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POLICE RESOURCE ALLOCATION

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POLICE RESOURCE ALLOCATION*

Introduction

This year the President's Commission on Law Enforcement and Administration of Justice published a number of reports¹ dealing with the nation's "crime problem" and analyzed the readiness state of a series of alternative responses to this set of social problems. For present discussion purposes, we wish to direct our attention to the specific problem of police resource allocation, to analyze this problem in terms of our existing state of knowledge, and to speculate about the implications which additions to this state of knowledge might have for police resource allocation in the immediate future.

For a number of years, police officials throughout the nation have been deploring the increased demands made upon their departmental resources. By consulting professional journals which deal with urban policing problems, one gains the impression very readily that urban policing forces are generally suffering from a "critical" shortage of personnel. For example, in 1966 one chief of police wrote:

Unfortunately, the vast majority of police departments in the United States are undermanned and often find it difficult, if not impossible, to keep manpower in step with demands made on their departments.²

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¹These publications include the commission's general report, The Challenge of Crime in a Free Society (Washington, D.C.: Government Printing Office, 1967), and some dozen Task Force Reports on single, related aspects.

²Robert M. Chairmonte, "Do you Need Ten More Men," The Police Chief, 33 (February, 1966), p. 12.

A month later the executive director of the International Association of Chiefs of Police expressed the editorial opinion that police protection was approaching the breaking point for the citizenry. In his editorial he deplored the fact that the resources of American policing were inadequate.

The obvious solution to this continual stretching of an already too-thin line of police protection is increased manning. Unfortunately, due to mounting costs of other city governmental services, this solution tends to be largely utopian.³

Obviously, before making a judgment about whether police resources are inadequate, it is necessary to make some analysis of the character of these resources, learn something of the character of the demands placed upon these resources, and learn something of the ways in which these resources are currently utilized.

In its Task Force Report: The Police, the President's Commission emphasized the fact that almost all large police departments in the United States are "substantially" below their authorized strength.

In 1965 a survey of about 300 police departments--including nearly all of the large city departments--showed that 65.5% of the forces polled were below authorized strength. The average force was 5% below its quota; the average large-city force was 10% below standard capacity.⁴

The commonly proposed solution to this "problem of undermanning" is to raise the pay of officers so that better officers may be attracted into the

³Quinn Tamm, "Is Police Protection at the Breaking Point?" The Police Chief, 33 (March, 1966), p. 6.

⁴Raymond L. Bancroft, "Municipal Law Enforcement, 1966," Nation's Cities, 4 (February, 1966), 16; as quoted in the President's Commission on Law Enforcement and Administration of Justice, Task Force Report: The Police (Washington, D.C.: Government Printing Office, 1967), p. 9.

vocation.⁵ However, these arguments for the use of increased economic rewards as a means of inducing quality men into the policing profession neglect a number of items.⁶ The above discussion does not touch on what is the heart of the matter, viz., what should be the standard or authorized strength of urban police departments. Central to this problem is the imperative need to determine both the demand for policing services and the value of meeting this demand. The argument that crime is increasing and that we need more police officers to meet this demand does not tell us how many officers we need nor what activities these officers should perform to solve these problems. One should note that the wide variation in police manpower per capita is

⁵We, of course, recognize that higher pay will serve to retain some officers who might otherwise leave the force due to "low pay," and that attrition losses may be the greatest source of this "undermanning."

⁶The argument can be stated as follows: (1) if economic rewards are increased, all individuals presently in the system will receive the benefit of these increased rewards; (2) in most large urban areas, police officers and other civil servants have job protection through civil service and little can be done to change the makeup of a police force other than allow attrition to take its course; (3) much of the police officer's daily routine consists of menial tasks which are often unattractive to younger officers of superior intelligence; and (4) higher economic rewards will make it even more difficult to force undesirables out of the police service, for this will increase the discrepancy between police pay and that for comparable civilian occupations.

Implicitly, many of the arguments for increasing the quality of our police forces are in reality criticism of the quality of existing forces. This is true not only of the operational level, but also of the supervisory and administrative levels. As long as the police service continues to be a "closed" personnel system, with admission almost exclusively at the entry level, arguments in favor of increased economic rewards will have little likelihood of increasing the quality of the police forces. (See, for example: Gordon E. Misner, "Mobility and the establishment of a career system in police personnel administration," Journal of Criminal Law, Criminology, and Police Science, 54 (December, 1963), 530-9; and the recommendation for "lateral entry" in the President's Commission on Law Enforcement and Administration of Justice, Task Force Report: The Police, pp. 120-43, esp. p. 142.

but an indication of the lack of availability of criteria to determine the demand for police services. (See Table 1 and Chart 1 in the Appendix.)

The economist's approach to the problem would be to determine the marginal cost of adding one patrolman and the marginal value (benefits) received by the addition of this patrolman. Then the economist would increase or decrease the number of patrolmen until the marginal value of an incremental patrolman equalled the marginal cost of that incremental patrolman. Without entering into a discussion relating to the continuity of either the cost function or the value of fulfilling the demand function--which are the necessary conditions for the proposed equilibrium to hold--we find this approach impractical since we do not have reliable cost data, we do not know the manner in which additional patrolmen will be utilized, we do not know the effectiveness of patrolmen in reducing crime, and, finally, we do not know the value to society, in a broad sense, of reducing the level of crime.

It may well be that the lack of relevant measures of performance and cost, and of data relating to demands for service are really the crucial issues in any effort to improve the performance (quality) of our policing agencies in combating crime. However, the extreme interpretation that if we do not have "good" data and measures of performance we will be unable to improve the efficiency of our existing departments does not hold, for it should be noted that in attempting to increase the individual efficiency of its municipal police officers, many metropolitan cities are presently experimenting with new techniques of utilizing their existing resources. An increasing number of cities have been experimenting with changing from a basic two-man patrol unit to a one-man patrol unit. (See Figure 1 for the extent to which this

experimentation is taking place.) Other cities have attempted other devices such as a Tactical Foot Patrol operation. In Philadelphia, the Tactical Foot Patrol Unit consists of teams of three policemen assigned to a specially marked vehicle. These teams are assigned each day to specific "problem areas." Upon arriving at the location of their assignment, one officer remains within sight of the patrol vehicle, while the other two officers separate and go on individual foot patrol. If the three-man unit is needed, a dispatcher alerts the unit and the officer remaining with the vehicle picks up the other two officers and speeds to the locale of need.⁷

Thus, we find that not only do we induce simple changes by the utilization of more capital-intensive processes, but we have also uncovered a complex set of unanswered questions which relate to the basic ways in which policing resources are to be allocated. These are questions which relate to the mix of capital and labor, the relationship of the tasks involved in police work and the skills and knowledge necessary to perform these tasks, and the existing mix of the labor force in terms of tasks performed.

Would criminal activity be constructively reduced by increasing or decreasing the proportion of officers performing the investigative or detective task?⁸ Would increasing or decreasing the proportion of officers in administrative tasks change significantly the amount and the

⁷Additional experiments with Tactical Foot Patrol have been attempted in New York City.

⁸Misner, "Mobility"; President's Commission on Law Enforcement and Administration of Justice, Challenge of Crime, p. 112; Also, the observations of the National Commission on Law Observance and Enforcement "Report on the Police," (Washington: U.S. Government Printing Office, 1931), p. 19, cogently describes the complex demands involved in police activities.

year	percent one-man cars only	percent combination of one-man and two-man patrol cars	percent two-man cars only	page no.	year o publicat
1955	20	60	20	407	1956*
1956	22	63	15	388	1957*
1957	23	64	13	403	1958*
1958	28	59	13	413	1959*
1959	26	64	10	396	1960*
1960	34	57	9	397	1961*
1961	35	57	8	434	1962*
1962	40	54	6	417	1963*
1963	38	57	5	413	1964*
1964	41	54	5	426	1965*
1965	No manning of police patrol cars mentioned				1966*
1966	No manning of police patrol cars mentioned				1967*

Figure 1--Motorized Patrol Manloading

Source: Municipal Yearbook (Chicago: City Manager's Association), various years and page references noted by *

quality of information available to patrol officers and/or change the the coordination of policing activities and hence reduce the effects of criminal activity? Or would significantly changing the methods, quantity, and quality of supervision of the patrol or investigative officers produce similar significant changes? Then the truly crucial question becomes, if any or all of the above would significantly improve the agency's efficiency in performing its assigned task, which would provide the greatest increases in efficiency?

It is now quite apparent that not only do we know very little about the cost or the effectiveness of policing activities, but also we know no more about the relative effectiveness of each of the alternative and complementary police functions. Hence, it becomes apparent that a mechanism for resource allocation is desirable in a policing activity. This mechanism, however, should ideally encompass the total resources of the department in its manpower, material, and capital equipment. The above discussion, however, indicates that there will be a large number of problems to be solved if we are to accomplish and implement useful and practical resource allocation schemes into an existing policing activity.

The Problems in Police Resource Allocation

Systematic analysis of the police function in the United States began with the late August Vollmer. Actually, some superficial work by city government specialists in this area predated Vollmer, but Chief Vollmer of the Berkeley, California Police Department was persistent, curious, and scholarly and he brought fresh insights into the examination of what the police business was all about. The list of police functions which appears now traditionally in all standard treatises on municipal policing has changed little since Vollmer's day. With little variation, the "standard list" of police functions consists of at least the following items:

1. crime prevention
2. crime repression
3. apprehension
4. criminal investigation
5. provision of public service
6. maintenance of the peace and security
7. regulation of non-criminal conduct
8. traffic regulation and control
9. provision of emergency services

Of the items appearing on the list of "functions" above, only two would seem properly to fit the qualifications of describing the social purpose of the police mission; i.e. (1) provision of public service and (2) maintenance of the peace and security. All the other functions seem logically to fall under these two aspects of the police mission and to be involved in the accomplishing of the two primary social objectives of the police. (Interestingly, note should be made of the fact that "law enforcement" has been deliberately excluded from the list of police functions, above. This exclusion was conscious, for it appears to the authors that "law enforcement" is actually a

process and consequence involving a congery of public agencies, including regulatory commissions, courts, prosecutors, etc. Despite the fact that policing agents in the United States today habitually refer to themselves as "law enforcement officers," law enforcement duties occupy only a very small portion of the police officer's time and even this he shares with other social agencies.)

This concept of the police mission consisting of the accomplishment of two primary social objectives may very well be at variance with the self-concept of the policeman. It seems fair to assume that police personnel, themselves, collectively envision their occupational specialty to possess two distinctive competencies, i.e., occupational skills which are not shared generally by other specialists. These occupational competencies are in the fields of criminal investigation and criminal apprehension. All other job skills of the policeman--driving, walking, riding, talking, relating to people, etc.--are shared generally with the population, as a whole, and certainly with other occupational specialities which impinge upon the work of the policeman. All other aspects of the policeman's job, except the areas of his special competence, might in fact, be more effectively turned over to some other occupational specialty. This might be done except that the contemporary urban policeman's job is much broader than the investigation of crime and the apprehension of offenders. The public and the police often incorrectly assume that the policeman's principal task is to control crime and investigate and apprehend criminals. Actually, data from any large urban police department will prove the fallacy of this assumption.

In one of our recent studies data relating to, for example,

the "field activities" of patrol personnel in one large city was analyzed. The analysis revealed that 70.9 per cent of the "called-for-services" involve miscellaneous public services, ranging anywhere from answering a nuisance call to assisting a resident who has been inadvertently locked out of her home. In addition, another 9.9 per cent of the field officer's time was spent dealing with traffic matters. In the case of this city, the sample of one year's activities revealed that more than 80 per cent of the field officer's on-call time was spent in non-criminal matters. Of the portion related to criminal matters the split between Part I and Part II offenses was almost equal. The precise data for all four categories of field activities were, as follows:

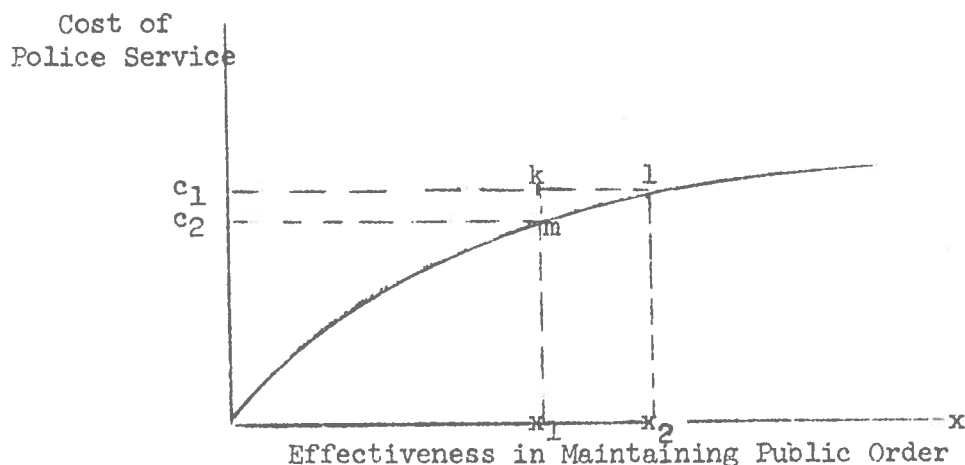
70.9%	miscellaneous public services
9.9	traffic accidents and violations
8.7	Part II cases
10.5	Part I cases
<u>100.0%</u>	

Actually, even these figures appear to be skewed in the direction of involvement in "criminal investigation and apprehension" activities. In many large urban police departments, non-criminal calls will account for 85 per cent of the officer's on-call time. When it is recognized that the data given above relate exclusively to the time the officer was actually occupied by an assigned or on-view activity, but performing duties such as preventive patrol, the inappropriateness of viewing police work as primarily criminal control and investigation becomes even more apparent. (The data did not relate to the so-called dead time, i.e., when the officer was available for assignment.) Our observations lead us to believe that data from any other large city will reveal similar patterns of field allocation.

It should be made very clear that there is no deliberate or unconscious intent here to minimize the social importance of police field assignment; nor is there any intent on the part of the authors to depreciate the social worth of deploying police field manpower to make it reasonably available for assignment to some demand for police service. The intent is quite the contrary. However, if the priority or weighting scheme for police activities includes only those activities which can clearly be labelled as criminal or requiring the services of a police officer and his special skills, the only result can be an inefficient allocation of policing resources, for, if the public services which will be performed are neglected in the assignment of resources, unless there exists a direct relationship between criminal activities and non-criminal activities (a highly unlikely condition) the officers will not be in the best locations to service these public needs with a minimum of travel and other wasted effort.

Optimal allocation of resources requires that the criterion objective function⁹ consider explicitly all policing activities whether they are of a criminal or non-criminal nature. In the opinion of the authors, police patrol personnel should be deployed in order to be readily available for field duty whether criminal or non-criminal in nature.

⁹The relationship which represents the relative priority of each of the demands for police services and assigns a weight (relative benefit) to the attempt by the agency to meet each of these specific demands.



$k = (x_1, c_1)$ cost of the activities performed by the agency using assignment criteria based exclusively on response to criminal activities at given level of effectiveness

$l = (x_2, c_1)$ the more effective point at a given level of expenditure for service using assignment criteria based upon response to both criminal and non-criminal activities

$m = (x_2, c_2)$ the lower cost of maintaining a given level of effectiveness using assignment criteria based upon response to both criminal and non-criminal activities¹⁰

Otherwise, as shown in the above diagram, the resulting allocation will be an inefficient one in terms of the cost to service each demand made upon the policing agency. This takes the form of additional unnecessary costs, since the police officers will not be in the optimal location to accomplish those tasks which they are called upon to perform. We will not enter the argument relating to whether police agencies should provide services which are not related to criminal

¹⁰Those readers who are not familiar with the economic concepts relating to efficiency and resource allocation are directed to C. Hitch and R. McKean, The Economics of Defense in the Nuclear Age (New York: Atheneum, 1965) Chapter 7, especially pp. 105-118 and for a quantitative treatment, pp. 379-385.

activity, for this is a cost which society has willingly and, sometimes grudgingly, paid since there is no other social agency which is skilled and available on an around-the-clock basis, to protect, to guard, and to serve.

In the Task Force Report: The Police, the President's Commission pointed out that, "Many American forces do not utilize their available field personnel effectively."¹¹

The most significant weakness appears to be the failure of departments to distribute patrol officers in accordance with the actual need for their presence.¹²

The Police Task Force concluded that "effective patrol distribution should be oriented exclusively at allocating field forces to places where crimes are most likely to occur."¹³ In reading the Task Force Report: The Police, one gains the impression that crime, itself, is the significant variable in the distribution in allocation of police field forces. This seems to be the inescapable conclusion if one reads only Chapter 2 which deals with police organization, management, and operations. If one reads other sections of the Report, one sees very clearly that the contemporary urban police mission is much broader than the "crime control" function. This confusion and inconsistency within the Report, itself, is understandable, for the general public

¹¹The President's Commission on Law Enforcement and the Administration of Justice, Task Force Report: The Police (Washington, D.C.: Government Printing Office, 1967), p. 51.

¹²Ibid.

¹³Ibid., p. 52.

conceives of the police primarily in a crime control role.

In discussing police resource allocation it is essential to obtain an impression of what the police should be doing. Perhaps, a better starting point is to conceive of the city government as possessing a "field patrol" capability designed to provide patrol on a decentralized, 24-hour basis to the residents of the city. This patrol capability is utilized to service varying demands on the part of the public--to serve a roving 24-hour fire watch patrol, to render aid to the sick and injured, to watch for violations of the law, to respond to alarms that crimes are in progress. From within the police field has arisen the clarion cry that the police are being overwhelmed by the increased miscellaneous services they are required to perform, to the detriment of their primary crime-control duties. It seems likely that if police personnel were to be asked to rate the priority of various services, they would be inclined to give a higher priority to crime-control related functions than to other functions. However, in many specific cases, police officers would probably indicate a higher priority for some non-criminal related tasks than for the less crucial criminally related activities. For example, which should be given preference, a call reporting a commission of a petty theft, or a call of a drowning child? Under these conditions, it is hoped that most citizens and police officers would have identical preferences.

The point of this is that neither the police field nor the academic world has developed any explicit and systematic way of giving priorities to police service, nor has there been developed any systematic method for determining a priori the specific level of police service which is needed in a particular sub-area of a community.

There are an abundance of "myths" and "rules of thumb," but certainly there is yet to be developed a systematic method of relating police need to the physical and social setting.

Concerning the "crime control" component of policing, we operate on the assumption that somehow police effort bears a direct relationship to criminality and to crime control. We are sure that conspicuous patrol serves some sort of preventive function, and yet we are never quite certain how this function becomes operative, nor are we really certain about what types of events conspicuous patrol actually prevents. We are not certain, but we think that physical and social environment has some relationship to the need for police service.

Again we see that the attempt to develop a systematic model for resource allocation reveals some essential problems in policing activities. We are unable to determine the effect of patrol on criminal activities (the probability that the aggressive patrol activities will reduce the likelihood that individuals will undertake deviant behavior), and we are unable to accurately determine the past demands for services at any given point in time or during any period of time, where we define demand for service in the broadest possible context. Such a definition would include called-for services, officer initiated services, and predicted or situational services.

At present there is not a useful taxonomy of events or activities which give rise to the need for police services. Without such a taxonomy, it is not possible to determine the characteristics of police work which will lend themselves to the development of a

predictive model. It is agreed by most academic researchers and a strong minority of operating police officials that the existing classification system for the collection of data relating to criminal and other policing activities¹⁴ is inadequate as it aggregates much of the information which is valuable for decision-making through the coding process and/or basic area classification methods. It is necessary to develop a taxonomy of demands with the accompanying definitions of demands which can be related to the actions officers undertake in performance of their duties. As an initial hypothesis, the framework must differentiate not only the legalistic type of crime but also recognize that certain criminal activities having the same legal classification will invoke different actions by police officers; e.g., officers will undertake different actions when the event is of an emergency or nonemergency nature, when the suspect is unarmed or armed--and these conditions will determine the officer size-up of the situation. This size-up invokes a response in terms of the number of officers sent to handle the particular event. Once we have developed a useful taxonomy which is not directly tied to administrative reporting requirements of Federal agencies but yet can meet those requirements which may be set by Federal agencies, we can then attempt to develop a model which will provide predictions of demands for services in a time-location-operational requirements

¹⁴Committee on Uniform Crime Records, Uniform Crime Reporting, (revised), (New York: Committee on Uniform Crime Records, International Association of Chiefs of Police, 1929).

framework. It will be necessary to determine not only the past demand for services and then simply use projective techniques to predict future demands, but also to look closely into the underlying causes for the demands for services and not rely on what might be merely an associative variable: i.e., past criminal activity and past non-criminal activity if the broader context which we suggest is accepted. It may well be that demographic and other socio-economic variables have much stronger relationships to future criminal activity than does past activity. The degree to which the socio.-geographic-economic variables are better predictors of demands for policing services can only be determined by experimenting with naive models (those models which predict on the basis of past activity) and more sophisticated models which utilize information obtained from study of broader sets of variables.

A suggested experiment would compare the predictions of future criminal activities which have been developed by the St. Louis Police Department's resource allocation group¹⁵ and compare the accuracy of their predictions resulting from the use of their exponential smoothing method to the results that would have been obtained had we developed a model using only the socio-demographic-economic variables with the hypothesis that there was no significant difference between the two methods. However, we would suspect that opportunistic models which utilized both information on demands for services obtained from exponential smoothing models and information obtained from causality

¹⁵ This is an O.L.E.A. funded study in the Saint Louis Police Department which began in July 1966.

models would provide significantly better predictions than either of the simpler models.

Another important problem in the development of good data for police resource allocation relates to the accuracy and reliability of the data itself. The fallacy of attempting to make intercity comparisons of crime rates has been long accepted as there exists a wide variation between cities in the percentage of actual crimes reported and/or cleared. Further, increasing the number of police officers assigned to an area will normally result in an increase in "crime," since many more crimes will be uncovered through increased police activity.¹⁶ With the acknowledged problem in both the reliability and accuracy of police statistics, it is obvious that any useful allocation scheme will require methods to assure the quality of the data which is utilized in the information base.

The problem of the development of the information base for resource allocation should not be looked upon as an insurmountable task, but one must recognize (1) that the existing mechanism for data collection is neither sufficiently refined (that is, between coding and aggregation it is not useful for decision-making purposes); (2) it does not take into account many causal variables, but looks primarily at associative variables; (3) its quality, as measured by its accuracy and reliability, is not adequate if we are to make

¹⁶These are usually "crimes without victims," see Schur, E., Crimes without Victims (Englewood Cliffs, N.J.: Prentice-Hall, 1965); and Operation 25 of the New York City Police Department (New York: 1955).

the greatest use of the advanced techniques developed in operations research.

Another major problem, even if we assume that crime control is the primary purpose or objective of the police, and even if we are willing to allocate police field forces on the basis of the amount of crime which is predicted to occur in a particular area, is determining the extent to which the police are "criminogenic." One of the unresolved matters in the field of criminal statistics is the determination of the extent to which the increased volume of crime is, in fact, a function of police presence or better police reporting. Certainly, there are whole categories of crimes whose number can be greatly affected by differing police policies and attitudes. This is particularly true of the so-called crimes without victims. This category of crimes includes most gambling, liquor associated, sex, and drug related offenses. Crimes of this sort are not normally reported to the police, except in those rare cases where there is a disgruntled customer. These crimes are discovered by aggressive policing. The relationship of police presence and improved police reporting procedures to the overall "crime rate" was graphically demonstrated in 1954 when the New York City Police Department embarked upon an experiment called Operation 25.¹⁷

¹⁷During the experimental period of four months, personnel strength of the 25th Precinct was increased 134 per cent. Beat structure was redesigned, the number of supervisors was increased, and new reporting procedures were developed. During this time, felonies were reduced in the Precinct by 55.6 per cent; the clearance rate increased for felonies from 20.2 per cent to 65.6 per cent. At the same time, however, because of its relevance to the discussion above, it is interesting to note what happened to certain Part II offenses. The increase in the following categories of Part II offenses was

Police Resource Allocation and Derivative Applications

In view of the limitations of present procedures for police resource allocation, it seems apparent that a systematic approach would yield a more effective police allocation pattern. Such an approach would direct explicit attention to demographic, territorial, spatial, and social factors in addition to the typically used base of crime data. The approach would correlate the data relating to present and future police activities with the known social and physical characteristics of different sections of the city. Explicit recognition would be made of variations in socio-economic characteristics and lifestyles. Land-use patterns characteristic of different parts of the city would also be noted. Each of these sections of the city should give rise to differing demands for police service. In other words, a broader approach to police resource allocation would make explicit recognition of the fact that Times Square, Greenwich Village, Harlem, and Riverside Drive give rise to differing demands for police service on the part of the New York City Police Department. In a sense, therefore, what we are suggesting is an expansion of the type of information inputs which are utilized for police resource allocation.

The development of sophisticated resource-allocation systems with the associated information and data bank will be a rather

as follows:

Possession of Deadly Weapons	107 per cent
Possession and Sale of Drugs	138 per cent
Juvenile Delinquency	176 per cent
Disorderly Conduct	130 per cent

The increases in the above categories of offenses may be attributed primarily to the increased presence of uniformed policemen.

expensive undertaking for even the largest of police agencies. But we should recognize that most of the exploratory and methodological work will be accomplished in the initial studies performed in the very largest of metropolitan areas and that smaller cities will be able to utilize this methodology and, to a lesser degree, the data on cost and manpower utilization with but minor modifications.

Although the large metropolitan police agency should be able to justify the cost of a resource-allocation system on the basis of the increased effectiveness in utilizing manpower and capital resources, the medium-large city with a population of 100,000 to 300,000 will require a broader application of the techniques of operations research and systems analysis if resource-allocation schemes are to be feasible.¹⁸

The medium-large city, where the resource-allocation system is computer based, will be able to attempt a wide number of applications which should enhance the economic feasibility of their resource-allocation scheme. A major application would be the employment of an information-processing and reporting system tied into the resource-allocation scheme. Also, there are large numbers of applications relating to manpower and supervisory development and training.

¹⁸Richard B. Hoffman, "The Transfer of Space and Computer Technology to Urban Security," Proceedings of the Fall Joint Computer Conference, 1966, 29 (American Federation of Information Processing Societies, Conference Proceedings, 1966), pp. 523-529, reprinted by Center for Planning and Development Research, RP 13 (Berkeley: University of California, 1966).

It is possible to develop scenarios and strategies which are developed from the responses of command officers. These responses are then translated into decision rules which can provide direction to junior officers in the absence of senior officers, and can be used to train officers by creating artificial situations, allowing them to simulate their responses, and then providing feedback on the effects of their decisions. This technique has been used extensively by the RAND Corporation and Systems Development Corporation in the training of Air Force and other military officers in simulating crisis situations and war games.¹⁹

These types of man-machine simulations develop managerial skill in making the most critical and complex decisions found under conditions of civil disorder. Under more normal conditions when simple, repetitive, and explicit rules are available, the calculations involved in more routine decision-making may be performed by the machine and the outputs may be directly sent to the field operational force. This quite obviously will reduce the workload of the managers leaving more time for personal observation and direct supervision of subordinates.²⁰

Other applications will utilize (1) queuing theory to restructure the organization to equalize the workloads of the individual physical units, which may or may not be something akin to the present beat

¹⁹M.G. Weiner, The Use of War Games in Command and Control Analysis (Santa Monica, California: RAND Corporation, October, 1961), p. 2466.

²⁰M.A. Geiler, Simulation Techniques (Santa Monica, California: RAND Corporation, October, 1961), p. 1808.

pattern, (2) statistical analysis to supplement and/or replace the existing methods of collecting data for crime analysis, and (3) management exception techniques for crime pattern recognition. It would also be possible for an officer assigned to a new beat or area to obtain, through the resource-allocation information data bank, the basic information relating to his area (beat) recognizing that many officer initiated actions are based upon the officer's personal knowledge of his operational area. If, as in many jurisdictions, the officers are generally not assigned a permanent beat, but are rotated, we find that the patrolman lacks much of this basic information so necessary to effective patrol. Presently, however, this information can only be obtained through continual assignment to the same area. The information data base could provide officers recently assigned to the new areas or beats with a large proportion of the information that they might otherwise have to personally develop over a period of six to nine months. Hence, the time to train an officer to peak effectiveness in a new area could be considerably reduced.

The above are just a few of the applications which a computerized resource allocation scheme would allow. When these schemes are widely implemented we should find that various departments will conduct tests of alternative tactics in policing work to determine the effectiveness of the existing methods of preventing criminal activities and to suggest more effective tactics.

The accomplishment of resource-allocation schemes which are broadly based and have wide derivative applications should provide even the medium-sized city with an economically feasible resource-allocation scheme for its police agency.

Future Implications

The existence of computerized resource-allocation systems with the accompanying cost and data bases which will be necessary for their successful implementation should significantly change both the methods and scope of the public services performed by our policing agencies.

At present, very little is being done by American policing agencies to take advantage of either the technological or managerial improvements which have been developed in private industry. The development of performance measures and the ability to determine deviations from standard performance levels will allow police managers to exercise a much higher degree of internal control of their own field and operational forces. In the long run we should anticipate that police command officers will determine the effect of varying strategies and tactics, prepare daily and long-term operational plans, and then determine, with some degree of accuracy and reliability, the effects of these plans, strategies, and tactics.

The development of basic costing data will allow experimentation and development of sophisticated costing measures such as learning curve analysis, perhaps to determine the relationship between (1) the cost of assigning men to a single precinct or rotating men between precincts, (2) cost analysis of various alternative assignments and training methods for policing officers, and (3) statistical costing and control methods. The utilization of skills and knowledge inventories in conjunction with the resource-allocation model will provide improved assignment of personnel by recognizing the varied background of individuals obtained from experiences outside of the

department and the varied experiences of the officers in terms of their geographical and operational assignments within the department. This inventory further can be used for manpower development and training. The departments can prepare five- and ten-year projections of the demands to be made upon them and translate these projections into the required skills and knowledge that will be necessary for the department to service these demands when they are made. An analysis of the existing manning of the department can reveal the training and development necessary so that its staff will be prepared to meet the future years' demands. Once the department recognizes where these demands cannot feasibly be met through manpower development training, early recruitment efforts can be undertaken so that the department will not be constrained by its unique traditions and regulations and hence prevented from obtaining the best possible men to perform its tasks. Further advanced application of a system which has a high-quality data base with accompanying costing information will very likely provide unforeseen advances which may improve the quality of life in our cities and metropolitan areas to a degree which we cannot today predict. The ability to experiment with varying methods of policing operations which may utilize other metropolitan and social agencies in coordinated efforts may alleviate one of the greatest problems of policing today--the image of the police officer in the eyes of society. As the agencies experiment and work together, the policing agencies will come to recognize the problems that exist in society and have a greater appreciation for these problems and, at the same time, society and these agencies will have a finer appreciation of the tasks and conflicts inherent in the policing function.

Although we do not feel that the resource-allocation scheme is a panacea for all problems in policing, when one recognizes that throughout the United States 85 to 90 per cent of all police department budgets is allocated to personnel, any method which improves the effectiveness in the utilization of a department's manpower resources will have a significant potential to make major contributions to the alleviation of the problems of our policing agencies as they attempt to control crime and socially deviant behavior.

A P P E N D I X

TABLE I
POLICE MANPOWER
PER 1,000 POPULATION

Size of City	1964			1966		
	Lowest Quartile	Median	Highest Quartile	Lowest Quartile	Median	Highest Quartile
over 500M	1.29	2.63	4.09	1.26	2.46	3.99
250-500M	1.12	1.72	3.83	1.04	1.22	4.22
100-250M	1.03	1.69	2.80	1.06	1.61	2.87
50-100M	.14	1.53	4.63	.39	1.49	3.92
25- 50M	.19	1.54	4.40	.16	1.42	6.62
10- 25M	.38	1.50	3.73	.05	1.45	4.00

Chart 1
POLICE MANPOWER
1964 & 1966

