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ABSTRACT

Relationships between structural and performance variables were studied in 16 public transit organizations in California. Data was collected from archives, personal interviews, management surveys and on-site observations. Statistical analyses focus upon associations between structural variables and organizational efficiency, effectiveness, and employee withdrawal. Organization size, span of control, centralization, and length of managerial tenure were all associated with higher levels of organizational performance. Specialization and formalization were found to be associated with lower levels of performance on certain efficiency and effectiveness indicators.

ORGANIZATION THEORY AND THE STRUCTURE AND PERFORMANCE OF TRANSIT AGENCIES

To obtain a fair share of the financial support available from government agencies, the administrative intensity of transit organizations has been increased. Before the advent of federal and state support, transit agencies could be managed by supervising operations, maintenance and fare collection. Now a wide range of administrative specialists are required: planners to prepare short and long range plans before an agency can request operating and capital assistance; accountants and auditors to ensure that funds received and spent are accounted for in the prescribed manner; personnel managers to ensure compliance with recruiting and hiring standards; attorneys to interpret regulations and defend agencies against the public and aggrieved employees and grant "facilitators" to make sure that no eligible money is missed.

How these changes in organizational structure affect the performance of transit is unknown. This paper is based upon research which was designed to answer this structure question (1). The research was also intended to assist transit managers to understand their organization environment and to recognize the probable outcome from changes.

Relationships were reported between structural and performance variables in 16 fixed-route bus systems located throughout California. Data for the study was collected from organizational archives, personal interviews, management surveys, and on-site observation. Statistical analyses focused on the associations between structural variables and elements of

organizational efficiency, effectiveness, and employee withdrawal (Fig. 1). Information was also collected on attitude variables but is not utilized here.

Structural Variables

The term "structure" embodies a variety of dimensions which are believed to be associated with the performance of organizations and their members. Seven variables were selected for analysis. Definition of these and the performance variables are provided in Appendix I.

Selection of dimensions for this study took into consideration both the nature of mass transportation and the nature of the relationships between the structural variables. Distinction was made between structural characteristics (measures of the configuration of the organization) and the structuring characteristics formalization, standardization and centralization (measures of the structuring behaviors within the organization) (2). Formalization, standardization and centralization allow organizations to carry on many activities efficiently. They knit together diverse activities of an organization through programs that link activities together. Structuring of activities gives a great deal of predictability and stability to whatever goes on in organizations. However, there are some costs of inflexibility and red tape.

Structuring measures were calculated through a questionnaire distributed to all managerial personnel. A total of 238 questionnaires were collected from the 16 transit organizations. Scores on each structuring measure for all managers in each organization were aggregated to produce an average score for that organization.

Performance Variables

Standardized measures of performance in transit are a fairly recent phenomena. Measures have been agreed upon but collection of the data and its reliability varies. This study utilizes the performance indicators developed by Fielding et al. (3), with the ratio constructed so that higher values indicate better performance on that indicator. Reliability was enhanced by comparing results for 1976-77 with data gathered from the same agencies in previous years.

Distinction is made between measures of efficiency and effectiveness as these are different concepts and should be measured separately. Efficiency is a measure of resources used to create transit service, whereas effectiveness measures the utilization of services produced. Three ratios were used to assess the efficiency of producing service and five ratios were used to assess the cost and level of consumption (Appendix I).

Selection of these eight performance measures resulted from an evaluation of theoretical considerations, data availability, and independence from environmental influences. This set is not an optimal one. As more reliable data becomes available, other indicators should be considered. These measures do, however, allow some comparisons between properties utilizing data which is, objective, understandable and interpretable across properties.

RELATIONSHIPS STUDIED

The analysis of structure--performance relationships must be approached with caution, particularly in the transit industry, for several reasons. First, general prescriptions regarding structural configurations and performance are rare and may be misleading. Second, standardized measures of performance often do not exist, and if they do, must be interpreted with caution due to questionable methods of collecting and categorizing data. Third, it is crucial to recognize that structure is but one factor that may relate to organizational performance. An examination of statistical correlations reveals that although relationships may be significant, the amount of variance explained by certain structural variables is of such low magnitude, that causal statements regarding structure--performance linkages should be discouraged.

In transit, the fact that standardized measures of performance are a fairly recent phenomenon only adds to the problem of interpreting structure--performance relationships. The main problem lies in how information is collected by the individual transit organizations. Various methods of collecting information such as revenue vehicle hours, percent population served, and passenger statistics often produce unreliable and sometimes invalid results. Fortunately, in this research we were able to check certain performance statistics for a given fiscal period with information gathered in previous studies. Thus, we could conduct a simple test of reliability and were able to identify problems which some organizations had in their statistical recording procedures.

The measures of organizational performance which were used in the analysis include employee turnover statistics as well as the three efficiency and five effectiveness measures. The analyses in this chapter

consisted of correlating various structural and demographic variables with the performance measures. In some cases, a clear pattern seems to emerge regarding a particular structural dimension and performance. In most cases, however, structural dimensions show only moderate relationships with a few performance indicators. It is worth noting, in these latter cases, that the relationships which demonstrated significance, did so in a consistent manner (e.g., several effectiveness measures indicating a positive relationship, for example, with a particular organizational variable) and in keeping with the direction of the relationships as suggested in the literature.

In the following section individual structural and demographic variables will be discussed with respect to their relationship with various performance measures. It should be emphasized that general patterns of relationships are important in this analysis, and that caution should be exercised when interpreting individual structure--performance associations.

Organizational Size

A good deal of research has focused on the issue of how the size of an organization may influence various aspects of organizational success. An examination of the literature suggests mixed findings. Five of six studies which have been performed in the last decade reported no association between size and performance. However, based on the results of several studies, size appears to be positively associated with increased organizational efficiency (4). An analysis of the relationship between size and performance for our sample of 16 transit organizations indicates

that organization size is closely related, though insignificantly, to one measure of efficiency--Revenue Vehicle Hours Per Vehicle (Table 1). This is perhaps due to the fact that larger bus systems operating in metropolitan areas, usually provide service on an 18 or 20 hour basis, whereas a 12-hour schedule is characteristic of transit systems in smaller cities. Thus larger properties may be more efficient regarding vehicle utilization than smaller organizations.

One measure of effectiveness, percent population served, also correlated positively with size. Large transit organizations usually operate service which extends beyond the central city. Their route coverage enables them to serve a higher percentage of the population. One measure with which size is negatively correlated is turnover of operating employees. Larger organizations in our sample had a lower turnover of operators than smaller properties. One reason which might account for this finding is that operators in larger properties receive higher pay than operators in smaller organizations. Higher rates of pay may contribute to the willingness to stay with the organization.

In general, there are few valid relationships between organization size and performance. Some performance variations are associated with total size, but available research suggests that total size may interact with other structural variables in determining such differences. Also, the effects of total organization size may operate through intervening constructs at the individual and group level. Based on the accumulated evidence, there is no clear trend with respect to the effects of size and performance in the transit industry.

Span of Control

Very few studies have examined the effects of span of control on performance (5). Only two studies actually posited the concept that large spans were superior. Both studies suggested that large spans provide the opportunity for better initiative and better communications as well as increasing the human resources available to the individual manager (6, 7).

The analysis of the transit performance data indicates that one efficiency and two effectiveness measures were significantly correlated to managerial span of control (Table 1). Vehicle utilization and system ridership measures were both positively correlated with span of control, while operating expense per passenger demonstrated a slightly negative relationship. Also, managerial turnover was negatively correlated with span of control. Thus, larger spans of control are associated with lower managerial turnover, lower overall operating expense per passenger, and better vehicle utilization and ridership figures. Although some of the correlation figures are low, the trend in the relationships lends support to the idea that perhaps managers who are responsible for more employees are able to perform their duties more effectively than might be the case in an organization typified by "close-supervision." Certain organizational efficiencies are also realized when larger spans of control are utilized especially at the lower managerial and supervisory levels. Larger spans mean fewer managers at the lower levels which translates into fewer managers overall in the organization. This has a direct impact on adminstrative costs. Thus, within an acceptable range, the span of control of individual managers, particularly at lower levels of

management, may be increased beyond an organization or industry "average" without detrimentally affecting the organization's effectiveness while quite possibly increasing its efficiency.

Specialization

Specialization, as represented by the numbers of occupational titles in an organization, has some interesting implications for organizational performance. Previous research has suggested that increased specialization is associated with increased innovation and creativity which are both inputs into organizational effectiveness (4). Although it appears that increased specialization may be positively associated with individual performance, the relationship with total organizational performance may be negative. Results from the sample of transit organizations illustrate this point. Specialization was negatively correlated with an efficiency measure and positively correlated with a cost measure (Table 1). The number of specialists in an organization was negatively correlated with revenue vehicle hours per employee. Since most specialists are employed at the middle-level managerial ranks, they generally do not affect the total revenue vehicle hours which an organization is able to provide. Increased numbers of specialists increases the size of the administrative staffs of organizations which produces a lower figure of revenue vehicle hours per employee. On a per employee basis, then, organizations which employ many specialists and support personnel do not realize proportionately more revenue vehicle hours and are not as efficient. Likewise, the existence of more specialized employees is more than likely to be associated with increased administrative costs which

significantly impact the overall organization budget. Thus the finding that specialization is positively correlated with operating expense per total passenger may be due, in part, to the expansion of overall organization costs which a specialized staff entails.

In the modern transit organization, specialization at the managerial level has increased, due to the increasingly complex nature of funding, staffing, and monitoring activities. The transit industry today is characterized by an influx of specialists who a decade ago would not have been necessary. The increased need for specialists and their associated support costs have caused transit organizations (especially small ones) to become more expensive to operate and less efficient.

Centralization

The effects of centralized or decentralized structures on decision-making and organizational performance has been the topic of much debate and a great deal of research during the past 20 years. Historically, an increase in organization size typically brought with it a concomitant increase in centralization of authority and power in the upper echelons of management. As organizations grew and expanded, the disparity between the relevant sources of information for decision-making (which were often located near the bottom of the hierarchy) and the decision-makers themselves become greater, often resulting in poor communications, less than optimal decisions, and reduced effectiveness. During the past 50 years this trend shifted to a more decentralized structure in which organization-wide policy decisions were made at the extreme upper levels

of management, while decentralized divisional responsibilities and operating decisions were delegated to the lower managerial levels.

Much of the early research in this area examined the effects of decentralization on employee attitudes and organizational performance. The results of these studies indicated that decentralized organizations more efficiently utilized human resources and therefore, resulted in increased job involvement and increased performance (8, 9).

More recent research has pointed out that a relationship between decentralization and both efficiency and effectiveness is not always found. In fact, in our sample of transit organizations, centralized structures were associated with 2 measures of organizational efficiency, three measures of organizational effectiveness, and 2 measures of employee turnover (Table 1). Centralized structures were associated with more revenue vehicle hours per employee, and revenue passengers per revenue vehicle hour as well as with lower operating expense per revenue vehicle hour, per total passengers, and per revenue passenger. Centralized structures were also associated with lower turnover for both managers and operating employees. No single structural variable was characterized by as many (or as consistent) significant relationships with performance measures as was degree of centralization.

These results are not altogether surprising when analyzed in the context of the particular organization environment which characterizes most transit organizations. The term "environment" here, refers to several factors which may mediate the relationship between centralized or decentralized structures and performance. For example, Perrow has

espoused a form of contingency theory in which an organization's technology was viewed as the most important source of inter-organizational variations in patterns of influence; that is, the appropriate degree of centralization was contingent on the routineness of the technology. He suggested that organizations characterized by more routine technologies (such as transit organizations) are best suited to more centralized structures (10). Other researchers have suggested similar mechanisms which might account for the appropriateness of a more centralized structure. Among those suggested include concepts of "mechanistic" environments (as opposed to "organic") and varying degrees of integrating and differentiating task situations (11, 12). For example, managers would have less inducement to decentralize in a stable environment than in an environment characterized by rapid change and instability, necessitating rapid feedback of accurate information and a timely response to maintain the equilibrium of the organization.

With respect to the tasks of transportation organizations, the type of technology and environment which characterize their operations would seem to require a more centralized form of structure. The associations obtained between the measures of centralization and the performance indicators seems to support this view.

One factor which should be incorporated into a discussion of the effects of centralization on performance is organization size. As transit organizations grow in size, they are almost forced to decentralize some decision-making to lower levels of management. Does this imply that larger, decentralized transit organizations are less likely to be efficient and effective? The answer is not a definite yes or no. Certain

organizational benefits accrue to both decentralized and centralized organizations. For example, some advantages of decentralization are:

1. It facilitates integration and coordination of large organizations characterized by rapidly changing environments.
2. It facilitates management by objectives and the organization of planning at all levels of management.
3. It tends to develop decision-makers at middle and lower levels of management which has a motivational effect.
4. It reduces the decision-making load of top management.
5. It reduces the time required for decision-making.

However, in spite of these advantages, excessive decentralization can have disadvantages:

1. It may add to the cost of supervision if more managers are added to the lower and middle levels.
2. It may lead to suboptimal decision-making--that is, decisions that benefit particular units, but work to the disadvantage of the total organization.
3. It may, in the absence of open communication among all levels of management, lead to loss of control by top management.

The optimal balance between the advantages and disadvantages of decentralization will differ with the characteristics of the individual organization. It does appear to be the case in transit organizations, that some degree of decentralization will occur as the organization increases in size. The extent to which the structure of the organization with respect to centralization or decentralization impacts performance and/or attitudes will depend, not only on the nature of various other

organizational and environmental factors, but also on the degree to which the organization moves toward a decentralized structure. A key principle which must be recognized is that as organizations grow, the decision-making structure is but one structural factor that may undergo change. The fact that various other structural features change concurrently should be acknowledged as a probable co-determinant of any subsequent change in attitudes or performance.

Formalization/Standardization

Standardization and formalization, as stated previously, represent the "how" and the "what" of organizational procedure. The literature suggests that extremely low or high amounts of formalization and/or standardization may have dysfunctional consequences for the organization (13). That is, extremely low levels of both may lead to ambiguity and extremely high levels may induce rigidity, neither condition resulting in either improved attitudes or performance.

Experience with the transit organizations in the sample indicated that a range of standardization-formalization exists from an almost total lack of (written) rules, standards, and procedures to systems characterized by extreme "by the book" operations. One major determinant of the existence of standard procedures and written rules and regulations seemed to be the inclination of the General Manager of the organization toward such factors rather than an industry-wide point-of-view that rules, regulations, and procedures are essential management tools. In some cases, General Managers were quite vocal about their ideas concerning "standard operating procedures," while others felt that each manager had

an "understanding" about his/her particular job and responsibility and that this knowledge was "acquired" through experience.

Most of the literature in this area has examined the effects of formalization on organizational performance. Clasically, formalization has been examined with respect to the existence of rules, regulations, codified job duties, etc. that govern employee behavior. It has been argued that increased formalization represents a hinderance to effectiveness because managers under highly formalized structures tend to do everything "by the book." Thus, creative, innovative, or adaptive behavior is severely constrained (14).

The analysis of the relationship between formalization and performance supports the basic findings in the literature. There was no relationship between formalization and the three efficiency measures. However, formalization did correlate negatively with two effectiveness measures associated with capacity utilization (Table 1). Formalization also correlated positively with both managerial and operating turnover. Thus, higher degrees of formalization are associated with lower levels of two effectiveness measures and higher levels of turnover. Although this finding in no way constitutes an indictment of high levels of formalization, it does lend support to the notion that transit managers would do well to avoid "excessive" degrees of formalization in their organizations. What constitutes "excessive" in an individual organization would entail a more detailed analysis of the personnel component of the organization together with a consideration of such structural measures as size and effects due to the organization's association with municipal, state, or federal bureaucracies.

The effects of standardization on organizational performance have not been explored in the literature to the extent of the formalization research. In many cases, standardization is simply mentioned in conjunction with formalization, although empirical support for any relationships, for the most part, deals exclusively with formalization (15). Analyses indicated with that standardization was only slightly correlated with one efficiency measure of vehicle utilization and was positively correlated with managerial turnover (Table 1). It was apparent in each organization visited that some degree of standard procedure was quite common. In fact, it appeared to be the case that a specific range of activities was pretty much standardized across all organizations. For example, hiring and promoting personnel, performance evaluation, and equipment maintenance procedure activities were all fairly standardized in each property. Individual organizations also seemed to be characterized by specific procedures which were also standardized, but the determination of those which were further standardized was more a function of the interests of the particular managers in the organization.

Thus it appears to be the case in transit organizations that some degree of standardization is required in order to ensure that the day-to-day activities of the organization are accomplished with some degree of continuity. As a structural feature of the organization, extreme levels of standardization should be discouraged, since, like formalization, such levels seem to restrict adaptive and innovative activities to the point of dysfunction.

Manager's Length of Employment

Although job tenure is not a structural variable, it is an important employee characteristic which has an impact on both attitudes and performance. In the sample, a series of questions were asked concerning the length of time an employee has worked with the particular transit organization--both as a manager and non-managerial employee. This job "tenure" measure was then correlated with the performance indicators associated with each individual's organization. The results were interesting in that management experience correlated very highly with two measures of efficiency and five measures of effectiveness (Table 1). Length of employment was related to better ridership statistics, improved vehicle utilization, and lower operating expense per vehicle hour and per revenue and total passengers.

This data would seem to indicate that several employee characteristics are worth considering with regards to their possible effects on organizational performance. Organizations which are characterized by a management force who have more experience in the organization seem to perform better on the whole. The amount of management experience which managers have had in other types of organizations (including transit organizations) does not appear to have as great an impact on overall performance as the total amount of time which each manager has spent in the particular organization, either in a non-managerial or a managerial role. Perhaps the reason for this finding lies in the particular "quality" of information which an individual accrues as a function of his/her membership in an organization. It has often been suggested that

a person having more organizational seniority is also more "organizationally intelligent," which means that person knows how to adapt to the demands of co-workers, subordinates, and the organizational situation (16).

There has been little, if anything, done in the empirical sense regarding organizational tenure or seniority and performance. What little has been done has focused on individual attributes and individual performance, but no systematic research efforts have examined organizational performance.

One interesting relationship which should be mentioned is that seniority correlates rather highly with organization size--larger organizations are characterized, to some degree, by a more experienced work force. This can be explained in part, by the fact that larger organizations employ more people and thus the number of individuals in larger organizations with more work experience is likely to be greater. The important point here is that perhaps gains in performance by larger transit organizations are due to characteristics of the work force in conjunction with structural characteristics which are affected by size.

The characteristics of the sampled property's managerial component has also been affected by recent changes in California legislation. The implementation of the Transit Development Act (SB 325) in 1972 encouraged expansion of transit service in smaller cities and suburban metropolitan areas. Many new managers were hired and these new systems are both less efficient and effective than the older transit systems in the major metropolitan areas of California.

CONCLUSION

Several aspects of organizational structure are related with and can possibly affect certain facets of transit organization performance. In terms of efficiency, effectiveness, and turnover rates, it was found that organization size, span of control, centralization, and managerial tenure were all associated with higher levels of organizational performance. Whereas specialization and formalization are associated with lower levels of performance on certain efficiency and effectiveness indicators.

The analysis of these results must be interpreted in light of the level of analysis performed. Certain structural features as perceived by the individual manager (e.g., centralization, standardization, formalization) were associated with organizational level measures of performance. The ideal situation would be one in which individual employee performance data could be used in the analysis with their respective individual structural measures. Unfortunately, such measures of individual output do not exist in any standardized form in the transit industry. Therefore, the study was limited to those measures which were available.

An additional caveat must be mentioned in conjunction with the interpretation of existing measures of structure. This involves the very nature of perceptual measures and their implications for interpreting organizational outcome variables. Within each organization, one may observe several "environments," especially in larger organizations. The "environment" with respect to centralization and formalization, for example, may be perceived by the individual managers in a maintenance department quite differently than by managers in the personnel department. The point is that when we associate individual perceptions of

structural elements with organizational-level outcomes, we may be obscuring the resultant association since individual managers may have opposing perceptions of their organization's structure--thereby almost "cancelling out" any significant effect.

These cautions do not diminish the significance of the results. The results confirm relationships which have been proposed regarding certain structure-performance associations. The implication for transit managers, especially those involved in organizational planning, are significant and should be used to indicate the probable outcome from altering the structure of an existing organization. One important concept which is partially rejected by the results is that there is "one best way" to organize transit organizations: there are several, depending on the organizational context.

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TABLE 1. ANALYSES OF STRUCTURE--PERFORMANCE DATA

	Pearson r	Significance Level	N
ORGANIZATION SIZE			
Percent Population Served	.4362*	.039	14
Revenue Vehicle Hours Per Vehicle	.3575*	.090	15
Operating Turnover	-.5662*	.035	14
SPAN OF CONTROL			
Revenue Vehicle Hours Per Vehicle	.2181	.001	232
Total Passengers Per Revenue Vehicle Hour	.1816	.002	238
Operating Expense Per Total Passenger	-.1095	.046	238
Managerial Turnover	-.1848	.019	180
SPECIALIZATION			
Revenue Vehicle Hours Per Employee	-.4486	.047	14
Operating Expense Per Total Passenger	.5101	.026	15
CENTRALIZATION			
Revenue Vehicle Hour Per Employee	.1574	.008	233
Operating Expense Per Revenue Vehicle Hour	-.1693	.005	233
Revenue Passenger Per Revenue Vehicle Hour	.1600	.007	233
Operating Expense Per Total Passenger	-.2110	.001	239
Operating Expense Per Revenue Passenger	-.2162	.001	239
Managerial Turnover	-.1320	.032	198
Operating Turnover	-.1845	.011	152
FORMALIZATION			
Revenue Passengers Per Revenue Vehicle Hour	-.5023	.030	14
Total Passengers Per Vehicle	-.5070	.032	14
Managerial Turnover	.2181	.002	187
Operating Turnover	.2178	.001	198
STANDARDIZATION			
Revenue Vehicle Hour Per Vehicle	.1181	.036	233
Managerial Turnover	.2262	.003	152
MANAGERS' LENGTH OF EMPLOYMENT			
Revenue Vehicle Hours Per Vehicle	.2095	.007	231
Operating Expense Per Revenue Vehicle Hour	-.1919	.002	231
Revenue Passengers Per Service Area Population	.3176	.001	237
Total Passengers Per Revenue Vehicle Hour	.1486	.011	237
Revenue Passengers Per Revenue Vehicle Hour	.2014	.001	231
Operating Expense Per Total Passenger	-.2104	.001	237
Operating Expense Per Revenue Passenger	-.2501	.001	237

*Kendall's tau used because properties classified into three size groups.

APPENDIX I

Structural Variables

- Organizational size is the scale of operation and for this study was defined as the number of buses in revenue service.

- Span of control refers to the number of personnel managed by each administrator and was operationalized by dividing the total number of employees by the number of supervisory personnel.

- Number of specialities is the number of different occupational titles or functional activities and was defined by sets of activities indicated by job descriptions.

- Administrative intensity is the ratio of administrative personnel (managerial and supporting staff) to total personnel. Managerial intensity is the ratio of managerial personnel to all personnel.

- Centralization is the degree to which power is concentrated in an organization. The maximum degree of centralization would exist if all the power were exercised by a single individual; conversely, the minimum degree of centralization would exist if all of the power was exercised equally by all the members of an organization. A centralization scale was used to establish the managerial level at which certain types of decisions are made. (Copies of assessment scales are included in Fielding et al. (1), Appendix II.)

- Formalization in transit organizations refers to the extent to which procedures, rules, instructions, and communications are formalized--that is, reduced to writing. For example, are contracts of employment with the organization in writing? Is there a formal organization chart? Are there written job descriptions? Are there work assessment records? The number of written documents in the organization which govern employee behavior were counted to develop an index for the organization.

- Standardization is the extent to which each of several organizational activities is subject to standard procedures or rules. For example, is inventory taken weekly, monthly? How are personnel evaluations carried out, if at all? Are progress reports prepared by department heads for their supervisors? It is a measure of routinization in an organization which is obtained by responses by managers to a prepared list of activities.

ORGANIZATION PERFORMANCE

Service Efficiency

- Revenue vehicle hours per employee (RVH/EMP) is calculated by the total number of revenue vehicle hours reported for each property over the total number of employees. It is a measure of labor productivity. Utilization of employee hours would improve the indicator but this information was not available.

- Revenue vehicle hours per vehicle (RVH/VEH) assesses the average number of hours of service per bus per year. It is a measure of equipment utilization.

- Revenue vehicle hours per operating expense (RVH/$) measures the amount of service produced per dollar of operating expense which measures production cost efficiency.

Service Effectiveness

- Total passengers per operating expense (PASS/$) measures the number of passengers per dollar of operating expense. It is an overall measure which combines elements of efficiency (cost) with effectiveness (consumption).

- Total passengers per vehicle (PASS/VEH) measures system ridership and capacity utilization.

- Revenue passengers per revenue vehicle hour (PASS/RVH) measures revenue passengers per unit of produced service.

- Passengers (revenue passengers) per service area population (PASS/SAP) measures the penetration of transit within area served.

- Percent population serviced (% POP SER) measures the accessibility of transit to the area's population.