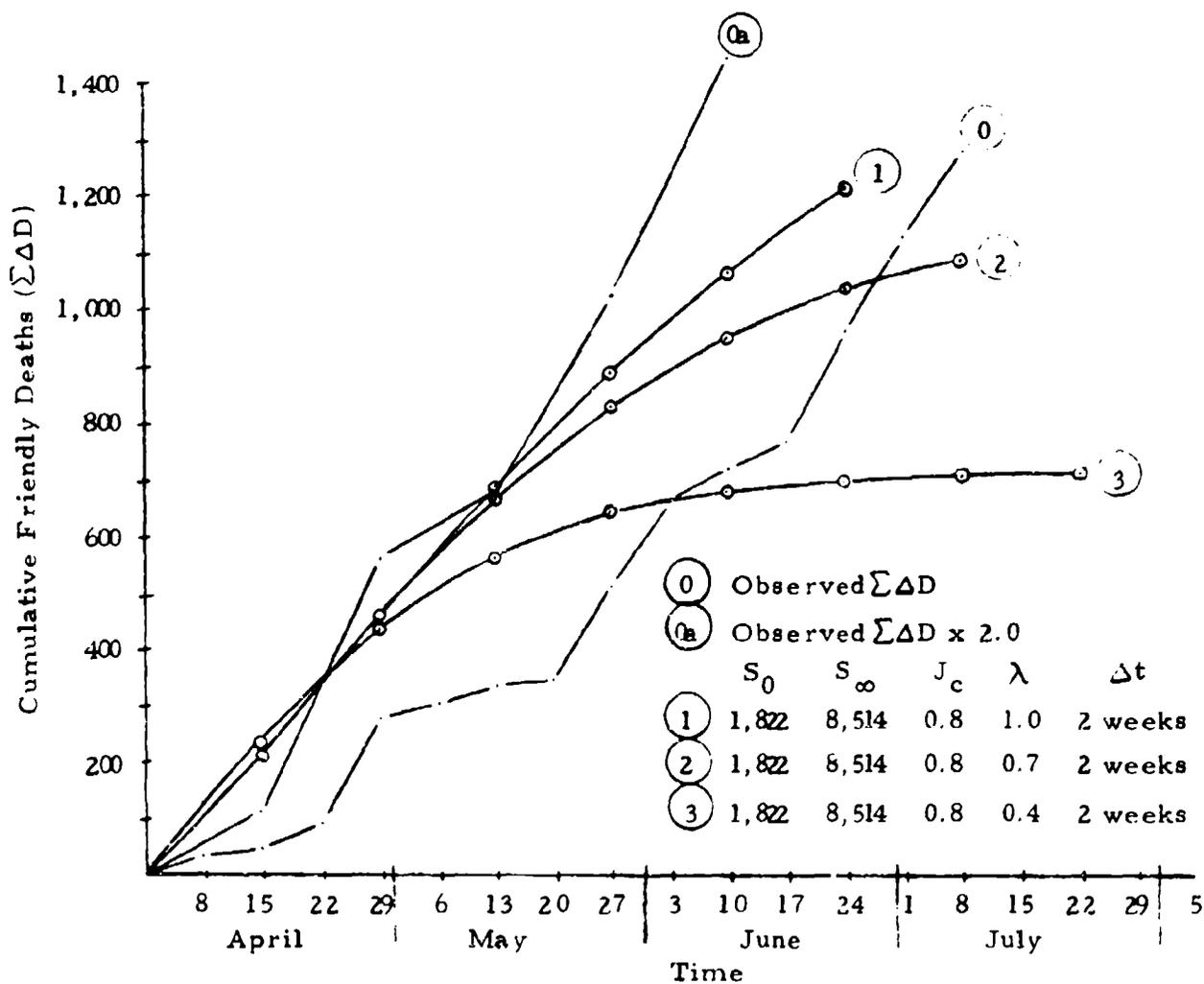
Attrition Curves for Quang Tri
Figure II-12

very low and so was S_∞ for the GVN. In the fourth week the GVN forces were mostly out of the remote bases and concentrated with the effect of increasing the S_∞ at least temporarily. The second flattening of the curve in May reflects the low GVN commitment ratio, probably less than 0.5. The increased S_∞ again in May and the start of the GVN counter-offensive is a second partition that needs to be applied to the modeling of attrition in Quang Tri. With the GVN on the offensive the

curve rises sharply as if the J_c has increased to 1.2 or more characteristic of a force on the offensive. In short, the weekly observations show that the time partitions for attrition curve fitting for Quang Tri need to be placed at 22 April, 20 May, and possibly 17 June in order to be accurate in detail even though a commitment ratio of 0.5 might be accurate for the three month period first tested.

Also illustrated in Figure II-12 are the results of later attempts to improve the data inputs for S_0 and S_∞ . Curve "2" represents the best available data for total strength at the onset and at the end of June 1972. The 24,385 figure for S_∞ is the sum of end of June strength and total casualties estimated by 7 times total deaths to that point. This estimate shown by curve "2" also fails to fit the weekly data for the reasons already noted. Finding that the "accurate" S_0 and S_∞ provided estimates greatly in excess of anything observed or even expected on a weekly basis led to the same logic about strengths that was used in estimating J_c . For curve "3" the value of S_0 is one-tenth of the strength present at the onset (1,822) and that of S_∞ is one-tenth of the strength at the end of June plus 7 times total deaths to that point (the casualties all were involved in the attrition process). Curve "3" shows that increased λ or S_∞ were needed by the GVN in May. The same S_0 and S_∞ figures were used to explore the sensitivity of the model to variation in the commitment ratio. The results are illustrated in Figure II-13 where curve "0" is the same weekly observed data shown in Figure II-12. Curve "0a" reflects an effort at curve fitting that assumed only half the GVN deaths were being reported. If this were correct the fit for commitment ratios of 1.0 and 0.7 (curves "1" and "2") is fairly good through mid May. Although the degree of bias in reporting friendly KIA at this particular time and place is only a matter of conjecture, the finding from these curves is that understating the friendly KIA only makes it appear as if the forces in Quang Tri were less dedicated to holding than they actually were. Even comparing curve "0" with curve "3", $\lambda = 0.4$, shows that on the average through June the GVN commitment may have been closer to 1.0 than 0.5. However, the shift to the counter-offensive complicates the question and more might be learned by study of the aggregates of Quang Tri and Thua Thien; Quang Ngai, Kontum, and Binh Dinh; and Phouc Long, Binh Long, Binh Duong, and Tay Ninh.

Although the data came too late for this work to be responsive in the manner planned last June, some brief testing of the approach for the battle areas mentioned above for the April through September 1972



Attrition Curves for Quang Tri
Figure II-13

period was carried out to at least evaluate the approach using attrition models. For this testing both friendly and enemy attrition were examined. The assumptions leading to the selection of S_0 and S_∞ were varied as were the values of J_c and λ . The objective was to observe the effect of varying these parameters and to find a set of curves that both fit the observed data and were logically consistent with regard to strength and J_c

estimates. In all situations the choice between using total strength present and the proportion of strength assumed to be engaged at any time was obvious. Total strengths yield estimates of attrition far in excess of actual values, even if " Δt " was taken to be several months. Changing the exchange ratio, J_c , changes the rate at which the "crisis" is reached. Increasing J_c increases this rate and anything above or below 0.8 will not allow the curves to fit with the same " Δt " for both the friendly and enemy calculations. Any variation in λ , commitment ratio, will change the level of cumulative deaths at which flattening of the curve takes place. These three sensitivities of the model are illustrated in Figure II-14.

Of the 12 curves shown in Figure II-14, curve 8 with " Δt " equal to one month seems most representative of the overall rise and September "statement" contained in the observed data. This curve for a J_c of 0.8 and a λ of 0.7 is plotted with the observed data in Figure II-15 along with the corresponding curves for estimated and observed enemy deaths in Quang Tri and Thua Thien provinces. While both pairs of curves converge only in the final months, they probably do accurately represent the average engaged strengths, exchange ratio, and commitment ratios for the six month period. As previously noted, at least four sets of these parameter values are needed to give a close fit to the weekly variation. The interesting points about these curves are that neither side has behaved as if the outcome was expected to be decisive. Both seem to be holding back from an all or nothing type of commitment. Until the GVN counter-offensive (the d curve), the GVN commitment ratio, λ , must have been less than 0.4 in order for the curves to be so flat (the a, b, and c curves). In other words, for the data available and the assumptions used to fit the curves shown here, the friendly forces in Quang Tri and Thua Thien disengaged when less than four percent of the effective strength in the provinces became casualties.

Figures II-16 and II-17 illustrate the same sets of estimated and observed curves for the Quang Ngai, Kontum, and Binh Dinh; and Phouc Long, Binh Long, Binh Duong, and Tay Ninh "offensives." In these cases the results are a much closer fit across all the six months. The weekly variation in the observed data does not show the changing GVN commitment ratio and shift to the offensive noted in the Quang Tri data. The estimates in Figure II-17 for friendly deaths are lower than observed values. Increasing J_c slightly and starting the estimates with May might have yielded a better fit and been more in line with the nature of the battles in Binh Long and Binh Duong during the siege and relief

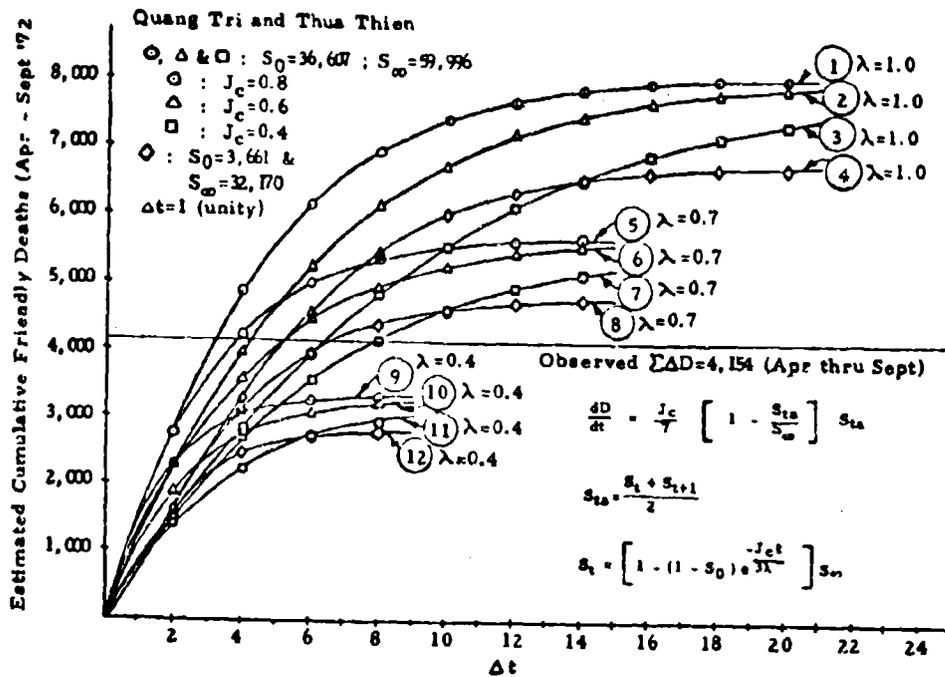


Figure II-14
Attrition Model Sensitivity Curves

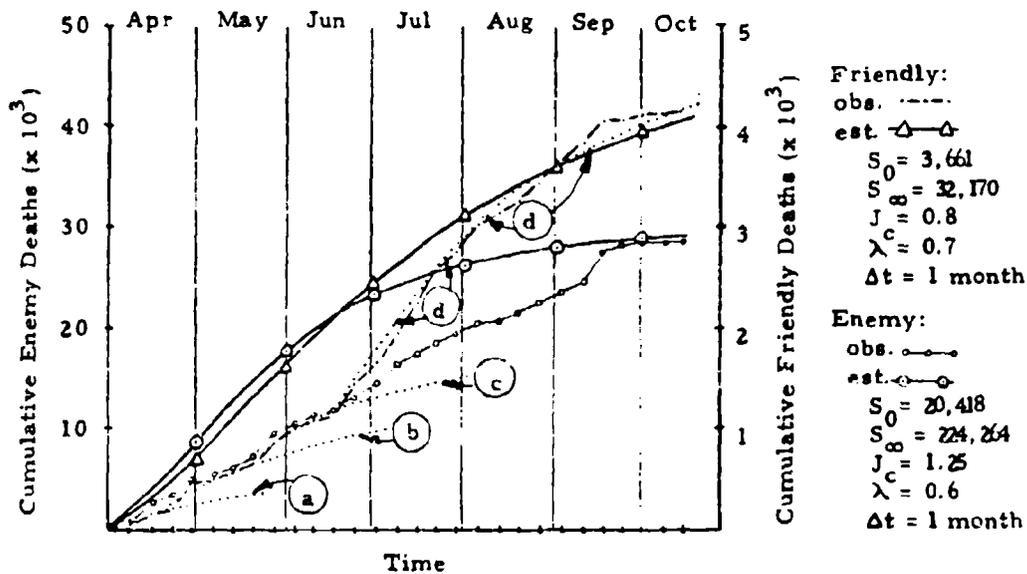


Figure II-15
April - September Attrition in Quang Tri and Thua Thien

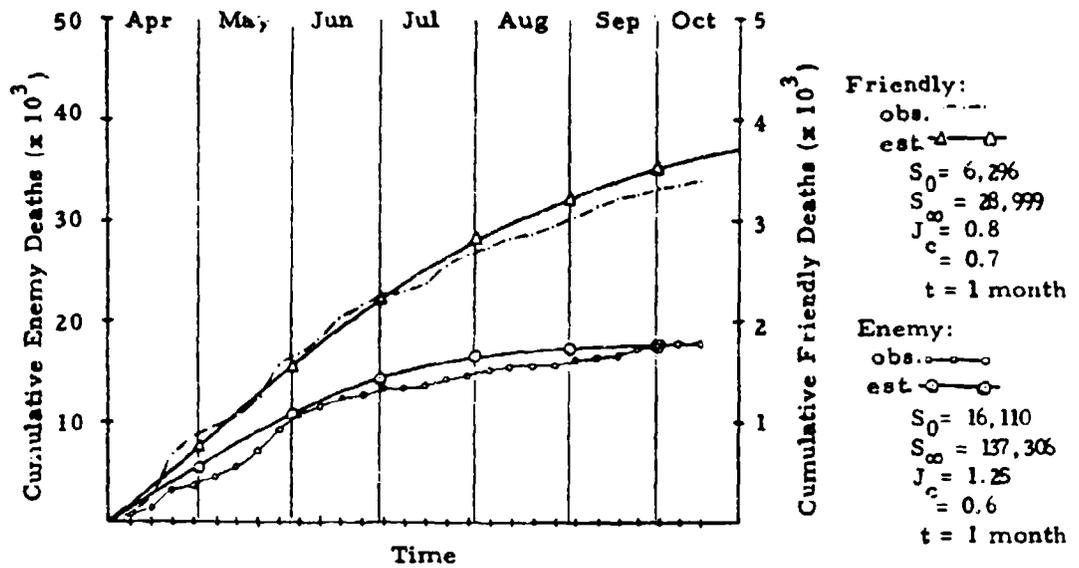


Figure II-16

April - September Attrition in Quang Ngai, Kontum and Binh Dinh

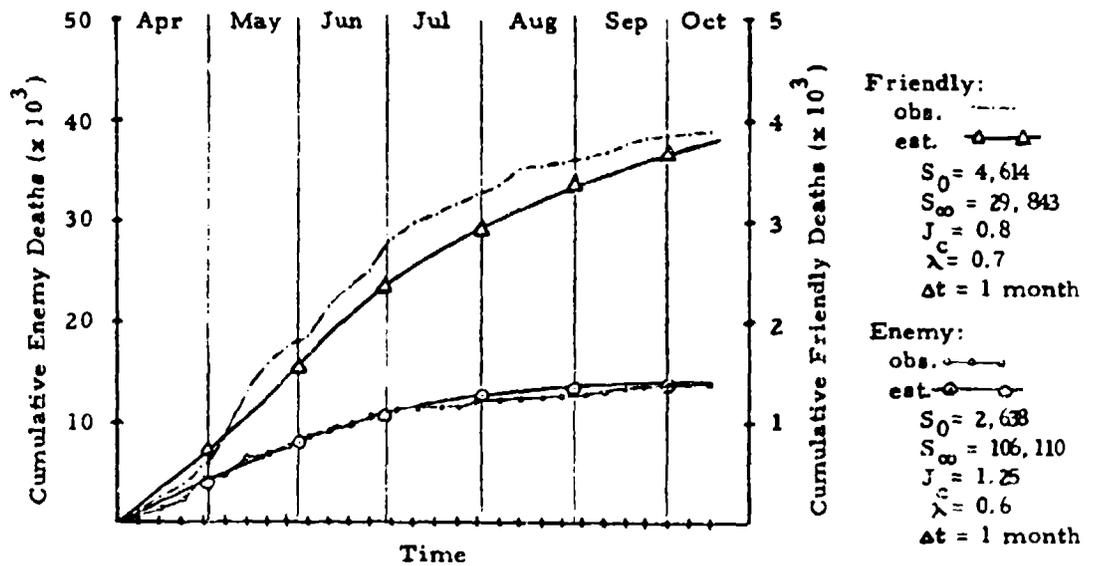


Figure II-17

April - September Attrition in Phuoc Long, Binh Long, Binh Duong and Tay Ninh

of An Loc. Overall, a " Δt " of one month, J_c (friendly/enemy) of 0.8 and 1.25 (enemy/friendly), and the 0.1 and 0.5 factors to adjust strength present to strength involved have produced some surprisingly good fits between observed and estimated curves.

Data - Country-Wide Assessments - The assessment of the country-wide impact of the offensive consisted of examining changes in the following dependent variables and seeking to explain them in terms of past change patterns as well as the independent variables listed below:

- Dependent Variables
 - Population living in hamlets rated AB for the HES PACIFICATION and SECURITY model scores.
 - Population living under GVN control according to the VSSG model (Dec '71 to June '72 and Apr '72 to June '72 changes).
 - Percent of population under GVN control (Mar '72 to Apr '72 change).
 - Province scores on the Bendix HES indices for -
 - PACIFICATION
 - POLITICAL MOBILIZATION
 - SOCIAL/ECONOMIC
 - GVN PRESENCE AND ACTIVITY

- Independent Variables
 - Province scores on the Bendix HES index for -
 - ENEMY PRESENCE AND ACTIVITY
 - ENEMY MILITARY ACTIVITY
 - ENEMY POLITICAL PRESENCE
 - ENEMY POLITICAL ACTIVITY
 - SOCIAL BENEFITS
 - Dispensaries Available
 - Maternity Clinics Available
 - Hospital or MD Available
 - Secondary School Available
 - Primary School Nearby
 - ECONOMIC STRENGTH
 - Surplus Goods in Market
 - Manufactured Goods in Market
 - ECONOMIC STIMULATION
 - Public Works Projects
 - Self Development Projects

GVN and VC POLITICAL INFLUENCE
SECURITY

Non-Selective Terrorism

- Numbers of incidents, operations, and results -
 - Enemy Ground Assaults
 - Enemy Stand off Attacks
 - Enemy Harassment
 - Enemy Coercion
 - Friendly KIA in Enemy Initiated Action
 - Friendly Large Unit Operations
 - Total Enemy KIA
 - Friendly KIA in Friendly Initiated Action

Results - Country-Wide Assessment - The immediate impact of the offensive and its extent was examined in terms of the percent of population under GVN control lost between March and April 1972. Five provinces lost more than 40 percentage points in this period and another seven lost between 20 and 39 percentage points. These 12 provinces are:

- March to April decline greater than 40%
 - Quang Tri
 - Quang Ngai
 - Kontum
 - Phouc Long
 - Binh Long
- March to April decline between 20% and 39%
 - Thua Thien
 - Binh Dinh
 - Quang Duc
 - Long Khanh
 - Tay Ninh
 - Kien Tuong
 - Chuong Thien

As should be expected the declines in both groups can be explained by the numbers of enemy ground assaults and standoff attacks. Less intense enemy activity such as harassment and coercion also were important in explaining the declines of the second group representing a higher proportion of enemy local unit involvement than in the first group

where the enemy forces were largely NVA units. Two important factors became apparent from examination of the patterns of change in GVN control. Of the 12 worst cases noted above only six had populations greater than 50,000 and only two of these had more than 500,000 in population. Therefore, it would be important to also examine the absolute changes as well as percentage data. Secondly, all but 8 of the 44 provinces did decline in GVN controlled population between December 1971 and June 1972, and many of these declines had started in late 1971 and were steady even if they were small in percentage terms. Explanation for these declines seemed as important as the more serious cases, even though more difficult to find.

The work continued by dividing the 44 provinces into quartiles of 11 according to their ranks on change in GVN controlled population between December 1971 and June 1972 (for long term impact) and between April 1972 and June 1972 (for initial recovery). The worst and best quartiles in terms of the December to June changes were:

- Worst Quartile: GVN Controlled Population Decline

Quang Ngai	-210,278
Dinh Tuong	-108,254
Binh Dinh	-101,918
Quang Tri	-88,057
An Xuyen	-84,878
Kien Hoa	-79,289
Kien Phong	-75,940
Quang Tin	-74,187
Ba Xuyen	-73,970
Chau Doc	-70,237
Chuong Thien	-69,206

- Best Quartile: GVN Controlled Population Decline or Gain

Lam Dong	-2,769
Bien Hoa	-2,158
Go Cong	0
An Giang	+855
Quang Duc	+617
Darlac	+2,390
Long An	+3,261
Binh Tuy	+3,313
Khanh Hoa	+4,414
Ninh Thuan	+9,701
Tuyen Duc	+18,057

Enemy action (the "offensive") in terms of ground assaults, stand-off attacks and harassment again accounts for much of the differences between the two groups of provinces. Only non-selective terrorism and coercion were above average in the best quartile and below average in the worst. Another striking difference between the two quartiles was found in the social/economic and development measures. Provinces in the worst quartile generally ranked very low on these measures while the best quartile provinces were consistently above average if not very high. Even though economic strength and GVN sponsored development could not possibly have prevented large scale NVA attacks³², these factors are also stand out in the differences between the best and worst quartiles ranked on April to June 1972 recovery.³³ These quartiles were:

●	<u>Best Quartile: Percent Recovered</u>	
	Quang Duc	+114.6
	Lam Dong	+ 90.8
	Phouc Long	+ 80.8
	Kien Hoa	+ 69.8
	Kien Giang	+ 67.3
	Vinh Long	+ 65.1
	Long Khanh	+ 60.6
	Binh Thuan	+ 60.0
●	<u>Worst Quartile: Percent Additional Decline</u>	
	Dinh Tuong	-103.3
	Kien Tuong	- 93.7
	Ba Xuyen	- 82.8
	Binh Duong	- 35.6
	An Xuyen	- 33.4
	Kien Phong	- 24.6
	Chuong Thien	- 2.9
	Phong Dinh	0

Binh Long and Quang Tri were excluded from the latter group because they had declined as far as possible and recovery had not yet started. Phong Dinh was included even though no single monthly decline was as much as ten percent because it had one major characteristic in common with the others. The GVN control score had been steadily declining since late 1971. The others simply had a major drop in April as well. One logical difference between the two groups was relatively fewer enemy ground assaults, standoff attacks, and harassment incidents in the best quartile. In these provinces the enemy activity concentrated on terrorism and coercion while these activities were below average in the worst quartile. Economic conditions measured by the availability of manufactured goods and surplus commodities in local markets also stand out as being above average in the provinces recovering, most and below average in those continuing to decline (Phong Dinh was an exception).

Additional effort was carried out on the problem of explaining and forecasting recovery rates using the post-Tet '68 experience as a data base. No strong, reliable regression models were found, however. Another overall assessment was sought in terms of the normal annual variation and the relatively long term 1967 through 1972 trend. Quarterly changes in province pacification scores were useful in placing the offensive and its impacts in a better perspective. For example, consider the following tabulation of significant changes:³⁴

Year	Dec - Mar		Mar - Jun		Jun - Sept		Sept - Dec	
	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)
1967	x	x	1	9	0	5	2	14
1968	0	26(max)	1	6	2	6	9	1
1969	3	6	6	3	24(max)	1	6	4
1970	6	7	13	2	15	1	4	2
1971	5	15	9	3	4	5	7	3
67-71 Ave.	3.5	13.5	6	4.6	9	3.6	5.6	4.8
1972	1	17	0	23	7	5	x	x

One of the many possible interpretations of this change data is that the impact of the offensive in 1972 was severe, but still less severe than the pacification declines following Tet '68. However, recall the fact that several provinces had started a pattern of steady, gradual decline in late

1971 with 17 of these being significant by the end of March. Adding the 15 provinces that did not start downward until April gives a total of 32 significant declines in pacification between December 1971 and June 1972. Thus, the set-backs of 1972 were significant in nearly three-quarters of the provinces, but how far back had pacification really gone? The answer can be found by comparing the situation in September 1971 with September 1972 as shown in Figure II-18.

September 1971 Situation

September 1972 Situation

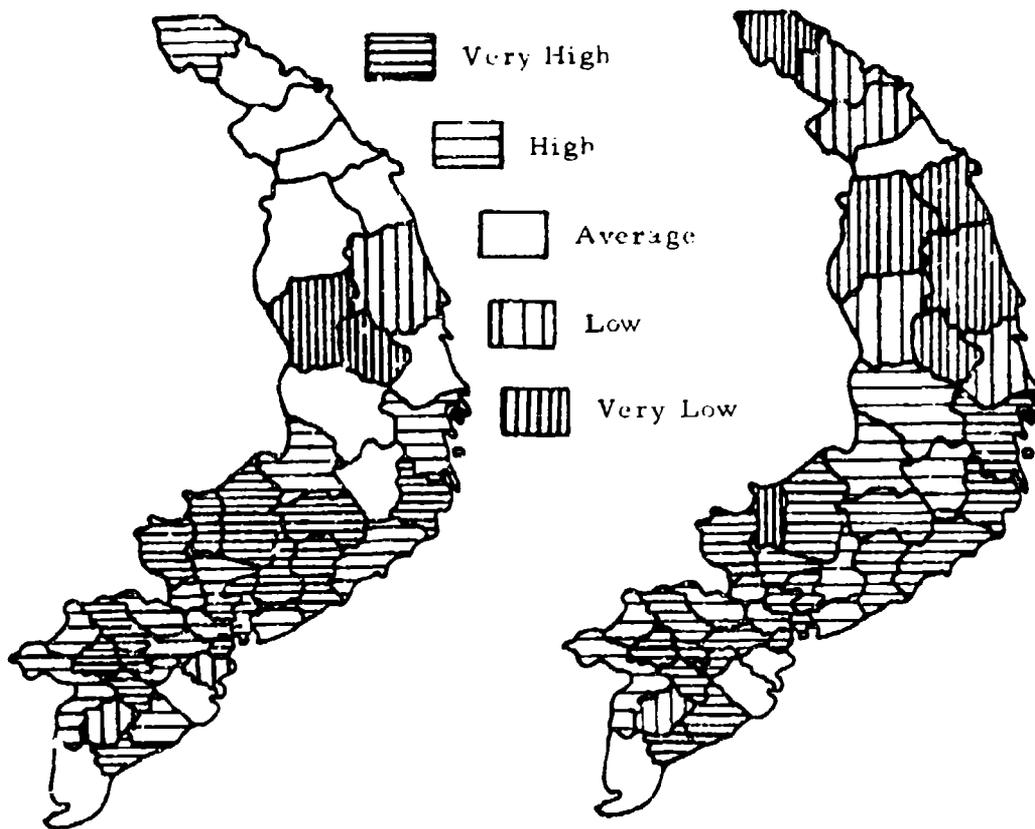


Figure II-18

Pacification Situations

The categorization of the situations from "Very High" to "Very Low" is based on the July 1969 to October 1972 distribution of the scores with one-fifth of the cases being placed in each category. The number of provinces in each category in the two months illustrated is:

	<u>September 1971</u>	<u>September 1972</u>
Very High	15	19
High	14	10
Average	10	4
Low	3	5
Very Low	2	6

Of the 29 provinces "High" or "Very High" in September 1971 all but 2 were still in one of these categories in September 1972, Quang Tri and Binh Long. The last time these two provinces had been categorized as "Very Low" was in December 1969 and it had taken until June 1971 for them to reach their pre 1972 levels. It could be said then, that the most severe declines involved setting pacification back about 28 months in calendar time and 18 months in recovery time. However, the improvement in these provinces through 1970 and 71 did not contend with quite so much NVA presence. Between September 1971 and September 1972 the changes in the "Average" category were 2 up to "High", 3 down to "Low", 2 down to "Very Low", and 1 up from "Low" to "Average". In short, most of the impact was confined to provinces categorized as average or below, and the overall effect could be summarized as pacification having been set back about a year.

Another approach to examining the offensive makes use of tabulations of the correspondence (or lack of it) between the significant changes of the dependent and independent concepts for the February to March, April to May, May to June, and August to September intervals. The dependent concepts were the aggregate Pacification model score and the GVN Presence and Activity, Political Mobilization, and Social/Economic sub-model scores. Tables II-5 through 8 present the number of provinces in which increased, unchanged, or decreased scores were observed for these four dependent concepts when the scores for Enemy Presence and Activity, GVN Presence and Activity (administrative, information, and rural development), and GVN Military Initiative (friendly KIA in friendly initiated action) either increased or decreased.

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TABLE II-5
PACIFICATION MODEL

		Increased <u>(20)</u>	Unchanged <u>(82)</u>	Decreased <u>(74)</u>
Enemy Presence & Activity	Inc. (63)	1	9	53
	Dec. (29)	9	18	2
GVN Presence & Activity	Inc. (32)	10	21	1
	Dec. (80)	1	34	45
GVN Military Initiative	Inc. (37)	3	10	24
	Dec. (24)	1	14	9

TABLE II-6

GVN PRESENCE & ACTIVITY SUB-MODEL

		Increased <u>(32)</u>	Unchanged <u>(64)</u>	Decreased <u>(80)</u>
Enemy Presence & Activity	Inc. (63)	4	28	31
	Dec. (29)	11	6	12
GVN Military Initiative	Inc. (37)	3	17	17
	Dec. (24)	3	6	15

TABLE II-7

POLITICAL MOBILIZATION SUB-MODEL

		Increased <u>(36)</u>	Unchanged <u>(85)</u>	Decreased <u>(55)</u>
Enemy Presence & Activity	Inc. (63)	6	30	27
	Dec. (29)	10	10	9
GVN Presence & Activity	Inc. (32)	12	14	6
	Dec. (80)	16	20	36
GVN Military Initiative	Inc. (37)	4	21	12
	Dec. (24)	4	11	9

TABLE II-8

SOCIAL / ECONOMIC SUB-MODEL

		Increased <u>(30)</u>	Unchanged <u>(102)</u>	Decreased <u>(44)</u>
Enemy Presence & Activity	Inc. (63)	9	30	25
	Dec. (29)	8	15	5
GVN Presence & Activity	Inc. (32)	9	22	1
	Dec. (80)	12	36	32
GVN Military Initiative	Inc. (37)	5	19	13
	Dec. (24)	4	12	8

Enemy Presence and Activity increases and decreases in GVN Presence and Activity are the most frequent (63 and 80 observations respectively out of a possible 176) significant changes observed. It can also be seen in Table II-6 that nearly half the declines in GVN Presence and Activity correspond to increases in Enemy Presence and Activity. The dominant feature of the data is thus increased Enemy Presence and Activity, but this simply confirms the fact that an enemy offensive is being observed in the data for these four time periods. That the aggregate Pacification score decreases are best explained by this dominant feature is not as interesting as the fact that half the increases (recovery) correspond to the GVN (civil) Presence and Activity being reestablished. GVN Military Initiative should be viewed as reaction to the enemy offensive. Thus, any correspondence between its increases and decreases of GVN Presence and Activity, Political Mobilization, and Social/Economic scores should be rejected as spurious. Tables II-7 and 8 show that Political Mobilization and Social/Economic scores were less disturbed by the offensive than were GVN Presence and Activity scores (48 and 58 percent unchanged versus 36 percent). The apparent impact of the offensive (Enemy Presence and Activity sub-model score increases) on the other three sub-models comprising Pacification shows that the first casualty of increased enemy action is probably local government. Any changes to enemy or GVN presence and activity (civil and military) measures were most likely to correspond to no change of Social/Economic conditions. Only decreases of GVN Presence and Activity show the expected impact on Political Mobilization. Finally, it is necessary to note that the positive aspects of Pacification tend to show immediate response to adverse conditions. Changes in the other direction are not associated with reductions in military activity at the same time. To explain these changes time lags need to be considered using an approach such as that employed in the time series analysis on the village programs topic.

The last area of concern with the offensive was the way in which the "regular-territorial" dimensional structure may have been altered. Analyzing the period April 1972 through September 1972 as a six month aggregate found very little change in this structure. The number of provinces falling into the four subsets for this period may be compared with the April 1967 through September 1971 partitioning by examining the following summary tabulation:

	<u>Province Sub-Set Categorizations</u>				Ambiguous Cases
	Regular Dimension		Territorial Dimension		
	Low	High	High	Low	
4/67-9/71	14	8	11	9	2
4/72-9/72	15	10	6	10	3
Unchanged	6	5	5	3	0
	Binh Tuy	Quang Tri	Kien Phong	Darlac	
	Phouc Tuy	Thua Thien	Dinh Tuong	Quang Duc	
	Haw Nghia	Quang Nam	Kien Giang	Phouc Long	
	Bien Hoa	Kontum	Chuong Thien		
	Go Cong	Binh Dinh	An Xuyen		
	Bac Lieu				
Changed	9	5	1	7	3
	Kien Hoa (HT)	Pleiku (LT)	Tay Ninh (HR)	Phu Bon (LR)	Quang Tin (HR)
	Vinh Binh (HT)	Phu Yen (LT)		Tuyen Duc (LR)	Quang Ngai (HR)
	Vinh Long (HT)	Khanh Hoa (LT)		Ninh Thuan (LR)	Binh Duong (LT)
	Phong Dinh (HT)	Binh Long (LT)		Binh Thuan (LR)	
	Ba Xuyen (HT)	Kien Tuong (LR)		Lam Dong (LR)	
	Chau Doc (HT)			An Giang (LR)	
	Long An (AC)			Sa Dec (LR)	
	Gia Dinh (AC)				
	Long Khanh (LT)				

More than half the provinces shifted to another category from where they usually tended to be. While such shifts often took place from period to period, the shifts observed here are unique in that they involved blocks of often geographically contiguous provinces of one category moving to another. There were seven low regulars moving to low territorial (the presence of NVA units may be responsible), four low territorials moving to high regular (clearly due to NVA presence), and high territorials moving to low regular (possibly because of relatively low levels on all measures except the RF/PF proportion of friendly deaths). Even though these changes were numerous, the unique characteristics of each sub-set were unchanged. The war intensified substantially and its focus shifted, but the basic nature continued much as before. The correlation between the April 1967 through September 1971 and the April 1972 through September 1972 two dimensional factor structures is 0.79.

In contrast to the stability of the six month aggregate structure, analysis of the individual months from April through September 1972 disclosed several substantial variations. The province to province variation could be well explained by a two dimensional solution, but the two dimensions were not the same regular-territorial dichotomy used as a reference in all the work with six month aggregates. The difference was most pronounced for the months May, August, and September. For example, observe the contrast shown in Figure II-19 between a straight two factor, orthogonal solution for August and the same structure rotated to the average (4/67-9/71) solution used as the reference for the regular-territorial dichotomy throughout the study.

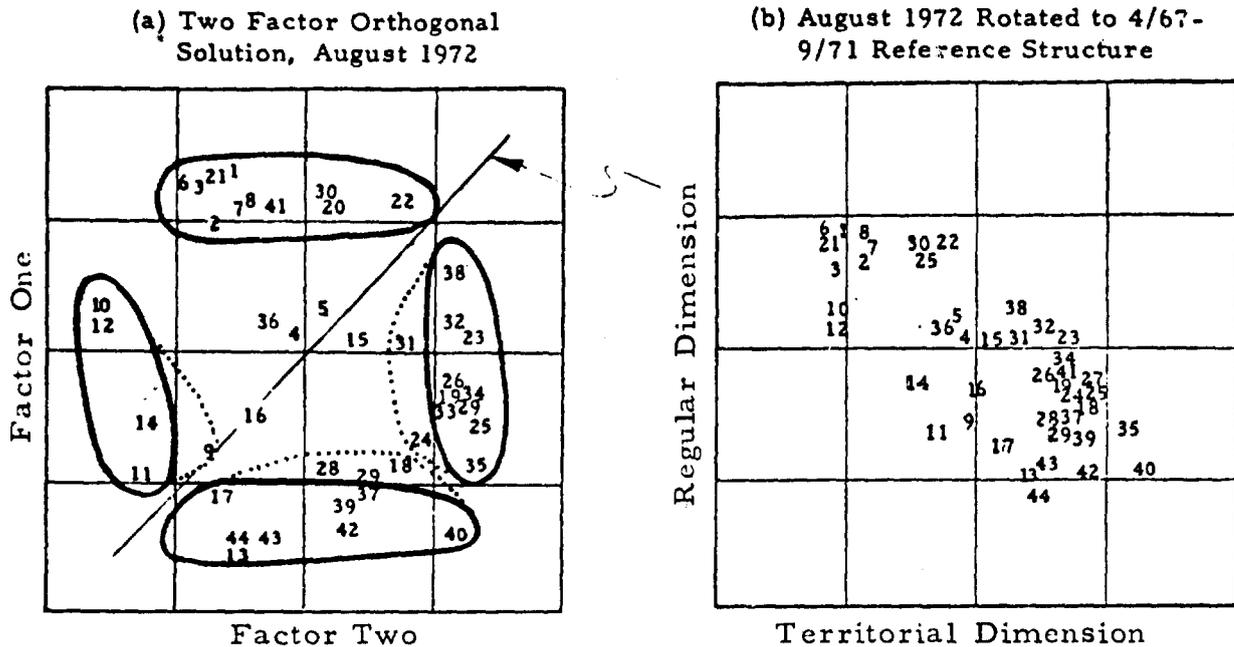


Figure II-19

Analysis Across Provinces, August 1972

The territorial dimension appears to have retained its orientation, but did lose its meaning as the low provinces moved toward high regular. The regular dimension was replaced by a stronger "factor one", which when its location relative to the reference solution is examined appears to deserve the label "1972 offensive." Quang Tri, Kontum, Binh Long, Pleiku, Quang Nam, Binh Dinh, and Thua Thien are at the "high" end and Ba Xuyen, Vinh Long, Bac Lieu, and Sa Dec are at the other extreme. This change in the structure describing across province variance has the effect of making the old regular-territorial approach of little value as a partitioning device for studying the offensive. In fact using the criteria for partitioning at ± 0.5 does not place any provinces in the high and low regular sub-sets for the quarter ending in August 1972. On the other hand averaging over a six-month period indicates that the basic nature of the war was only briefly altered.

Friendly Initiative³⁵

Problem — This work was the continuation of the basic line of inquiry that sought to optimize the mix of ARVN, RF, and PF strengths in terms of expected GVN control. The research strategy was expanded to include activity as well as strength as independent concepts, and used several alternative outcome measures as the dependent concept. The basic assumption behind this work was that future enemy action is suppressed by current friendly initiative. Since both very high levels of friendly initiative and the high levels of enemy initiative that might be a consequence of low friendly initiative would produce high friendly casualties, the first research problem considered was to find an optimum level of friendly initiative that would be associated with a minimum level of friendly casualties. This hypothesis is illustrated in Figure II-20 in which the relationship might be expressed as friendly casualties being a function of friendly initiative and the square (or some other exponent) of friendly initiative as shown. Constant $_1$ is the expected friendly casualties for zero friendly initiative. An optimum will exist if the data reveal constant $_2$ as negative and constant $_3$ as positive. Once the appropriate levels of activity could be identified for various conditions (defined by the regular-territorial sub-sets), the sensitivity to changing the mix of RVNAF components was the next part of the problem.

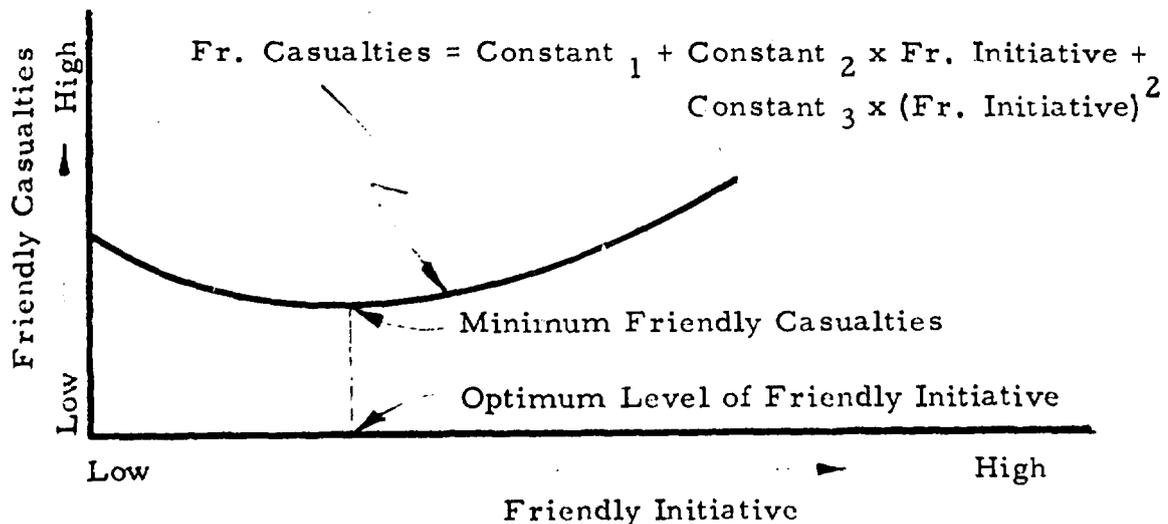


Figure II-20

Optimizing Friendly Initiative

Approach - Multiple regression with the data partitioned into the four war category sub-sets was carried out to find the values for the three constants. Data from the 1969-70 SEER file was used with the variables defined as follows:

- Friendly Casualties - ARVN/VNMC KIA on friendly initiated operations at time one plus ARVN/VNMC KIA in enemy initiated action at times two, three, and four.
- Friendly Initiative - An index constructed by summing the standardized scores (at time one) for number of ARVN/VNMC small unit operations and the percentage of available ARVN/VNMC battalion days spent on large unit offensive operations.

The regressions were all so weak (maximum $R^2 < 0.1$) that it was decided the other friendly forces (US and third country) could not be left out. The regressions were repeated on data substituting friendly totals in place of just ARVN/VNMC. This did not change much in the results which can be summarized by the plots shown in Figure II-21 where the time lag for costs due to enemy initiative is three months. The best R^2 was only 0.15 and

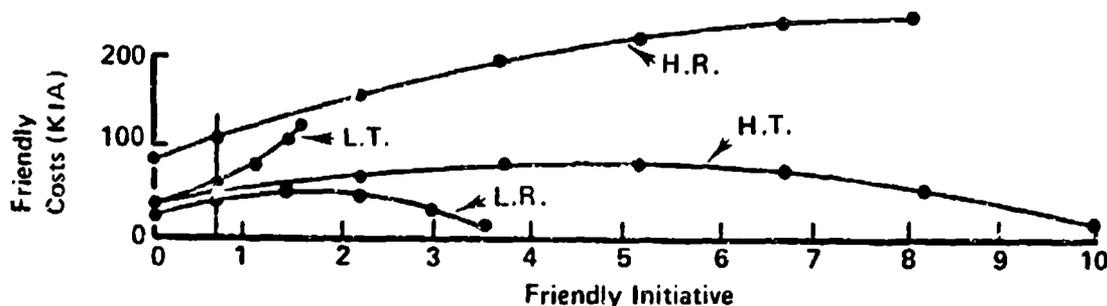


Figure II-21

Friendly Costs versus Friendly Initiative

there was hardly an optimum solution. This approach was abandoned in favor of a "shot-gun" strategy of looking at various bivariate scatter plots in search of a better way to define the dependent and independent measures.

A definition of friendly initiative better than the abstract sum of standard scores was needed in order to translate the results into operational terms anyway. In this "shot-gun" strategy the abstraction was shifted to the dependent variable by construction of a composite index incorporating future numbers of enemy incidents, friendly KIA per enemy incident, the rate per 1000 assigned friendly strength killed in enemy incidents, and the change in GVN control. These "outcomes" were categorized as favorable or unfavorable on the basis of the history in each province. In addition to partitioning by war category, enemy density and force ratios were used as intervening factors to define a variety of possible "threat" situations in which some future force strength and activity decisions would be needed. The results were to be expressed in operationally useful tables or charts such as those illustrated in Figure II-22 and Table II-9. The data was partitioned into more than 1200 sub-sets in search of the kind of regularity between threat, friendly strength or action, and measures of outcome that would yield such outputs.

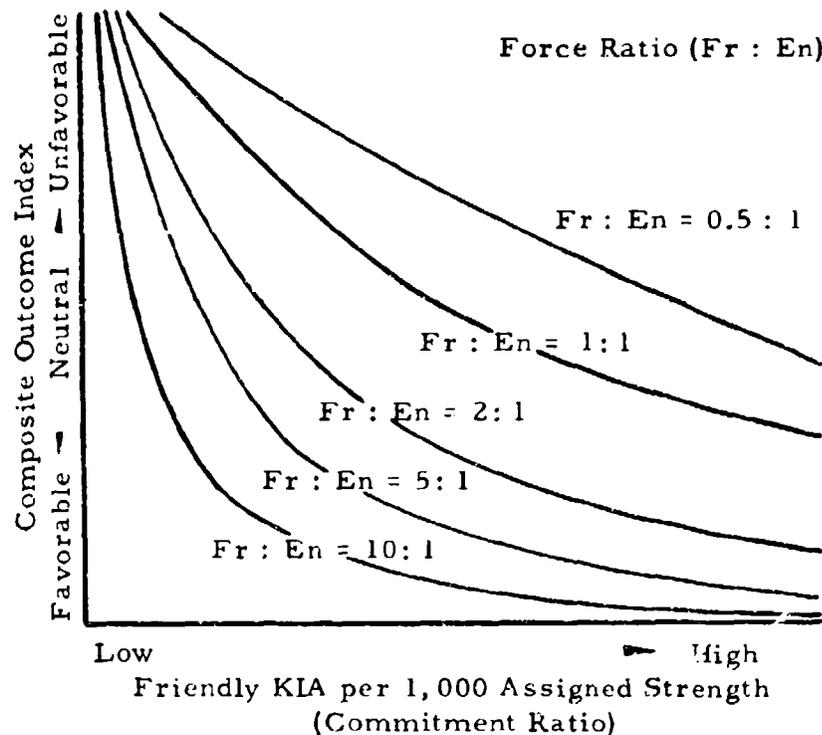


Figure II-22

TABLE II-9
 PLANNED TABULAR DISPLAY OF ANALYSIS OUTPUT

Enemy Regular Force Density (Troops/sq. km.)	Probabibility of Favorable Outcome - p(F)									
	1	2	3	4	5	6	7	8	9	10
0.0-0.1	0.8	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
0.1-0.2	0.6	0.7	0.8	0.9	1.0	1.0	1.0	1.0	1.0	1.0
0.2-0.5	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.0	1.0	1.0
0.5-1.0	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7
1.0-5.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4

Friendly Maneuver Battalions

Unfortunately, either the data or the approach or both missed the mark because the relationships found were general y very weak and often indicated adverse results for friendly military operations.

Data — The selection of variables used in the final series of analyses to derive some useful information about the utility of military force in Vietnam included:

- Friendly Strength and Activity Measures
 - Friendly Regular Strength (SEAPR)
 - ARVN/VNMC Strength (SEAPP.)
 - RF Strength (SEAPR)
 - Total National Police Strength (SEAPR)
 - PSDF Participation (QHES)
 - Total Friendly Strength (SEAPR)
 - Friendly KIA or Friendly Initiated Action (SEAPR)
 - Friendly KIA, Fr. Init. per 1000 Total Assigned Strength (SEAPR)
 - Function 1 Air Support (Interdiction) Sorties (AIRSUM)
 - Function 2 Air Support (Close Air Support) Sorties (AIRSUM)
 - Tactical Air/Gunship Sorties Supporting ARVN/VNMC (SEER)
 - Air Lift/Medevac Sorties Supporting ARVN/VNMC (SEER)
 - Rounds of Artillery and Naval Gun Fire Supporting ARVN/VNMC (SEER)

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- Friendly Regular Density (Troops/sq. km.) (SEAPR)
- Friendly Regular Strength per 1000 Contested Population (SEAPR)
- Friendly Territorial Strength per 1000 GVN Controlled Population (SEAPR)
- Intervening/"Threat" Measures
 - Overall Force Ratio (Friendly/Enemy) (SEAPR)
 - Regular Force Ratio (SEAPR)
 - Territorial Force Ratio (SEAPR)
 - Enemy Regular Density (Troops/sq. km.) (SEAPR)
 - (Measures of combat support were also treated as intervening parameters)
- Outcome Measures
 - Total Enemy Incidents per Month (averaged over one, two, three, and four months) (SEAPR)
 - Friendly KIA in Enemy Initiated Incidents (for current month and one, two, and three months ahead) (SEAPR)
 - Friendly KIA per Enemy Incident (for current month and one, two, and three months ahead) (SEAPR)
 - Friendly KIA in Enemy Incidents per 1000 Total Friendly Assigned Strength (averaged over one, two, three, and four months) (SEAPR)
 - Change in Percent GVN Control (over one, two, and three months) (SEAPR)
 - Composite Outcome Index - Sum of scores standardized by province for:
 - Four Month Average Number of Enemy Incidents
 - Four Month Average of Friendly KIA per Incident
 - Four Month Average of Friendly KIA per 1000 Strength
 - Three Month Change in Percent GVN Control

The rationale behind the choice of some variables should be noted. The strength data is straightforward except for PSDF participation. A consistent time series of PSDF strength data could not be found. Tests of the relationships between the HES questions on PSDF participation (percent of households with a member in PSDF) and activity and several months of data for number of armed PSDF and number of key inter-teams were carried out to see how well the HES data reflected across province variation. A rank order correlation (ρ) of 0.32 for PSDF participation and armed PSDF seemed

good enough to warrant using the HES data rather than drop PSDF from the research design. The measures of friendly regular strength per square kilometer and per 1000 contested population (difference between total and GVN or VC controlled population) were selected to reflect the responsibility of regular units to clear areas and advance GVN control. The population protection responsibility of the RF and PF was to be measured by the ratio of their strength to GVN controlled population. The composite outcome index says that several factors determine the favorability of how the situation looks in any given month. It also says that one should look ahead three months to judge the results of current activity and deployment, but time lags of two, one, and zero months were also examined in other iterations of this work. The distribution of scores on this index is shown in Figure II-23. The most favorable outcome is negative (-6.3 for Binh Duong in December 1971) and most unfavorable outcome is positive (12.24 for Binh Long in May 1972) on this scale. The mean score for each province is zero because of the

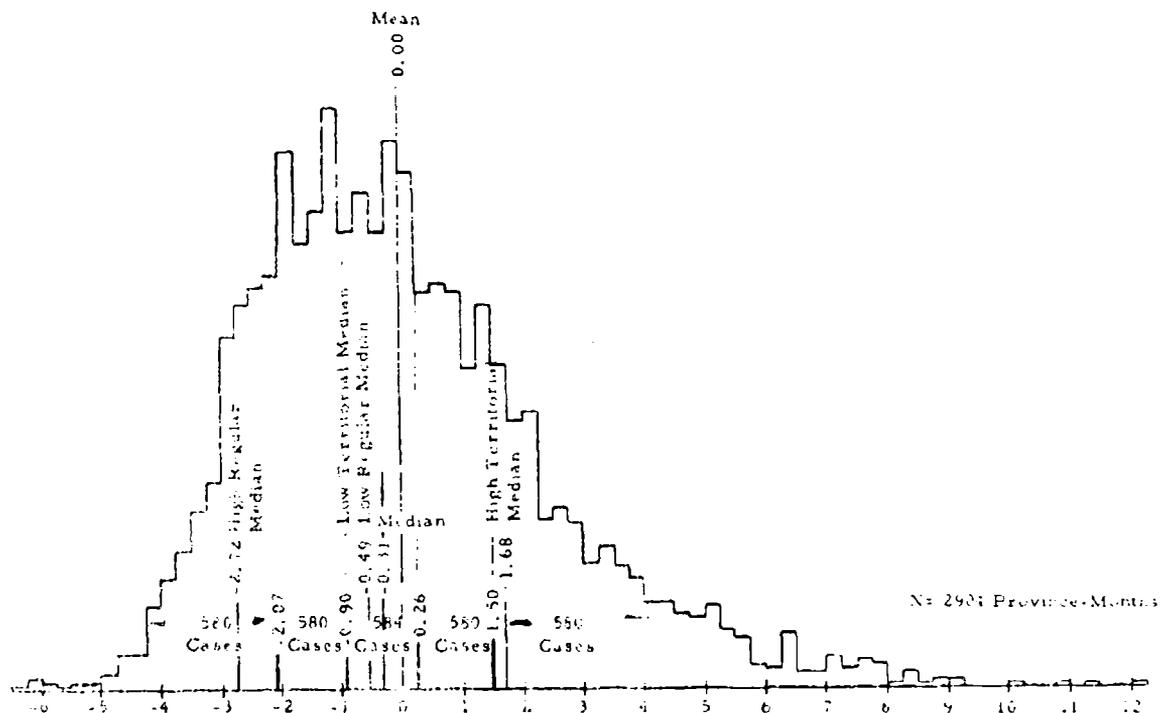


Figure II-23

Distribution of Composite Outcome Index Scores

standardization by province. The four elements of the index were standardized by province to compensate for the fact that a rather good outcome for Quang Tri would be considered a disaster for Go Cong. This also explains why Binh Long is the worst case and not Quang Tri. The intense combat of 1972 was unusual for Binh Long while it had been almost common for Quang Tri. It was surprising to find that the median value for the high territorial data sub-set was less favorable than the median value for the high regular sub-set. Table II-10 gives descriptive statistics for the four elements of the index and the correlation between each element and the composite index for the total and four war type data sets. The differences in

TABLE II-10

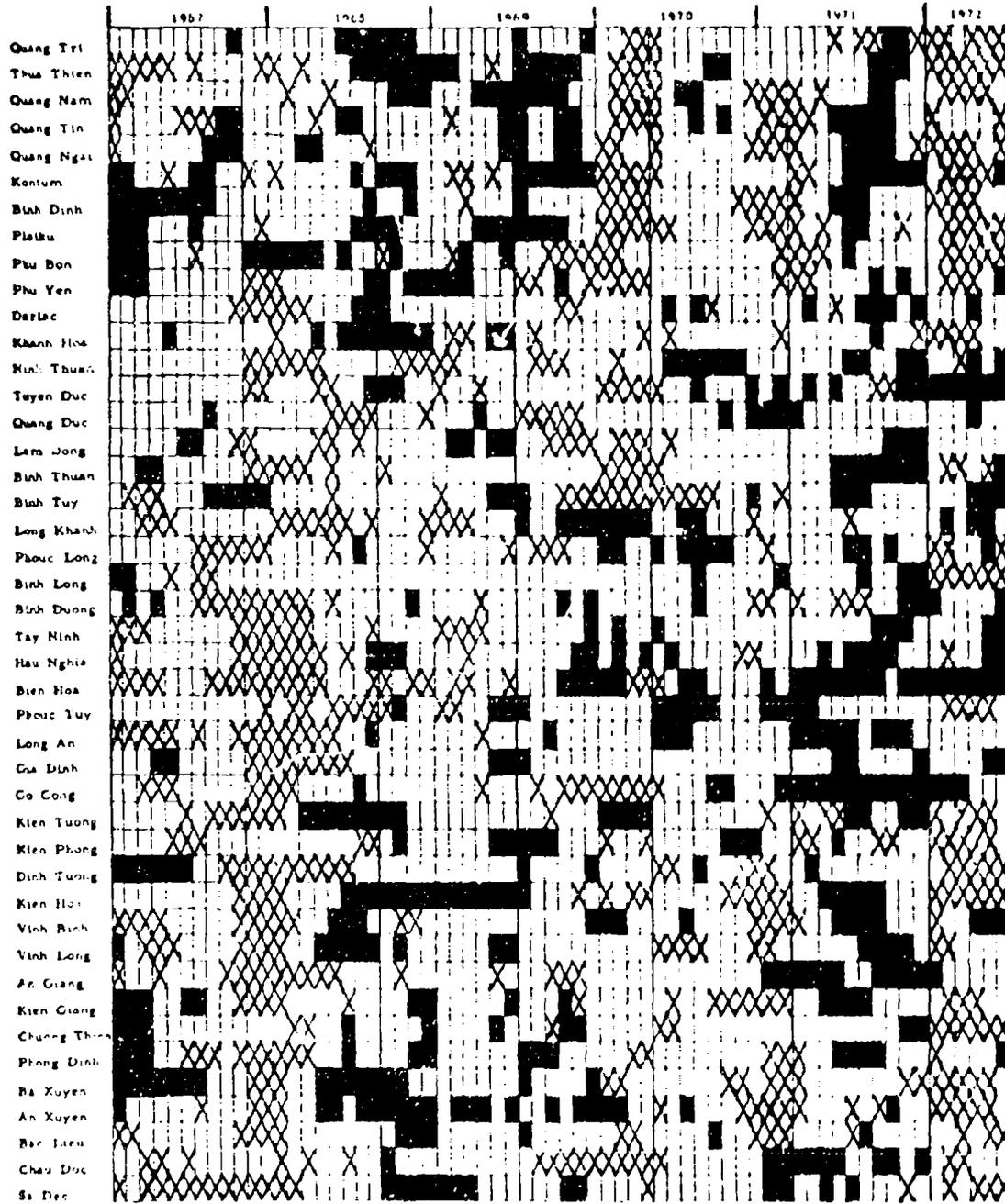
ELEMENTS OF COMPOSITE OUTCOME INDEX

Outcome Index Element	Mean Value	Standard Deviation	Correlation With Index	No. of Cases
Enemy Incidents per Month (T_0 to T_3)	51.2	53.2	0.283	2904
Low Regular	25.0	24.8	0.266	643
High Regular	110.6	74.7	0.300	552
High Territorial	42.9	30.3	0.408	696
Low Territorial	50.4	43.6	0.382	465
Friendly KIA, En. Init. per Month (T_0 to T_3)	28.1	29.3	0.498	2904
Low Regular	14.4	16.9	0.487	643
High Regular	57.9	37.0	0.604	552
High Territorial	26.0	19.1	0.524	696
Low Territorial	28.3	33.1	0.623	465
Friendly KIA per 1000 Fr. Strength (T_0 to T_3)	2.46	2.92	0.399	2904
Low Regular	2.27	3.45	0.356	643
High Regular	2.98	2.60	0.487	552
High Territorial	2.34	2.21	0.382	696
Low Territorial	3.04	4.08	0.406	465
Change in GVN Control (T_0 to T_3)	1.95	12.48	0.416	2904
Low Regular	1.72	13.56	0.505	643
High Regular	2.11	11.32	0.372	552
High Territorial	2.56	7.80	0.544	696
Low Territorial	1.47	16.66	0.473	465

the means and standard deviations cause a high regular province-month with zero or very low enemy activity to appear more favorable (or lower) on the composite index scale than the same outcome in a high territorial province-month (minus 4.38 versus minus 4.09). Thus this difference in median scores is an artifact of the index construction which gives greater weight to inactivity in areas that normally have rather high levels of activity than is given to normally quiet areas.

Before discussing the analysis results and presenting some detailed examples one more display based on the composite outcome index is appropriate. Figure II-24 illustrates the temporal and geographic distribution of the 580 most favorable and 580 most unfavorable outcomes. This is a useful presentation because it not only gives an overall perspective for evaluating the situation at any point in the January 1967 through June 1972 time frame, but also gives some credibility to the index in the way major extremes and general trends in the war stand out.

Results - Relationships between the outcome index and the independent variables (factors subject to change at US/GVN initiative) were found to be very weak, even when controlling for intervening parameters such as war type and enemy regular density. If anything, the higher levels of friendly strength and activity seem to be associated with unfavorable outcomes. Table II-11 is an abstract of the descriptive statistics by quartile of outcome for each war type. Comparison of these mean values across levels of outcome shows only that there is very little regularity between the factors subject to friendly initiative and GVN control and enemy initiative three months later. The same general impressions are found if outcome is examined versus varying levels of friendly strength and activity. Figures II-25, 26, and 27 are plots of curves fitted through the mean outcome index values for various ranges of friendly loss rates on friendly initiated action, friendly territorial strength per GVN controlled population, and enemy regular density for each war type category. Only enemy regular density has curves that show a non-zero relationship, but the effect is mixed and apparent at only high levels of enemy density. High enemy density has the expected result of driving the outcome more unfavorable in the high territorial and low regular cases, but the opposite seems to occur in the other two war type categories. To explain this difference and also to study the other relationships in greater detail these subsets partitioned according to both war type and enemy density were examined for a number bivariate relationships.



580 Most Favorable Cases (Index < 2.97)
 580 Most Unfavorable Cases (Index > 1.50)

Figure II-24

Temporal and Geographic Distribution of Extreme Outcomes

TABLE II-11

DESCRIPTIVE STATISTICS WITH STRATIFICATION BY OUTCOME

	Composite Outcome Index			
	Very Fav.	Favorable	Unfavorable	Very Unfav.
RF and PF Strength				
Low Regular	6,830	7,040	7,830	7,780
High Regular	8,230	7,150	7,200	7,540
High Territorial	6,920	6,950	7,240	8,160
Low Territorial	7,210	6,780	7,340	6,710
Total Police Strength				
Low Regular	1,570	1,420	1,850	1,090
High Regular	1,510	1,240	1,030	910
High Territorial	1,920	1,410	1,760	1,210
Low Territorial	1,310	1,700	2,050	2,394
Friendly KIA, Fr. Intl.				
Low Regular	19.5	30.4	36.7	51.1
High Regular	30.7	33.0	16.4	33.0
High Territorial	25.6	39.4	35.5	47.7
Low Territorial	29.4	27.5	36.6	20.9
Fr. KIA, Fr. Intl/Fr. Str. (1000's)				
Low Regular	1.9	2.8	3.1	4.3
High Regular	2.5	2.8	1.5	2.8
High Territorial	2.4	3.4	3.3	4.0
Low Territorial	2.5	2.7	3.2	2.0
Territorial Force Ratio				
Low Regular	8.57	8.60	7.39	6.99
High Regular	7.89	9.35	9.48	6.83
High Territorial	7.28	6.06	7.38	7.16
Low Territorial	9.72	8.74	7.22	8.57
Enemy Regular Density				
Low Regular	0.47	0.45	0.55	0.78
High Regular	0.60	0.54	0.43	0.49
High Territorial	0.56	0.66	0.48	0.52
Low Territorial	0.53	0.52	0.72	0.40

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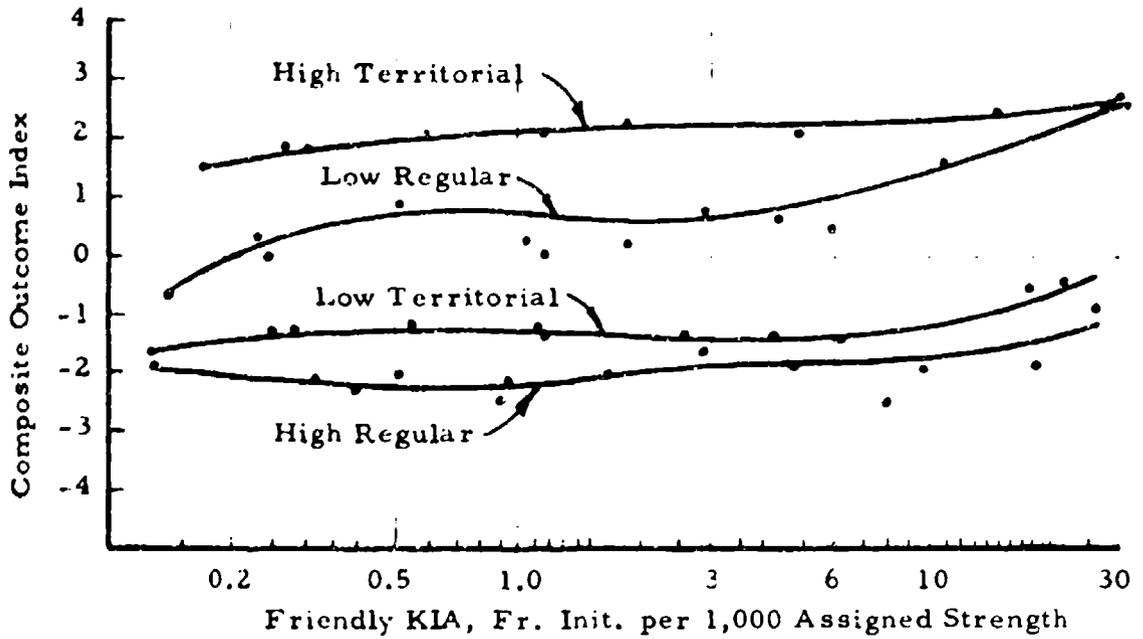


Figure II-25

Outcome Versus Friendly Initiative

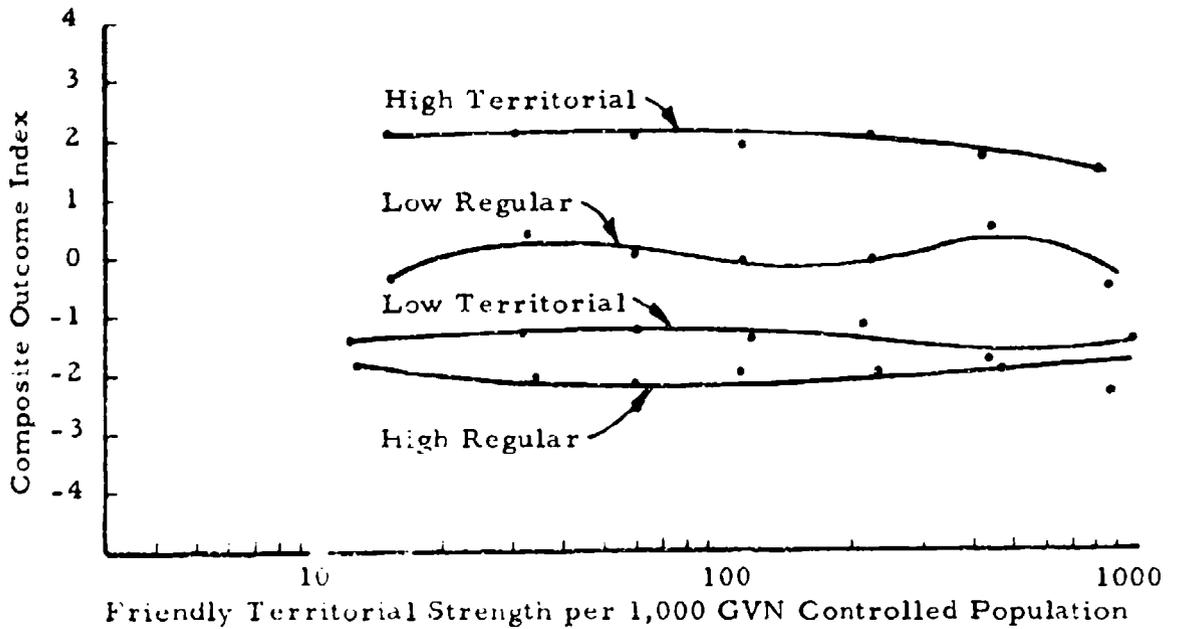


Figure II-26

Outcome Versus Friendly Territorial Strength per 1000's of GVN Control

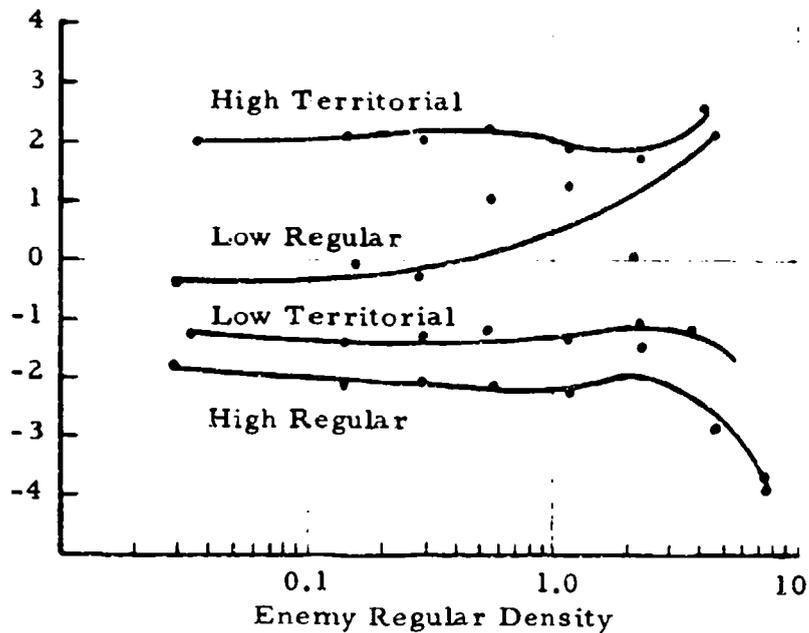


Figure II-27

Outcome Versus Enemy Regular Density

Again friendly strength and initiative were found to be generally unrelated or adversely related to outcomes. One reason for this is illustrated in the scatter plot of friendly KIA's (friendly initiated at time zero versus enemy initiated at time plus three) shown in Figure II-28. Here less than four total friendly KIA per thousand assigned strength make up nearly half the observations. This large concentration of cases at the low end of both scales (very low activity by both sides) dominates the statistical relationships. This aspect of the data seems to almost as strong at high levels of enemy density as at low. Although the data was not included to allow vigorous testing, it might be reasonable to explain this concentration of cases in a sort of "no activity" cluster in terms of enemy intentions.

One way to control for enemy intentions is to assume that when friendly initiative was zero all low cases of enemy initiative were low because the enemy did not choose to act. By excluding all those cases from the relationship it might be possible to approximate the deletion of all cases where the enemy did not intend to initiate action. The result of accepting that logic and extending it to rejection of a decreasing fraction of cases for each increment of friendly initiative does show evidence of an optimum level for friendly

TABLE II-12

HIGH REGULAR EXAMPLE WITH CASE DELETIONS

Enemy Regular Density (Z)	Probabilities of Low KIA to Enemy Initiated Action - (pL)					
Z > 1.6	0.0	0.23	0.44	0.41	0.41	0.57
1.6 > Z > 0.8	0.0	0.18	0.48	0.41	0.27	0.25
0.8 > Z > 0.4	0.0	0.15	0.44	0.59	0.33	No cases
0.4 > Z > 0.2	0.0	0.18	0.42	0.41	0.50	1.00
0.2 > Z > 0.1	0.0	0.22	0.17	0.44	1.00	No cases
0.1 > Z	0.0	0.17	0.38	No cases	1.00	No cases

x = 0.0 < x ≤ 2.0 < x ≤ 5.0 < x ≤ 11.5 < x ≤ 23.0 < x
Friendly KIA Rate, Friendly Initiated (x)

An alternative assumption is that low enemy activity is really a response to low friendly military initiative - that the enemy intentions are based on how hard they are being pressed. Not deleting any of the low cases of both measures of military initiative yields the type of results shown in Table II-13. The high regular situation was selected as the example because it does have the

TABLE II-13

HIGH REGULAR EXAMPLE WITHOUT CASE DELETIONS

Enemy Regular Density (Z)	Probabilities of Low KIA to Enemy Initiated Action - (pL)					
Z > 1.6	1.00	0.60	0.57	0.46	0.41	0.57
1.6 > Z > 0.8	0.75	0.52	0.61	0.46	0.27	0.25
0.8 > Z > 0.4	1.00	0.46	0.56	0.64	0.33	No cases
0.4 > Z > 0.2	1.00	0.53	0.55	0.46	0.50	1.00
0.2 > Z > 0.1	0.60	0.59	0.25	0.50	1.00	No cases
0.1 > Z	0.00	0.50	0.50	No cases	1.00	No cases

x = 0.0 < x ≤ 2.0 < x ≤ 5.0 < x ≤ 11.5 < x ≤ 23.0 < x
Friendly KIA Rate, Friendly Initiated (x)

lowest percentage of cases in the low-low quartile. Thus the "real" impact of friendly initiative should be least distorted by low enemy activity due to chance or design independent of friendly initiative. The results do not say much for a pre-emptive or attrition strategy. The best chances for low enemy initiative seem to be at a zero level of friendly initiative. One way to rationalize these results would be to say that the low-low quartile is explained by enemy activity being deterred by friendly presence or pre-empted by air power with low cost for friendly ground forces. However, the relationships between friendly strength and enemy activity are also weak. Table II-14 also shows that the relationship between outcome and air support is inconsistent. There are some cases in which higher levels of air support seem to be associated with very favorable outcomes (low territorial and high regular), but the opposite is also indicated (low regular and high territorial).

TABLE II-14

OUTCOME VERSUS AIR SUPPORT

	Composite Outcome Index			
	Very Fav.	Favorable	Unfavorable	Very Unfav.
Aerial Interdiction				
Low Regular	76.1	90.2	103.8	87.1
High Regular	99.5	95.9	63.7	84.0
High Territorial	91.8	106.2	97.5	70.6
Low Territorial	132.3	86.8	153.7	61.0
Close Air Support				
Low Regular	142.4	170.4	222.2	140.8
High Regular	225.6	235.2	129.0	181.2
High Territorial	196.5	243.4	168.3	148.8
Low Territorial	266.4	160.0	248.2	92.7

The high regular example can also be used to illustrate a possible optimum solution for friendly initiative if the logic behind deletion of the low-low quartile is followed. Figure II-29 is a plot of friendly KIA rates from friendly initiative at time zero versus total with the enemy initiated component at time three.

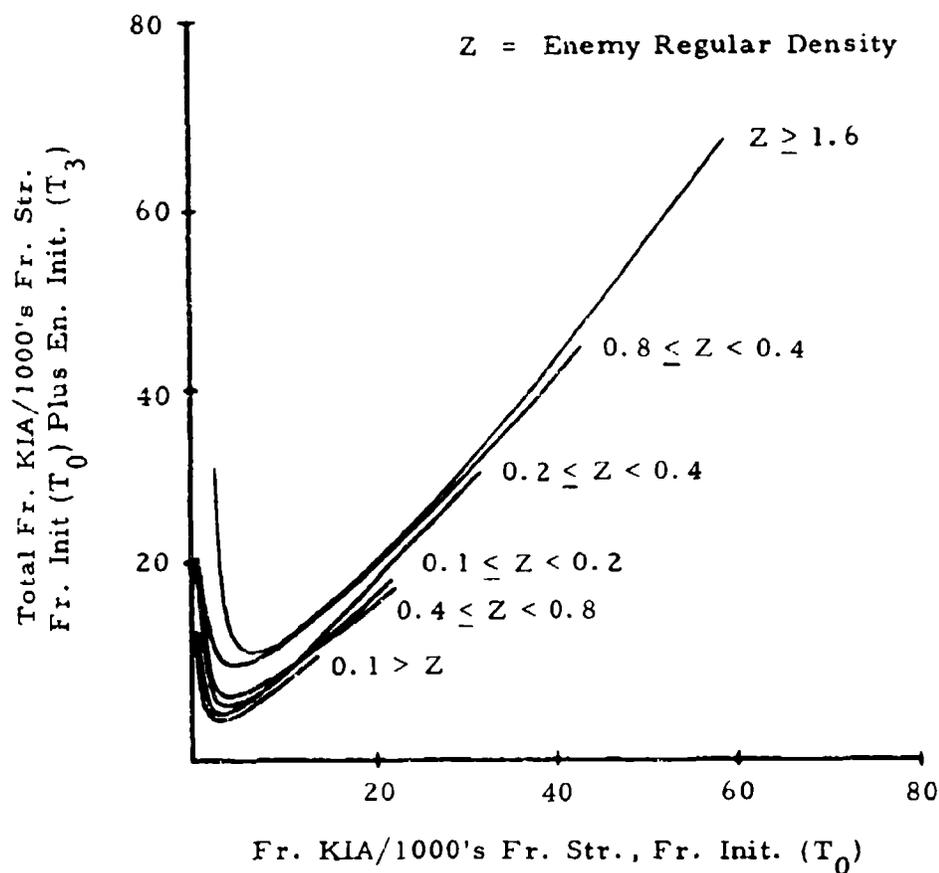


Figure II-29

Total Cost Versus Friendly Initiative

These curves indicate that above a friendly initiative of about five the total is dominated by friendly initiative with one exception. There are indications that at the highest level of enemy density, no level of friendly initiative is going to suppress enemy activity. Apparently that force density means that enemy intention clearly is to assume the initiative.

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32. Nor does friendly initiative appear to be systematically effective in pre-emption of future enemy action as is shown later in Section II.
33. Recovery is measured by the percentage of the offensive related decline regained (or increased) as of June 1972. Only provinces experiencing a decline of at least 10% are included.
34. In this study of change patterns a significant change is defined as being greater than one standard deviation above or below the mean quarterly change.
35. Project documentation on Friendly Initiative includes -
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SECTION III

EVALUATION

Introduction

There are two primary areas of concern for this evaluation--the Vietnam data base and the research carried out during this project. The data question can be separated into several parts. The problems of storage and recovery along with screening for completeness and accuracy have constituted at least a third of the effort on this project. The available data, the data management procedures, data quality, and the reasoning behind the decisions, the use, rejection, or aggregation of various data elements are all discussed in detail in Volume II of this report. Another question about the data simply asks if the collection of thousands of data elements was necessary. There is no straight answer to that question. This project has made use of several hundred data elements, but only in aggregate form to measure general concepts such as friendly or enemy, offense or defense, large or small, etc. because the research problems have not involved specifics such as comparing the relative utilities of alternative communications concepts for the PF. Such specific problems should have been considered in planning future military assistance programs and the data is there. If the question about data necessity is stated in terms of what the Secretary of Defense needed to monitor and evaluate the current situation and trends in the war, the obvious answer is that a much smaller data collection is adequate. Perhaps no more than five aggregate indices need concern the high level decision maker if his concern is only to know how things went last month. A set of some 36 measures aggregated on a quarterly basis has been selected as most useful for province level study of the war. This data is defined and included in Volume III of this report.

Evaluation of the research carried out will be the main subject of this discussion. Each major research topic will be evaluated as appropriate for the elements of the problem formulation, problem solution, and interpretation stages of the operations research procedure. There are four elements to the problem formulation. Some explicit statement of the operational objective(s) is the first. The research strategy also needs to specify the alternative means for achieving the objective. The comparison of alternatives was not as much a part of the work on this project as was simply asking the data for evidence that a single alternative could be systematically associated

with the attainment of the objective. A step beyond specification of objectives and alternatives is to establish criteria for evaluating how well or if the objectives are reached. Then comes the element that often sends the analyst back to reconsideration of the first three. It is easier to say the objective is to win the battle using all appropriate means at a minimum cost than it is to find compatible measures of all the factors at work in the system. Once the problem can be expressed in terms of a hypothesis about how one or more courses of action are expected to impact on some terminal conditions, there are at least four ways in which to proceed with the problem solution. One could begin by asking if the expectations are in concurrence with theory. This was not explicitly done here, but did play an important role in the problem formulation. Nor were any tests (field or laboratory) or simulations performed other than to check the sensitivity of some models used to represent the system. The main approach used to solve the problems can be termed empiricism. The research sought to find out what the three thousand province-month observations said about confirming or denying certain expectations. Finally, the research had to face the issue of interpreting the meaning of how the data fit expectations. More often than not this took the work right back to problem formulation asking if the data may not have been accurately measuring the objectives and alternatives or what key element of the system was omitted to produce such divergence between expectation and result.

ARVN Performance

Problem Formulation - The examples presented for this work used attrition of enemy forces as the operational objective for ARVN units. The alternatives were the different units with the evaluation criteria being the attrition expected of the average unit for a given mission and combat environment.

Problem Solution - Both theory and empiricism were employed. Theory was introduced by using the factors cited by field observers to explain variation in performance as the inputs to multiple regression models of attrition.

Interpretation - Finding that the differences between divisions were less than generally believed and that the First Division was not best brought this work back to a search for better data. It is not clear that different data would have produced more credible findings. The approach has merit because it does avoid judgment as to how good a unit is in comparison to what the evaluator

thinks a U.S. unit would be (in spite of vastly different situations and motivations). Were the work to be repeated, an effort should be made to partition along mission as well as war type lines. For each unit mission a different set of operational objectives would be appropriate. For instance:

<u>Mission</u>	<u>Operational Objectives</u>
Combat Operations	Enemy attrition from friendly initiative Reduced future enemy action
Defense	Reduced (deterred) enemy action Enemy attrition on enemy initiatives
Active Pacification	Enemy attrition Reduction of contested population Expansion of area under GVN control
Static Pacification	Same as defense plus... Increased participation of RF, PF, and PSDF in passive and active roles.

Description

Problem Formulation - The objective of this aspect of the work was to provide a basis for selecting measures of key factors believed to play a role in the war. The alternatives for this objective were simply the available data elements. The criteria for selection of data elements as key indicators or components of composite indices were substantive meaning and simplicity. The research sought to include the maximum amount of substance and explanation of variance in a minimum number of measures.

Problem Solution - Inputs to this work were selected on the basis of what event or condition is being reported and not having excessive zero observations. For example, the data element U.S. large unit battalion days was included because it is a measure of the general concept "friendly activity". Crew served weapons lost by third-country forces is a data element consisting of nearly all zero observations and relatively little substantive interest unless someone wanted to plan for future third-country crew served weapon requirements. Rather than delete the second example as a data element, it was aggregated with all friendly force crew served weapons lost as a possible measure of the same general concept "friendly activity". This form of selection, aggregation, and organization of data elements by general concept was still too complex for comprehension or use in models of expectations. Factor analysis was employed to identify the major patterns of variance over time and across provinces.

Interpretation - Simply finding that the data elements measuring enemy activity fall into three independent patterns or that variance in military presence and activity across provinces can be reduced to scores on two dimensions was of considerable interest. It provided a relatively simple way to examine the war at province level without having to scan 44 observations for hundreds of data elements. Province averages for the four categorizations of the war seem to be an improvement over aggregating provinces into military regions. This is especially true if some relatively inactive provinces can be excluded. When every province is forced into one of four categories the scheme breaks down. An Giang is really no more like Phu Bon than it is like Chuong Thien. Some of the parsimony provided by going to key indicators or composite indices of a pattern of variance over time also has limitations. A U.S. and ARVN "battalion day" are not equivalent, even though the use of total friendly battalion days assumes as much when it is used to measure friendly large unit activity. However, from another perspective the error introduced is probably small because U.S. battalion days are found in only a small fraction of the total province-month observations. Just how to use the descriptive findings must ultimately depend on the decision problem being researched. If nothing more, the descriptive work performed offers future analysts a better perspective for making choices when they must fit hundreds of data elements into a ten parameter model.

RVNAF Composition

Problem Formulation - Increased population under GVN control was the operational objective to be realized from various combinations of ARVN, RF, and PF strength as alternatives. The criterion was implicit in that the force mix associated with an expected maximum GVN control was the research objective. Not reaching that research objective was initially believed due to defects in the problem formulation. The objective should have been measured as a percent of the population under GVN control to compensate for differences in province size. The score for GVN control either as a total or a percentage may not be the best measure of the operational objective for optimizing the mix of ARVN, RF, and PF because the GVN control model includes the presence of local GVN security forces making it biased toward reflecting PF strength. The use of multiplicative interaction terms was handy for finding an optimum, but it may not be the best representation of the interaction between two types of forces. Expressing each force type as a percent of the total might have been better. Many of these questions were explored in later

work on the relationships between military presence and activity and various measures of the outcome. The results of that work make it clear that not finding an optimum force mix can not be blamed on only the design. There probably aren't any optimum military solutions.

Problem Solution - The use of regression models including the second order and interaction terms was neat for finding out if an optimum solution existed. Alternative models were not tested extensively with the same data set, but several of the bivariate relationships were examined carefully. Finding that ARVN strength tended to have a negative relationship with GVN control led to work with the cross-lagged correlations. This introduction of time lags showed that changed to GVN control led ARVN strength. A decline to GVN control is followed by increased ARVN strength.

Interpretation - As already noted in some detail not finding an optimum mix was interpreted a problem with the measures and model selected. Presentation of the results as sets of sensitivity curves had interesting possibilities not fully realized because of lack of confidence in the models. The current situation in a province with 1,500 ARVN; 2,000 RF; 5,000 PF and 4,000 people under GVN control could be plotted as shown in figure III-1. In this example the 5,000 PF do not go with the 40,000 people actually under

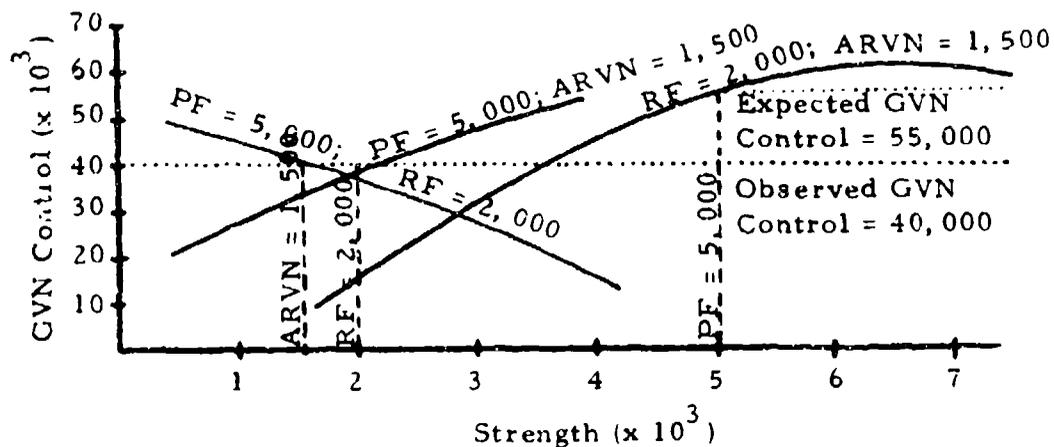


Figure III-1

Sample Use of Sensitivity Curves

GVN control. Something could be wrong with either the effectiveness or employment of the PF to make the observed effect of 5,000 equivalent to only about 3,500. The results of this work also led to some study of extreme cases. In this study very large increases or decreases in GVN control were compared to various measures of military presence and activity. It disclosed several interesting effects. Large increases are understandably related to starting at low or moderate levels of GVN control. It is easier to register gains when there is more room for improvement. Large declines are easily explained by enemy activity, but friendly military activity does not account for large increases to GVN control. The processes are not reversible. Finally, there were indications that low level enemy activity such as terrorism have a catalytic effect in that they tend to be associated with gains in GVN control rather than declines.

Village Programs

Problem Formulation - This work involved several different iterations of the problem formulation and solution. The operational objectives were those of the "other war". Rural development through village self help was expected to gain popular behavior and attitudes favorable to the GVN and erode those favorable to the VC. Because the program efforts are very diverse and the available data in the HES deals with broad categories rather than specific development efforts, most of the analysis considered the alternatives to be development in general versus military initiative by either side. Even when the most detail possible in separate HES questions was studied the development activity was measured in general terms only (i. e., frequency of agriculture cadre visits as opposed to a specific measure such as units of hog cholera vaccine administered). The approach of a cease-fire brought a shift in the work from asking if village programs were effective or a waste of resources to concern for what programs were desirable for the post cease-fire period. The research design considered many levels of detail ranging from all hamlets to provinces aggregated by war type. The measures examined also ranged from some 90 HES questions to a half dozen composite indices. The work can be said to have been persistent in trying everything even though it was not very efficient.

Problem Solution - The methods employed were as varied as the levels of detail examined. Cross-sectional analyses examined the relationships expressed by rank order correlation statistics as well as by the correspondence shown by three colored hamlet plots. Rank order correlation was

compared with product moment correlation results. Correlation and regression were employed with time series data. Work with regression models attempted to incorporate the non-linear and interaction effects observed on scatter plots. Eventually, a form of causal path analysis might have sorted out the unique contributions of each factor in the "system" explaining popular behavior. But there were too many likely paths and too many provinces for the time and resources available. Furthermore, a precise interpretation of how the process worked in each province was considered less important than the application of the analysis results to the practical problem of post cease fire planning.

Interpretation - Application of several analysis methods to several large data sets produced more statistics, graphs, and map plots than could ever be interpreted in detail. What started as a few simple tests from which the scope and methods were to be reduced to the most promising few measures and techniques grew into trying all approaches on all the data. There were several reasons for this growth rather than narrowing of scope. A basic reason was discovery that use of only the composite indices allowed errors to be introduced if the component questions were not screened for every case. As long as it was necessary to examine all the questions it was just as easy to obtain statistics on all the bivariate relationships at the same time. Another reason for continuing to examine relationships found to be nil in the sample tests was a suspicion that the sample may not have been representative, or the apparent independence was simply not credible. The tests on a cross-sectional basis were finally narrowed down to a dozen plausible hypotheses and reported in terms of, "it is generally confirmed, but..." The time-series analysis dealt with fewer parameters, but it ultimately treated each of the 44 provinces separately. From an academic perspective, it would be desirable to carry this work on through the development of 44 causal path models. Incidentally, the "processes" are similar in most provinces in the sense that rural development seems to work in general, but in detail every province is a little unique. In the end the analysis concluded with the tabulation of all the apparently valid causal linkages. Instead of interpreting the results as a set of models, the differences between provinces were translated into the different implications these results should have for future development efforts. The final product was a set of recommendations for allocation of post ceasefire development effort.

1972 Offensive

Problem Formulation - This work was actually a number of separate efforts to provide some rapid systematic evaluations of the situation and its implications. To a large degree the research was oriented toward providing description rather than solutions to operational problems. Thus, it is not practical to tabulate objectives, alternatives, criteria, and measures. There were decision problems that the results eventually obtained can support. For example, the work on attrition models could be used to estimate the course of action for various amounts and rates of ARVN reinforcement facing the 1972 or possible future NVA offensives in northern MRI. Any decisions regarding how to help the GVN deal with the offensive could have benefited from the descriptions placing the 1972 activity and its consequences in a long term perspective.

Problem Solution - Both theory and empiricism played a role in this work. Adaptations of Lanchester attrition models were used in what amounted to simulations for the purpose of finding values for the time interval, exchange and commitment ratios, and assigning strength limits that would make the model fit the observed data. Correlation and regression were used in other parts of the work, but simple tabular summaries produced the clearest descriptions.

Interpretation - The delays in acquisition of data made the results too late to be of practical value for the assessment of events during 1972. Therefore, little more was said by way of interpretation other than that the attrition models have promise. That the offensive was largely an NVA affair and did not achieve more than setting pacification back a year is not news to those close to the scene. However, the review of published accounts of the battles in order to make estimates of the missing data did show this perspective of the offensive and its impact is not widely held.

Friendly Initiative

Problem Formulation - This task is related to the question of enemy offensive because the basic premise was that friendly initiative will pre-empt enemy activity. Assuming this to be true the friendly commander should want to know how much initiative is enough because more than enough could be more costly than to little. The operational objective here was one of minimizing

the friendly battle costs. The alternatives considered were various levels of activity, support, and strengths. Measures important to the problem also included the threat and general nature of the war.

Problem Solution - Again the research relied on empiricism letting the observed data produce the answers. Only the answers were not the ones expected by the basic premise. Regression models were rejected in favor of looking at smaller and smaller subsets of the data. When friendly initiative alone emerged as generally counter productive as far as having an optimum level is concerned, the research focused on finding what conditions or combination of conditions tend to explain favorable outcomes. As with much of the other work done on a multivariate basis, the results are distorted by too much interdependence among the "independent" measures. It is easy for the statistics to summarize what appears to be going on, but even the introduction of time lags does not produce easy answers as to why. At best the work can be useful for applying other methods to different measures in search of the same answers.

Interpretation - How does one tell the Department of Defense that military initiative in Vietnam had no systematic utility? A finding that aerial interdiction is essentially unrelated to any measure of outcome other than aircraft losses has no value unless someone will pay attention. When this pattern of findings began to emerge from the early work, the research design and selection of measures were blamed. The data set finally used was an attempt to meet anticipated rejection of the findings. Strengths and activity were normalized, the data was partitioned according to enemy threat, and provinces were treated as separate cases, but the only consistent interpretation possible is that NVA and VC forces have been reacting to friendly strength and initiative. Only an assumption that a proportion of the province-months should be deleted because the enemy did not act because he didn't intend to will show a limited positive impact for friendly initiative. The last multivariate attempt used a form of discriminate analysis to evaluate what combination of measures best accounts for favorable or unfavorable outcomes. Here the military theory finds at least partial confirmation. In order of strength, these measures of friendly strength and activity are:

- Close Air Support - low explaining very unfavorable outcomes
- Friendly Initiative - high explaining very unfavorable outcomes
- Overall Force Ratio - generally as expected
- ARVN/VNMC Strength - the opposite of expectations
- Territorial Strength per 1,000 People Under GVN Control - the opposite of expectations

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There does seem to be potential for finding acceptable guidelines for the use of friendly resources in the data. Unfortunately, time ran out on this project before they could be confirmed and made into explicit recommendations.

SECTION IV

CONCLUSIONS

Can the application of multivariate analysis techniques to aggregate data such as that available from Vietnam provide useful assistance to decisionmakers? Yes it can, even though many of the results of the Bendix program were of the negative variety and those that were positive emerged as less than convincing. This evaluation is trapped in the conflict between the need to be positive and assertive in order to be given attention and the awareness of how "soft" some of the data is, the analytical assumptions that were "bent" along the way, and how one might have proceeded differently given two years of hindsight. Another bind exists between the need for a clear and concise statement of results and their implications and the need to build credibility by presenting the complex details leading up to those results that were not intuitively pleasing. Finally, the particular nature of the available data and the large size of the data base combined to produce the most important defect in the utility of the data and analysis methods as quantitative decision aids. Very few decisions need to be made in three months, six months or a year. Most seem to have a time frame of a week or two at most (and some were "needed yesterday"). The work on this project has shown that a three month response time is hard to meet and when the time is not taken to carefully review all the data and check the various manipulations of that data, errors creep in.

These areas of compromise between what was needed or desired and what was possible become the basis for this evaluation of both the work performed and what might have been done:

- Did the data actually represent the substantive concepts being examined?
- Did the methods employed accurately disclose the relationships in a useful form?
- Did the interpretation of results bring clarity to an admittedly complex phenomenon?
- Did the effort to clarify complexity conceal any significant limitations or sensitivity of the analysis?
- Did the level of detail examined strike an appropriate balance between the complexity of the problem and the time available to produce results?

Consider first the problem of "softness" in the data. From the onset of the project the question of data quality was one of major concern. Approximately a third of the effort was devoted to the screening and management of the data base. The purpose of the descriptive analyses was to identify the relevant substantive concepts and the most appropriate data elements for use in composite indices or as key indicators. With the exception of the data on friendly casualties which tend to be low, all data elements for military activities used in the study represent events or conditions which seem to have been reported accurately. Even though friendly casualties may be understated, this measure correlates very strongly with most other measures of friendly activity such as weapons lost or captured, enemy casualties, mission days, contacts, etc. Therefore, friendly killed in friendly initiated action probably does accurately represent the level of friendly offense. However, it would have been easier to interpret if the measure could have been the proportion of available resources allocated to offense, but differences in reporting small and large unit activity would not permit the construction of this measure. The indices constructed from aggregate responses to HES questions are also open to question. Economic strength might be better represented by some combination of a price index and average family income, but this is not available on a monthly province level basis. In the end, a combination of the status of local markets and the quantity and variety of goods available is probably representative of as much accuracy and detail on a country-wide scale as one can find anywhere.

The subject of HES data leads into the problem of selecting the appropriate method. The basic issue concerns the meaning and use of an aggregate score of, say 2.6, derived from many question responses having weights of 0, 1, 2, 3, and 4 where the interval between each weight is not necessarily equal. If the method employed assumes that the intervals were equal, as was the case in the analysis of time series data for the village program question, error could be introduced if the results are interpreted as meaning a unit of change in the independent variable will yield a proportional change in the dependent variable. This type of interpretation was not made. Instead, the interpretation and application of time series analysis results was restricted to comparisons across provinces. Some findings with regard to the relative strength of relationships between economic stimulation (ordinal scale) or friendly offense (interval scale) and political influence (ordinal scale) are questionable. However, the relatively low and sometimes adverse apparent impact of friendly offense is supported by the same low relationships with other outcome measures which are also interval data. Additional support for the use of parametric methods with ordinal data was derived by a comparison of the results obtained with both rank-order and product moment correlation routines. Finally, extensive testing of the relationships was carried out on a cross-sectional basis using non-parametric methods before going into the time series work.

The need to develop clear and concise interpretations from extensive analysis of rather complex phenomena tended to be at odds with the data and method questions. It would have been desirable to interpret the results with a statement that doing "x" will produce "b" change in "y". Or that for a threat of "z" enemy density the probability of a favorable outcome is a maximum with "r" friendly regular troops allocating "o" percent of their time to offensive operations with "t" friendly territorial troops per 1000 people under GVN control. Such prescriptive interpretations were diligently sought, but were either not found or were without meaning. Frequently, the data for "x" and "y" had to be an abstract index so the best that could be said of the results was that the relationship between "x" and "y" was strong, moderate, weak or nil; was linear or subject to saturation and threshold effects; was reversible or not; and was clearly or ambiguously causal in nature. With regard to outcome, many alternatives were considered. Unfortunately, this war has been one of recurring episodes. There is no data element labeled "win/lose". The GVN control score developed by the Vietnam Special Studies Group does tell something about the status of opposing military forces relative to the population. Gains on this index can be assumed to be favorable and declines unfavorable. There are measures of both the frequency and intensity of enemy activity for which declines or at least below average experience could be considered generally favorable. One problem is that a very good month in one province might be the worst ever in another. However, by allowing the standards of favorability to be based on the unique experience of each province, it did seem reasonable to construct a composite index from the GVN control and enemy activity measures. Then the analysis did not yield the clear relationships between future outcome and friendly presence or activity that could have been given a useful interpretation. There are at least four reasons or interpretations. The composite outcome index may have no meaning. The choice of analysis method failed to show the true relationships. Or if the negative results are valid, it was because there were many observations of high friendly presence and activity where the enemy threat was low, or conversely, there were many observations where the enemy activity was much lower than could be expected from enemy presence even though friendly presence and activity was also low. Study of more than 500 scatter plots makes the latter interpretation seem most likely. The probability of high enemy activity was so low that increased friendly presence or activity does little to reduce it. In short it was not possible to concisely interpret something that could not be found.

Because so few simple and intuitively pleasing interpretations were possible, there was little problem of concealment or distortion of results. If anything, it has been necessary to report too many examples of the detailed, complex results. During the descriptive work the effort to compensate for seasonal variation yielded a fairly simple finding that was easy to misinterpret. It was found that seasonal variation did not change the basic structure of the patterns of variation over time. This did not mean that there are no seasonal effects. It means only that the eight variables that best describe military presence and activity in the dry season are just as valid for the wet season. Forces tend to do the same thing in either season—just more or less. A similar confusion was experienced when it was found that security did not strongly influence the relationship between economic strength and political influence. If anything, the relationship is stronger under conditions of low security, but this may be an artifact of the level of economic strength that goes with low security. In any event, the conclusion was not that security in itself is unimportant to political influence; it only meant that the payoff of economic strength in terms of popular behavior was largely independent of security. On the other hand, hamlets with really low security do not even get into the data, so the results should not be interpreted as a mandate to improve the economy of all hamlets without regard to enemy threat or safety of the RD cadre team given the job.

The problem of response time has been most vexing from the onset. Just the process of acquiring and updating the data base has taken far longer than ever anticipated. By the time a tape is obtained, read, and the data screened and merged with existing data several weeks slip by even if no problems are encountered. Then there are the seemingly unavoidable instances of the garbled tape, wrong label, wrong code book, or the key data element not being present. Working with province level, monthly data has produced problems not apparent with data aggregated by military region. It simply takes time to find and deal with a province whose population increases 250 percent in one month. If this sort of error is found after population has been used as a variable for several months, it is unpleasant to calculate the lost time and effort. A fair estimate of time requirements for the various elements of a 20 variable research design using some 100 data elements from the raw data is as follows:

- Update and screen basic data file(s) - three weeks
- Problem formulation and variable specification - two weeks
- Variable/index construction and screening - two weeks

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- Review of descriptive statistics and scatter plots - one week
- Revision of research design and variable selection - (two weeks)
- Initial analysis/modeling - two weeks
- Preliminary interpretation and analysis reiteration(s) - three weeks
- Draft report and interpretation - two weeks

This adds up to some 15 to 17 calendar weeks for an analyst, research assistant and about half time for a computer programmer. It assumes results that generally conform to the expectations and no serious data problems. If there are surprises, the time span can easily double. Another factor that can add to the time factor is a revision of the objectives too late or after the research becomes overly entrenched in the original data set. While it is easy to see that much time was lost on wrong approaches or simply asking the wrong questions of the wrong data, there may have been no way to learn this without trying. One way to reduce time requirements is to be less ambitious. Aggregate the data by military region and quarter or even by country-wide annual observations. It may well be that province-months are not the best level of analysis. For one data set, the Pacification Attitude Analysis System (PAAS) data, individual respondents should yield the most reliable findings. At the other extreme, the student of Vietnamese history in the next century may find a very clear picture by observing Southeast Asia at ten year intervals. That is probably a ridiculous comment, but it does underscore the importance for seeking a satisfactory compromise between the decision problem, research strategy, data, and the available time and resources.

The experience with the Analysis of Vietnamization project does not offer any simple formula for how to reach that compromise. It began as a fishing expedition into the sea of Vietnam data. Some good catches were made, but not all have been easily digested. Some likely sources of better catches have been identified, but the really big one seems to have escaped. In the end, the Government, other researchers, and possibly even the Vietnamese will realize some advantage from this experience.

After arming the fuze on this report with the final comments on friendly initiative in the preceding section, it is fitting that the concluding remarks draw upon the work of a wiser and more successful analyst. In approaching the evaluation task guidance was sought in text books on operations analysis and the self criticism appearing periodically in Operations Research and the Military Operations Research Symposium Proceedings over the past ten years. Also uncovered in this review of the literature was E. S. Quade's book Analysis for Military Decisions.^{*} The concluding portion of Quade's critique seems appropriate here.

From the 29 precepts for conducting operations research:

- "1. The design of the analysis is crucial. ..."
- "3. The investigation may require many cycles or passes at the problem. ..."
- "5. Detailed treatment usually should come late in the study, ..."
- "8. In all analysis, the use of models is inevitable... However, ... The analyst must be more interested in the real world problem than in the idealized model..."
- "9. For most phenomena there are many possible representations; ..."
- "12. Computations with models... are frequently valuable not because they prove results, but because they lead to more and better analysis at the intuitive level."
- "16. A study that attempts to influence policy must make a convincing comparison of alternatives. ..."
- "20. Insofar as possible, a systems analyst should try to use the methods of science and to establish the same traditions. He should be objective and quantitative; all his calculations, assumptions, data, and judgments should be made explicit and subject to duplication, checking, criticism, and disagreement."
- "23. Inquiry can never be complete. ..."

^{*} E. S. Quade (ed.), Analysis for Military Decisions, Rand Corp., Santa Monica, Rand McNally & Co., Chicago, 1964.

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- "24. Real uncertainty that cannot be removed by further analysis is always present in any study of the real world. . . ."
- "25. In a complex real-world problem, full optimization over the entire scope of the problem is ordinarily beyond the capability of analysis; . . ."

From the 31 questions for the decision makers using operations research:

- "1. Does the project leader appear to have a fair background knowledge of the subject area?"
- "2. Does the preliminary formulation show an understanding of what needs to be done to fill in the gaps in our knowledge?"
- "3. Is the (research) process an organized one?"
- "4. What is the purpose of the analysis?"
- "5. Who is doing the analysis?" (Are there vested interests).
- "6. What decision is the analysis concerned with?"
- "7. Who must make the decision?"
- "8. When must or should the decision be made?"
- "9. What alternative . . . courses of action are considered. . . ?"
- "10. Does the analysis ignore any related factors that should be considered jointly with the problems in the analysis?"
- "11. Are all the alternative actions considered in the analysis really possible?"
- "12. Does the analysis ignore any consequence of the decision . . . ?"
- "13. Are the assumptions explicitly stated?"
- "15. Do the decision making criteria appear reasonable?"
- "16. Does the systems analyst fully disclose his subjective judgments?"
- "18. Are the results of the analysis presented in a useful form?"

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- "19. Are the limitations of the analysis, as well as its good features, pointed out clearly and candidly?"
- "21. Are the conclusions intuitively satisfying?"
- "23. Is the significant problem being considered, ...?"
- "25. What contingencies were considered?"
- "26. Are enemy or competitor reactions explicitly taken into account?"
- "28. Were the assumptions of the model made explicit?"
- "29. Is the model adequate?"
- "30. Does the study give consideration to other possible models?"
- "31. Are the recommendations made with full recognition of the uncertainties involved?"

Given a more intimate knowledge of the intentions, difficulties, and complete results of the Analysis of Vietnamization Project than can be presented in this lengthy abstract of the work, the author and principal investigator concludes that the work rates a good score on the precepts and questions raised by Quade. Many of the answers sought were not found. This is not necessarily a defect in either the methods or the data. The negative as well as positive findings have been reported. If this type of approach had been applied consistently since the early stages of the war, the work on substantive questions might have been more timely, and responsive. At this time there are many "what if" questions for decision makers to which the results of this project can and should be applied. As the Department of Defense recovers from the changes forced by the Vietnam experience it is hoped that this empirical approach to learning from the past will receive at least equal attention with the anecdotal approach.

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SECTION V

REFERENCES

Introduction

This listing of references covers a wide range of materials extending from theoretical works on the subject of revolutionary warfare to various reports prepared by the Bendix analysis staff during the project. It is not meant to be a complete bibliography of the Vietnam War. Only the books, papers, and data sources used in the planning and interpretation of the analyses are included. Many journal articles, papers, and news reports are not included even though they were routinely reviewed for information and ideas during the course of the work. For example, specific references to the several boxes of articles from the New York Times, Washington Post, Far Eastern Economic Review, Air University Review, Military Review, Aviation Week and Space Digest, etc. are not included in this listing even though they were routinely clipped and incorporated in the file of background data. Other sources in this same category include various pamphlets and periodic reports issued by the U. S. Department of State and Defense and the Government of the Republic of Vietnam. Some references are included for reports of the lessons learned, combat experiences, combat after action report, and senior officer debriefing report categories because of their role in providing the analysis staff with a sampling of the "combat lore" and operational perspectives of those charged with responsibility for the day to day conduct of the war.

This study was oriented to apply various data and data analysis methods to understanding the processes at work in this conflict. Therefore, almost all of the references used except for the data source documentation served as only general background information. This is reflected by the organization of references into eight categories of background information plus other quantitative work and some analysis method documentation. Several categories of reports and papers resulting from the project are listed and briefly described. All the technical reports with a "BSR" number assigned were given the same distribution as this final report and should be available to qualified requesters from the Defense Documentation Center. Some references are also made to draft working papers and memoranda which are not generally available. They represent the development of research strategy, interaction with the study users at OASD(SA) Regional Programs, and miscellaneous efforts overtaken by events or incorporated in subsequent technical or final report volumes. They are included here simply to complete the documentation of the project work.

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BSR 4033A

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SECTION VI

GLOSSARY

This glossary is both a key to some of the acronyms evolved during the administration and reporting of this war and the operational definitions of terms used in the reporting of data from Vietnam. References and areas of differences or variation in the definitions are indicated when appropriate.

<u>Term</u>	<u>Definition</u>
Accessible	The GVN facility in question can be reached during daylight hours, by foot or by normally available public transportation in 1-2 hours or less without jeopardizing the individuals personal safety (HES Handbook).
Active political party	Party membership rolls are maintained, meetings of party members are regularly convened, a newsletter may be circulated, etc. (HES Handbook).
Ambush	A surprise attack, usually conducted from planned positions, against a moving or temporarily halted troop unit or convoy. (MACV Dir. 335-13).
APT	Armed Propaganda Team.
ARVN	Army of the Republic of Vietnam
Assault	An attack in which the enemy uses both fire and maneuver in an attempt to seize or damage his objective. (MACV Dir. 335-13)
Attack by fire	An attack in which the enemy uses fire alone consisting of 20 rounds or more in an attempt to inflict casualties and/or property damage. (MACV Dir. 335-13).

<u>Term</u>	<u>Definition</u>
Battalion day	Battalion days are used as a means of measuring allocation of effort. The battalion advisor reports the number of battalion or mission days spent on each mission: combat, security, training, active or static pacification support, etc. It may be calculated by dividing the number of companies on an operation by three and multiplying by the number of days the operation lasted. (MACV Dir. 335-13).
CDEC	Combined Document Exploitation Center.
Chieu Hoi	Program aimed both at inducing VC to rally to the GVN and then employing them productively (military and civil pacification roles).
CICV	Combined Intelligence Center Vietnam.
CIDG	Civilian Irregular Defense Group. Local Vietnamese or ethnic paramilitary forces that provide border security, advised by U.S. Special Forces personnel. (RF/PF Handbook).
CMIC	Combined Military Interrogation Center.
Combat operation or sweep	An operation conducted to find, fix and destroy enemy forces, and to find and destroy his equipment, base areas, and lines of communication. The primary targets for such operations are the enemy main force units, although they may be conducted on occasion against local, regional, and provincial forces as well. (MACV Dir. 335-13).
Combat reconnaissance operation	Use of small, highly trained units effective against squad or smaller units in NVA/VC areas.
COMUSMACV	Commander, United States Military Assistance Command Vietnam.

<u>Term</u>	<u>Definition</u>
Combined	An operation or activity carried out by elements of two or more nations operating together or in close coordination. (MACV Dir. 335-13).
Contact	An application of firepower by either VC/NVA or friendly forces. There must be reasonable evidence of VC/NVA in the vicinity of the friendly unit. Unless determined to be command detonated, mines or booby traps are not considered contacts. Light resistance in the form of sniper fire is (MACV Dir. 335-13).
CORDS	Civil Operations and Rural Development Support (The RF/PF Handbook says "revolutionary" rather than rural).
Correlation	Relation of two variables indicating the degree to which change in one is accompanied by a corresponding or parallel change in the other.
CTZ	Corps Tactical Zone.
Daylight	For reporting purposes, daylight is the period between 0600 hours and 1800 hours. (MACV Dir. 335-13).
DSA	District Senior Advisor.
DTA	Division Tactical Area.
Eagle Flight	A helicopter borne force capable of searching out and pursuing its prey developed especially for flat, low lying terrain like that of the Delta where lack of roads, great expanse of inundated long, vast networks of tree-lined rivers and canals and widely dispersed population make fighting the NVA/VC on foot a most difficult task. (Handbook for U. S. Forces in Vietnam).

<u>Term</u>	<u>Definition</u>
Enemy ground attack	See "Assault."
Enemy initiated incident	<p>Any act initiated by the enemy which is directed against friendly personnel or property. It may or may not include personnel casualties, property damage, or the use of arms. An enemy action against a friendly maneuver element engaged in offensive (combat) operations is considered an enemy reaction to the friendly operation and is classified as a friendly initiated contact and not as an enemy initiated incident. Several criteria are used in classifying enemy initiated incidents:</p> <ol style="list-style-type: none"> 1. Significance - <ol style="list-style-type: none"> a. <u>Size</u>: When the enemy force is estimated to be a battalion or larger, or b. <u>Casualties</u>: When the attack results in a total enemy and friendly KIA and MLA or 30 or more, or c. <u>Objective</u>: When the enemy has attacked a major installation such as a base camp, airfield, a logistical installation or political/military command and control installation, or d. <u>Damage</u>: When there is a loss of a substantial amount of equipment, destruction or damage to aircraft or weapons systems or a large quantity of enemy material, supplies or equipment has been captured, or e. <u>New Weapons, tactics or techniques</u>: When the enemy introduces a new weapon or employs a new tactic or technique. 2. Attacks are reported in three categories - <ol style="list-style-type: none"> a. <u>Large scale</u>: Attacking force consists of a battalion or more (criteria 1c above). b. <u>Significant</u>: Meets one or more of the criteria, 1b through 1c above.

<u>Term</u>	<u>Definition</u>
Enemy local or main force unit	c. <u>Large Scale Significant:</u> Meets the criterion of size plus one or more of the other criteria, 1b through 1e. (MACV Dr. 335-13).
Enemy losses	The enemy unit referenced here may be either regular NVA or VC. An NVA unit is one which is formed, trained, and designated by North Vietnam as an NVA unit; a VC main force unit is one directly subordinate to Central Office for South Vietnam (COSVN) or a VC military region, sub-region, or front; a local force VC unit is directly subordinate to a district or province party committee and normally operates within the territorial jurisdiction of its respective control headquarters. (HES Handbook).
Enemy platoon equivalent hours of contact	Consist of five factors: killed in action (KIA body count and estimated); died of wounds or permanently disabled (estimated at 35% of KIA); POWs', returnees (Hoi Chanh); and non-battle casualties (estimated at 2,000 monthly). (Handbook for U. S. Forces).
Family book	One hour of contact with an enemy company is the equivalent to 3 hours of contact with a platoon, a battalion is 9 hours, etc. (MACV Dir. 335-13).
FWMAF	An identification booklet issued by the National Police, which is used to record the name and date and place of birth of every person currently living at a given address. The persons listed may or may not be related as members of the same family. (HES Handbook).
GVN	Free World Military Assistance Forces.
	Government of Vietnam.

<u>Term</u>	<u>Definition</u>
GVN-approved medical services	Medical services which are provided for, or generally accessible to, hamlet residents (by GVN or other source) and which are recognized by GVN as meeting acceptable standards of medical care. (HES Handbook).
GVN health worker	GVN health personnel are classified according to the amount of training they have received. The village health worker may be a medical doctor with years of training (unlikely) or a government medic who has completed a three-month course (most likely). (HES Handbook).
GVN ID cards	Identification cards, issued by the National Police, which the GVN requires its citizens to carry on their persons at all times. The ID card contains the following: the individual's name, home address, date and place of birth, the names of father and mother, picture, fingerprints, and information concerning any special identifying marks. (HES Handbook).
GVN-sanctioned maternity clinic	Normally such a GVN-approved maternity clinic will be staffed by a GVN-trained and licensed midwife. The "Clinic" may be a portion of the mid-wife's home or of a village building or may be a separate facility. (HES Handbook).
GVN-sponsored public health station	It is a GVN goal to provide government-staffed health stations that are accessible to all village residents in GVN-controlled areas. Present manpower shortages have required that the stations be deployed on an area basis rather than within each village. (HES Handbook).

<u>Term</u>	<u>Definition</u>
Harassment	An incident is which the primary objective is to disrupt temporarily the activities of a unit, installation, village, hamlet, or activity rather than to inflict serious casualties or damage. Against civilians burning of crops, taxation, forced labor, etc. are examples. Military units may receive sniping at defensive positions, booby traps, and mining of LOC not otherwise considered as sabotage are examples. (MACV Dir. 335-13).
Harassment by fire	An incident involving enemy fire of less than 20 rounds to inflict casualties or property damages on civil or military targets (MACV Dir. 335-13).
HES	Hamlet Evaluation System.
Hoi Chanh	A "returnee" to the GVN side under the "open arms" or Chiew Hoi program.
Household	A term used in the HES questions (in lieu of "family") to be interpreted as an inhabited physical structure (i. e. , house). In Vietnam "family" is defined in a broad sense to include all related persons, therefore, in many hamlets there may be only several families by Vietnamese definition (i. e. , nearly every inhabitant is in some manner related), but many households. (HES Handbook).
Joint	An operation or activity involving two or more services of the same nation.
JCS	Joint Chiefs of Staff (US).
JGS	Joint General Staff (GVN)
JUSPAO	Joint United States Public Affairs Office.

<u>Term</u>	<u>Definition</u>
Large defensive operations	Aggregation of all large unit, day and night, short and sustained, static pacification and security operations data.
Large offensive operations	Aggregation of all large unit, day and night, short and sustained, active pacification and combat operations data.
Large unit operations	Any operation consisting of the reporting unit's headquarters plus two (three by some sources) or more of its line companies. (MACV Dir. 335-13).
LOC	Lines of Communication.
Local/Village security forces	In most cases, these forces consist of National Police, RF/PF, or PSDF; but may also be ARVN, FWMAF, or U.S. forces assigned to provide security for the village. (HES Handbook).
MACCORDS	Military Assistance Command Civil Operations and Development Support.
MACCORDS-RAD	MACCORDS, Reports and Analysis Directorate.
MACV	Military Assistance Command Vietnam.
Market	Need not consist of physical market structure or shops to be called a market. Sidewalk vendor operations may be sufficient as long as hamlet residents have the opportunity to purchase food and light manufactured items on a regular basis within the hamlet boundaries. (HES Handbook).
MALT	Mobile Advisory Logistics Team - for support of RF/PF personnel and logistics. (RF/PF Handbook).
MAT	Mobile Advisory Team - for assistance and training of RF/PF and PSDF units. (RF/PF Handbook).

<u>Term</u>	<u>Definition</u>
MOI	GVN Ministry of Information.
MR	Military Region - may refer to US/GVN regions 1, 2, 3, or 4 (formerly CTZ I, II, III, or IV) or various NVA/VC region or "front" designations.
MRD	GVN Ministry of Revolutionary Development.
National Police	Known to Vietnamese as "Canh Sat" consisting of regular and several specialized branches including field forces, maritime, etc. and may or may not be uniformed. (HES Handbook).
Night	For reporting purposes, night is the period between 1800 hours and 0600 hours (MACV Dir. 335-13).
NLF	National Liberation Front.
NVA	North Vietnamese Army.
NVN	North Vietnam.
Open during daylight hours	With reference to LOC and accessibility this reflects that transportation is available to the general public for travel from the village to the province capital during daylight hours. Availability of regular transportation, especially tri-lambrettas, implies that the road is both relatively secure and passable during daylight. (HES Handbook).
OPCON	Operational Control.
Open public meetings	Meetings for which the village population has received advance notice and at which their attendance and participation are encouraged.

<u>Term</u>	<u>Definition</u>
Operation	RF/PF operations are defined as follows: (1) Movement must be planned and executed for the purpose of contact with the enemy. (This includes ambushes but excludes listening posts); (2) the force must be under the operational control of a single headquarters; (3) the force must consist of a fire team or larger, but less than three companies; and (4) the minimum duration for an operation is six hours (unless significant contact occurs in less time). (TFES Handbook).
Owners	Land ownership in the sense that a family's rights to the land are officially recognized in village records. (HES Handbook).
Organized non-military activities (PSDF)	The key words are organized and non-military. This implies that the PSDF members are organized for activities, such as firefighting, civic development, first aid, warning systems, and the like, but do not carry weapons. (HES Handbook).
PAAS	Pacification Attitude Analysis System.
Pacification	The GVN has combined the aspects of both military operations and civil nation building into a process called Pacification. <u>It is the military, political, economic and social process of establishing or re-establishing local government responsive to and involving the participation of the people.</u> It includes the provision of sustained, credible territorial security, the destruction of the enemy's underground government, the assertion or reassertion of political control and involvement of the people in government, and the initiation of economic and social activity capable of self-sustenance and expansive. The economic element of pacification includes the opening of roads and waterways and the maintenance of lines of communication important to economic and military activity. (Handbook for U.S. Forces in Vietnam, 1968) Robert Komer emphasizes the <u>rural</u>

<u>Term</u>	<u>Definition</u>
Pacification (cont.)	rather than <u>revolutionary</u> thrust of Pacification and offers an outline of the 1969-70 accelerated Pacification Campaign in his 1971 paper titled the Impact of Pacification in Insurgency in SVN:"
	Aims Primarily -
	<ol style="list-style-type: none"> 1) <u>Sustained protection of the rural population</u> from the insurgents, which also helps to define the insurgency of its rural popular base, and 2) <u>Generating rural support</u> for the GVN via programs meeting rural needs and cementing the rural areas <u>politically</u> and administratively to the center;
	And Secondly -
	<ol style="list-style-type: none"> 1) To help <u>neutralize the active insurgent forces</u> and apparatus in the countryside.
	The Accelerated Pacification Program -
	<ol style="list-style-type: none"> 1) <u>Stressed sustained territorial security</u> (local clear and hold) using RF and PF as the logical force-in-being on which to build, a force rapidly expanded by more than 100,000 in 1968 alone to number some 510,000 men in over 1,500 RF companies and 6,000 PF platoons. 2) <u>Included civil programs</u> aimed at <ul style="list-style-type: none"> - revival of a modestly functioning rural administration, - rural economic revival to provide economic incentives to the farmer, and - establishment of other essential rural services, such as medical and educational facilities, refugee care, and a civil police presence. 3) Priority assigned to revival of the <u>rural economy</u> by <ul style="list-style-type: none"> - changing terms of trade between urban and rural sectors by increasing prices paid to crop producers, - accelerating import and distribution of fertilizer, - introduction of new rice strains, and - introduction of water pumps and tractors.

<u>Term</u>	<u>Definition</u>
Pacification, active	An operation, or mission category, conducted by a unit under OPCON of a sector commander for support of pacification, to seek out and destroy or neutralize enemy forces which threaten the population or resources of the assigned pacification area. Includes reconnaissance in force, direct attacks against located enemy forces, cordon and search operations, long range patrols, and ambushes. (MACV Dir. 335-13).
Pacification, static	An operation, or mission category, conducted by a unit under OPCON of a sector commander for support of pacification, to deny enemy access to protected areas where pacification is in progress, and to prevent enemy action against the population or resources within the pacification areas. Includes outposts, patrols, and strong points within or in the immediate vicinity of protected areas. This category also includes mission days of reserve, training, and rehabilitation while the unit is formally assigned in support of pacification. (MACV Dir. 335-13).
NOTE:	Active and static pacification mission days and other associated data were aggregated with the data for combat operations and security mission categories respectively to obtain an offense-defense dichotomy of friendly mission. It was found a bias exists in the pacification mission data because some division or regimental commanders would never assign one of their units to OPCON of a sector commander even though the mission might in fact be in support of pacification.
People's Group	RD Cadre -organized people's groups are designed to promote civic action and cooperation within important segments of the hamlet population (e. g., farmers, youth, women, etc.). (HES Handbook).

<u>Term</u>	<u>Definition</u>
PF	Popular Forces; platoon size units, ideally composed of local residents recruited and assigned as village or hamlet security forces and will be used to provide the populace with 24 hour security against the VC local guerrilla elements; also used for LOC and static installation security, for maintaining outposts, intelligence and security patrols, and night and day ambush; assigned to command of subsector commander and sometimes village chief; will also be trained to participate actively in revolutionary development as part of their normal security role (RF/PF Handbook).
Phoenix	The National Police and all civil and military intelligence services campaigning to identify and eliminate the hardcore cadres who make up the VCI.
Political parties	A political party in Vietnam may be an organization of diversified membership formed to promote a specific political personality or program, or it may be a homogenous organization designed to promote the interests and solidarity of a regional, religious, or ethnic group. (HES Handbook).
POLWAR	Political Warfare; as employed within RVNAF (including RF and PF) encompasses political indoctrination, motivation, troop information and education, public information, psychological warfare, civic action, social welfare, security, and chaplain's activities (Handbook for U. S. Forces).
POW (or PW)	Prisoner of War.
PSA	Province Senior Advisor.

<u>Term</u>	<u>Definition</u>
PSDF	People's Self-Defense Forces; a part-time local security mechanism revived after the Viet shock of 1968. While overall strength is several millions, many of that number serve in unarmed auxiliary capacities as a means of engaging the population politically in anti-VC activity. The military strength for local defense is best measured by the number of armed and trained key inter-teams, a measure that can not be found as a consistent time series due to the changing definitions and program objectives during the revival of the PSDF.
PSYOP	Psychological Operations; the planned use of propaganda and other measures to influence the opinions, emotions, attitudes, and behavior of hostile, neutral, or friendly groups in such a way as to support the achievement of GVN objectives. (Handbook for U.S. Forces).
Public works projects	Public Works Activities are broader in scale than Self-Development, and require planning, support, and expertise from sources outside the village. Public Works might include, for example, construction or repair of a road, bridge, canal, irrigation ditch, reservoir; rural electrification; portable water supply system; etc. (HES Handbook).
RD	Revolutionary Development and/or Rural Development depending on who is using the term and the time. In more recent years the concept "RD" has been replaced by another comprehensive, multi-year plan known as the Community Defense Local Development (CDLD) Program under the MRD.
Rehabilitation	Mission category assigned to a unit by competent authority usually after extended field operations or intense combat engagements for rest and refit. (MACV Dir. 335-13).

<u>Term</u>	<u>Definition</u>
Revolutionary development	<p>Within the pacification process, RD is conducted in specified areas to focus priority government effort, to bring the people under GVN control and to provide them with a new life. In these RD areas, the GVN, through its RD cadre groups, establishes a channel of communications between the people and their government and, through their productive work, gains the support and loyalty of the people. An important aspect of RD is the transition from appointed local officials to elected hamlet and village chiefs and councils for the Real New Life Hamlets (Ap Doi Moi).</p> <p>Revolutionary Development (RD), the leading edge of pacification, is the formalized Government of Vietnam program under the sponsorship of the Ministry of Revolutionary Development, in specified hamlets located generally within RD campaign areas. It includes the local security for those hamlets and social activities at that level.</p> <p>On the GVN side, Revolutionary Development Councils composed of both military and civilian representatives function at the national through district levels. At the national level, the Central RD Council (CRDC) develops policies and manage the overall program.</p> <p>Below the national level, the Vietnamese have organized RD councils at each step of the formal civil/military chain. The functions of the councils are to review RD activities and ensure that military and civil aspects are coordinated. At Corps/Region level there are both military and civil members in the RD council since the Corps Commander has both civil and military responsibilities. Therefore, the MACV advisory team includes military and civil advisors.</p>

<u>Term</u>	<u>Definition</u>
Revolutionary development (continued)	<p>The Vietnamese Province, or Sector, is the operating level for pacification. It is here that the detailed pacification plan is developed and subsequently executed after coordination and approval by higher levels. Because of the key role at the Province in pacification, both GVN and US structures contain full military and civilian agency membership.</p> <p>The District or Subsector is the lowest formal level of Vietnamese government. Although the District Chief does have duties in both the military and civil fields, only a military advisory team is provided. In order to accomplish his duties in both fields, the MACV Subsector Advisor must draw on the resources and talents of the Province where civilian agency representation is found. (Handbook for U. S. Forces).</p>
RF	<p>Regional Forces; military organization assigned to the sector commander for territorial security; primarily will support the pacification program by providing adequate territorial security through conduct of offensive operations against enemy force local units. RF units will also be assigned missions</p> <ul style="list-style-type: none"> - to support the PF in security of hamlets and villages, - to defend LOC's (lines of communication), political economic centers, and government installations; - to defend more critical outposts and forward operating bases within the province, thereby relieving regular ARVN units of these security missions. <p>RF units are assigned to the command of the sector commander. The basic maneuver unit of RF is the rifle company. Its organization and equipment provides it with necessary means to conduct a variety of combat operations. The RF also contain administrative and support units to provide training and logistics support to the rifle companies and PF platoons in the sector. (RF/PF Handbook).</p>

<u>Term</u>	<u>Definition</u>
RVN	Republic of Vietnam.
RVNAF	Republic of Vietnam Armed Forces; includes ARVN, VNAF, VNN, and VNMC as regular forces and RF, PF, PSDF, and CIDG as local full and part time militia organizations.
Sabotage	An incident causing destruction or damage to LOC, facilities, or property that does not qualify as an attack. It is directed primarily against material targets. Sabotage is normally a covert act. Examples are destruction or damage to public facilities, bridges, or railroads. (MACV Dir. 335-13).
SEAPRS	Southeast Asia Province Summary data file.
Security	<p>The key to pacification is the provision of sustained territorial security. Territorial security is defined as security from VC local forces and guerrilla units and NVA/VC main force units if any are in or threatening the area. It also includes the protection of the people within a hamlet from the VC infrastructure and bullies.</p> <p>The principal RVNAF forces for territorial security are the RF, PF, and to an increasing degree PSDF. ARVN and FWMAF units were assigned to the mission of territorial security when the local GVN forces were deemed inadequate. Two parts to territorial security are</p> <ul style="list-style-type: none"> - Security for areas undergoing RD, and - Security for other important areas including previously pacified areas, LOC, resources, and government centers. (Handbook for U.S. Forces).

<u>Term</u>	<u>Definition</u>
Security Operation (other than support of pacification)	An operation or mission category conducted to deny enemy access or damage to friendly political, economic, and military resources and installations, other than those specifically designated within the pacification program. It may include outposts, strong points, patrols, road blocks, ambushes and reaction force operations. (MACV Dir. 335-13).
SEER	System for Evaluating the Effectiveness of the Armed Forces of the Republic of Vietnam.
Self-development projects	Self-development as a concept was elaborated in the 1969 Pacification Guidelines. Emphasis is upon the organization of projects planned and executed principally by the village officials with the support of the people generally known as village self help projects (VSH). (HES Handbook).
Short duration operation	Any operation of less than 24 hours duration. (MACV Dir. 335-13).
Small defensive operations	Aggregation of all small unit, day and night, short and sustained, static pacification and security operations data.
Small offensive operations	Aggregation of all small unit, day and night, short and sustained, active pacification and combat operations data.
Small unit operation	A definition that varied some over time ranging from all operations other than large unit operations to combat operation involving a platoon or larger force of line troops, but less than three companies; and an operation involving a fire team or larger force of line troops, but less than a platoon. (MACV Dir. 335-13).

<u>Term</u>	<u>Definition</u>
Sortie	An aircraft airborne on a mission against the enemy or in direct support of such a mission. For the purpose of this report, a sortie is defined as a <u>single</u> aircraft providing direct support to a combat operation, e. g., close air support, helicopter gunship support, helicopter lift, fixed wing lift, etc. (MACV Dir. 335-13).

Strengths	Advisors should estimate enemy force size in accordance with VC/NVA force structure as presented in the table below:
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<u>Unit Type</u>	<u>VC</u>	<u>NVA</u>	<u>Average</u>
Squad	9	9	9
Platoon	27	35	30
Company	85	110	100
Battalion	395	450	425

(HES Handbook).

On the friendly side the strengths of various friendly units was estimated if not contained in the data by use of the following table:

<u>Unit Type</u>	<u>Authorized</u>	<u>Average</u>
ARVN Battalion	645	527 to 588
US Battalion	845	845
ROK Battalion	-	845
Other FWMAF Bn.	-	770
RF Company	212	180
PF Platoon	35	30

Squatters	Farming families who do not rent or legally own the land upon which they are settled or which they farm. Such people may be recent refugees or long-time occupants; their holding of the land may be challenged or unchallenged by local authorities. (HES Handbook).
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<u>Term</u>	<u>Definition</u>
Sustained operation	Any operation of 24 hours or more in which a unit does not return to its base camp (MACV Dir. 335-13).
SVN	South Vietnam.
TAOR	Tactical Area of Responsibility.
Technical assistance	Technical and administrative support which could be reasonably expected from district or province level technical services in support of village projects. (HES Handbook).
Tenancy	Land tenancy described the situation where a farming family rents the land on which it is settled, or which it farms. The rent may be paid in cash or as a percentage of the crop. (HES Handbook).
Terrorism	An incident directed against civilians, public officials, or military personnel not engaged in military duties in which the primary objective is to intimidate. Assassination, kidnapping, mining, or bombing of public facilities and buildings, B.O.Q., and civilian transportation constitute terrorism. (MACV Dir. 335-13).
TFES	Territorial Forces Evaluation System.
Training	A mission category assigned to a unit by competent authority. (MACV Dir. 335-13).
USAID	United States Agency for International Development.
USARV	United States Army Vietnam.
USIS	United States Information Service.

<u>Term</u>	<u>Definition</u>
US Standard	A standard which, based on his experience and training, the advisor would reasonably expect an equivalent US unit or individual to attain and maintain for use in assigning evaluations of RVNAF units. (MACV Dir 335-13).
UTM	Universal Transverse Mercator. A standard grid system used to identify geographic points of areas. Eight-position UTM Coordinates are used, providing location of geographic points accurate to within 100 meters. UTM coordinates are listed as eight positions. The first two are alphabetic and the last six are numeric.
VC	Viet Cong.
VCI	Viet Cong Infrastructure; the <u>political and administrative</u> organization through which the VC control or seek to control the South Vietnamese people. The Infrastructure at village and hamlet levels embodies the membership of the People's Revolutionary Party (PRP) chapters, leadership elements of parallel front organizations, and guerrilla unit leaders. Rank and file members of front organizations and of organized guerrilla units are not to be considered as members of the Infrastructure. (HES Handbook).
Village administrative center	Focal point for village civic affairs. Typically, village office would be located here. (HES Handbook).
Village Administrative Committee	The Committee is responsible for implementing the decisions of the Village Council. The village chief, elected by the Village Council, automatically becomes the Committee Chairman; the deputy village chief, appointed by the province chief, serves as vice-chairman. There may be as many as six commissioners (military; agriculture and land reform; economy and finance; civil status; taxation; social welfare; and culture) all of whom are appointed by the village chief subject to the approval of the Village Council. (HES Handbook).

<u>Term</u>	<u>Definition</u>
Village Council	The Village Council, the legislative arm of village government, is composed of five to eleven members elected by the people of the village for terms of three years. The council is responsible for directing the activities of the Village Administrative Committee, the executive arm of village government. The Village Council elects one of its members to serve as Village Chief (Chairman of the Village Administrative Committee). (Note: In areas where elections cannot be held, the province chief may appoint a Provisional Village Administrative Committee which assumes the combined functions and authority of the Council and the Village Administrative Committee.) (HES Handbook).
Village guerrilla unit	Village guerrilla units, typically organized into squads (about 9 members) and platoons (27-35 members), are directly subordinate to the Party apparatus at village and hamlet levels. Although the amount of time devoted to guerrilla duties by the individual guerrilla varies considerably, he is considered to form a full-time part of the enemy's offensive threat. Guerrillas on occasion operate outside of their home hamlets and villages with local or main force units. Typical guerrilla unit missions include limited offensive operations, harassment, sabotage, propaganda, protection of Party committees, collection of taxes, and security and reconnaissance for local or main force units. (HES Handbook).
Village Land Reform	The function of the Village Land Reform Committee is to investigate the claims of the village farmers applying for participation in the GVN land distribution program and to forward recommendations to the Ministry of Agriculture and Land Reform for action. The Committee is composed of the village chief (or his designate), the Village Agriculture/Land Commissioner, one hamlet chief of the village, and a non-voting technical consultant from the Province Land Service. (HES Handbook).

<u>Term</u>	<u>Definition</u>
Village Office	The village office may be only a portion of the house of a village official, but it must be recognized throughout the village as the place where village business can be conducted and where GVN village records are maintained. (HES Handbook).
VIS	Vietnamese Information Service.
VNAF	Vietnamese Air Force.
VN Standard	A standard which, based upon his experience and observation and taking into consideration the social and ethnic differences involved, the advisor can reasonably expect the VN equivalent unit or individual to attain and maintain. (MACV Dir. 335-13).
VNMC	Vietnamese Marine Corps.
VNN	Vietnamese Navy.
VSSG	Vietnam Special Studies Group.
WIEU	Weekly Intelligence Estimate Update.
Youth activities	Activities may be organized under public or private sponsorship but must be primarily designed for young people (ages 8-18). Such youth group activities may be designed to promote the secular interests of a local political party or church, may be GVN programs (such as the 4T sponsored by the Ministry of Agriculture), or may be generally non-secular activities such as boy scouts, sporting groups, etc.