A STUDY OF THE FUNDING OF PUPIL TRANSPORTATION IN VIRGINIA

by

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Dissertation submitted to the Graduate Faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

in

Educational Administration

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November, 1981

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ACKNOWLEDGEMENTS

I wish to express my gratitude to Dr. David Alexander and Dr. Richard Salmon, co-chairmen, for the time and effort they devoted to directing and guiding this study. Appreciation is also expressed to the other members of the Committee--Dr. William H. Cochran, Dr. John C. McLaulin and Dr. Kenneth Underwood--for their assistance. I was fortunate to have such an outstanding Committee direct my study.

The cooperation and assistance of , , and of the Virginia Department of Education was appreciated. Also, the assistance provided by of the Norfolk Public Schools was helpful.

My special thanks to for his invaluable assistance and to for her excellent work in typing my dissertation.

Finally, I wish to thank my family and friends for their support and encouragement during this endeavor.

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Chapter 1

INTRODUCTION

Pupil transportation in this country evolved from the educational needs of pupils living in sparsely populated areas. In the early days of public education, schools were placed as close as possible to the pupils which contributed to the creation of very small school districts throughout most of the United States. However, all pupils were not within walking distance of a school, and some form of transportation to school was necessary.

Initially, pupil transportation was considered the responsibility of the parent, and the schools were not officially involved in the problem. As public education grew and the need for pupil transportation increased, many school districts began to provide transportation for pupils. It was a common practice for the school district to charge the pupil a monthly fee for the service.

Two movements in public education created the need for extensive pupil transportation services and helped justify the need for both local and state funding: compulsory attendance laws and the consolidation of school attendance areas. Many states used the consolidation

concept to justify legislation authorizing pupil transportation at public expense.

The first law authorizing the expenditures of public funds for pupil transportation was enacted by Massachusetts in 1869.[1] Eighteen states had enacted transportation laws by 1900; and by 1919, pupil transportation at public expense was legal in all states.[2] This resulted in increased spending for pupil transportation; and by 1920, states were spending over 14.5 million dollars for pupil transportation.[3]

Pupil transportation has grown considerably since 1920; and most of the growth, about 75 percent, has taken place since World War II.[4] The continuation of the school consolidation movement, especially during the late 1940s and the 1950s, was a major factor in its rapid development. As a result of the consolidation movement, the number of school districts decreased from a high of approximately

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[1]E. Glenn Featherson and D. P. Culp, Pupil Transportation (New York: Harper and Row, 1965), p. 2.

[2]J. F. Abel, Consolidation of Schools and Transportation of Pupils, U. S. Bureau of Education Bulletin, No. 41 (Washington: Government Printing Office, 1923), p. 22.

[3]Ibid., p. 58.

[4]E. Glenn Featherson, "School Transportation: The Things A School Board Should Know," American School Board Journal, 157:5:15, November, 1969.

125,000 in the 1930s to 16,014 in the fall of 1978.[5] The growth of suburban areas adjacent to large cities and pupil transportation at public expense within cities also contributed to the increase in pupil transportation. More recent factors affecting its growth have been court-ordered busing to desegregate schools and the transportation of handicapped pupils.

Pupil transportation has become one of the fastest growing aspects of public education. In 1970-71, more than nineteen million pupils were transported in 245,608 vehicles.[6] During 1973-74, nearly 1.9 billion dollars, or 3.7 percent, of all public education expenditures was spent for pupil transportation.[7] By 1975-76, the number of pupils transported had increased to over twenty-two million and the number of buses had increased to 312,000.[8] Expenditures continued to increase; and in 1977-78, slightly more than

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[5]W. Vance Grant and Leo J. Eiden, Digest of Educational Statistics, 1980, National Center for Educational Statistics (Washington: Government Printing Office, 1980), p. 59.

[6]"Growth in School Transportation in the United States," School Bus Fleet, 13:6:66, December/January, 1978.

[7]W. V. Grant, "Statistic of the Month: Transportation of Public School Pupils," American Education, 12:1:back cover, January, 1976.

[8]"Growth in School Transportation in the United States," p. 66.

2.7 billion dollars was spent for pupil transportation.[9] Statistics for 1978-79 indicate that nearly twenty-three million pupils were transported at public expense in 323,333 buses at a cost (including capital outlay) of over 3 billion dollars.[10] School busing has become the largest single transportation system in the country.

NEED FOR THE STUDY

The increased interest in pupil transportation financing has been generated, in part, by the tremendous expenditures for the service. School districts in Virginia spent more than 75 million dollars for pupil transportation during the 1978-79 school year.[11] Dramatic increases in the cost of fuel, equipment, salaries, and insurance are causing transportation costs to rise dramatically. In view of these increases, methods of financing pupil transportation will likely receive increasing attention as public pressure mounts to insure full value for all educational expenses.

A national review of state pupil transportation programs reveals many different approaches to the problem

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[9]Grant and Eiden, p. 74.

[10]"School Bus Statistics," School Bus Fleet, 25:6:64, December/January, 1981.

[11]Virginia Department of Education, Annual Report of Pupil Transportation, 1978-79 (Richmond: State Printing Office, 1980), p. 7. (The Department is hereafter referred to as VDE.)

of funding pupil transportation. Although pupil transportation costs and the ability to pay for them usually vary considerably among the school districts of a state, the sound principles of fiscal equalization are not used extensively in pupil transportation. However, some states have recently developed and adopted distribution formulas which provide for fiscal equalization. The recently developed equalization formulas take into account factors beyond the control of the local board which affect pupil transportation costs.

Variations in per pupil transportation costs among school districts of a state are dependent upon several factors. Some factors are beyond the control of the local board of education, while others can be influenced by board policies. Factors related to transportation costs which are used or have been used in state transportation plans include road conditions, topography, geographic locations, equipment depreciation, salaries, number of pupils transported, bus miles traveled, number of buses used, size of buses, capital outlay, assessed valuation, the number of transported pupils per bus mile, the number of transported pupils per square mile, and expenditures. Most states utilize several of these factors in the distribution of funds to the local school districts. However, recent studies in West Virginia, Illinois, Tennessee, Florida, and

Indiana have indicated that the major factor beyond the control of the local board of education affecting transportation costs is the number of transported pupils per bus route miles traveled (linear density). Unfortunately, the pupil transportation formula used in Virginia does not take into consideration the density of transported pupils in the determination of the local district's entitlement.

During the 1978-79 school year in Virginia, the transportation cost per pupil per year ranged from a high of $520.43 in Norfolk,[12] to a low of $26.86 in Covington. The state average was $82.52 for public-owned service and $119.08 for contracted service. The percent of operation cost received by school districts from state funds ranged from a high of 63.55 percent in Colonial Beach to a low of 17.34 percent in Norfolk. The average percent of operation cost received by school districts from the state categorical transportation fund was 31.99 percent in 1978-79.[13]

In view of the wide variation per unit in transportation costs and the per unit operation cost reimbursed by the state (irrespective of fiscal capacity), an analysis of factors

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[12]The $520.43 per pupil per year is the cost of public-owned transportation which serves special education and vocational pupils exclusively. Regular pupils were transported on a contract basis at a cost of $121.99 per pupil per year.

[13]VDE, Virginia Report of Pupil Transportation, p. 17.

causing such variations appears to be needed. Also, the state distribution plan should be studied to insure that it provides for the equitable distribution of transportation funds to all school districts in the state.

The funds required for transportation, which are not reimbursed by the state, are funds that could be denied the instructional program of a school district. Therefore, it can be argued that the greater the transportation needs and costs, the more the instructional program may suffer in school districts facing a serious shortage of revenue.

PURPOSE OF THE STUDY

The purpose of this study was to examine the pupil transportation program in Virginia relative to those used in the fifty states, to examine variations in transportation costs among Virginia's school districts, and to analyze the present pupil transportation funding method and alternative funding plans in relation to recognized principles of pupil transportation finance.

STATEMENT OF THE PROBLEM

Considerable variations in per pupil expenditures for pupil transportation, as well as diverse economic and geographic conditions within the state, led to an analysis of the funding of pupil transportation in Virginia. In

conjunction with the analysis, the following questions were addressed:

1. What types of funding plans are used for pupil transportation in other states, and what are the valid, established criteria which may be used to evaluate state pupil transportation programs?

2. How adequately does the Virginia pupil transportation program meet valid, established evaluation criteria?

3. What factors contribute to the variation in the per pupil expenditures for pupil transportation services among the school districts of Virginia, and which factor or combination of factors is the best predictor of per pupil expenditures for transportation?

4. What alternate funding plans should be considered for use in Virginia, and what are the fiscal implications of such plans for the school districts and the state?

DEFINITION OF TERMS

ADA of Transported Pupils

Virginia's pupil transportation funds are distributed, in part, on the basis of an equal amount for each pupil transported in average daily attendance (average number transported daily) in school buses meeting the standards and specifications of the State Board of Education.

Area Density

Area density is the number of transported pupils per square mile. It is computed by dividing the ADA of transported pupils by the number of square miles of the area served.

Average Daily Mileage

In the distribution of Virginia's pupil transportation funds, the average daily mileage is computed for each bus from the point where the first pupil is picked up in the morning to the point where the last pupil is discharged in the afternoon, including regularly scheduled trips between schools, but excluding all special trips and excursions. If the length of a bus route is changed during the year, the average of the daily mileage shall be used.

Capital Outlay

In the compliation of Virginia's Annual Report of Pupil Transportation, capital outlay is limited to expenditures for the purchase of school buses which increase the total number in the fleet. Any increase in this total must be covered by a capital outlay expenditure.

Local Composite Index

The composite index (LCI) is a measure of a school district's ability to pay for public education. The LCI is used as a factor in the distribution of basic state

aid to the local school districts. The LCI is composed of 50 percent true values of property and public service corporations, 40 percent personal income, and 10 percent taxable retail sales. The divisor is weighted two-thirds for ADM and one-third for total population in the school district.

Cost of Replacement

In the compilation of Virginia's Annual Report of Pupil Transportation, replacement costs are limited to expenditures for the purchase of school buses which do not increase the total number in the fleet.

Deadhead Miles

Deadhead miles represent school bus mileage from the storage area to the point where the first pupil is picked up in the morning and the mileage back to the storage area from the point where the last pupil was discharged in the afternoon.

Equity in Financing Pupil Transportation

The intent of the equalization concept is to extend state aid for pupil transportation with regard to both need and fiscal capacity. Factors beyond the control of local school districts which cause a substantial

variation in per pupil transportation costs are considered.

Linear Density

Linear density is the number of transported pupils per mile of bus route. It is computed by dividing the total average daily attendance of transported pupils by the total number of one-way miles pupils were transported on regular routes.

Net Operating Cost of Transporting Pupils

In the compilation of Virginia's Annual Report of Pupil Transportation, net operating costs are actual expenditures for transportation service less gas tax refunds.

Regular Transportation Funds

In Virginia, funds appropriated to reimburse districts for the operation of department-inspected school buses are classified as regular transportation funds.

Special Transportation Funds

In Virginia, funds appropriated to provide aid to districts which provide for the free transportation of pupils by public transportation are classified as special transportation funds.

LIMITATIONS OF THE STUDY

This study dealt primarily with analyzing the distribution of regular transportation funds. Funds distributed to school districts which were identified in determining the transportation costs of basic state aid (Standards of Quality) were not included. Payments to parents in lieu of transportation service and payments to other school districts for pupil transportation were not considered, because the cost of such services and the number of students involved were insignificant. Also, capital outlay expenditures and bus replacement costs were not considered, because these expenses fluctuate widely from year to year within each school district.

Transportation costs for special trips, extracurricular activities, summer school, and federal programs were not considered, because the state does not reimburse for these expenditures. In addition, the deadhead miles traveled by school buses were not considered, because the state does not allow such mileage in the reimbursement plan.

The extra costs inherent in transporting handicapped pupils were not specifically addressed in this study. Transportation services for the handicapped are included in the regular transportation program, and separate data were not available.

ORGANIZATION OF THE STUDY

Chapter 1 presented a brief introduction of the development of pupil transportation services in the United States, the need for the study, the purpose of the study, the problem, definition of terms, the limitations of the study, and the organization of the study.

Chapter 2 presents a review of the literature related to pupil transportation funding with special emphasis on the types of funding models, factors affecting costs, and criteria used to evaluate transportation programs. This chapter also reviews the growth and development of pupil transportation and presents the findings of a national survey of state pupil transportation programs.

Chapter 3 presents a comprehensive review of Virginia's pupil transportation program.

Chapter 4 provides a description of the research design and the methodology used in the study.

Chapter 5 contains an analysis of the data.

Chapter 6 reports the summary, conclusions, implications, and recommendations.

Chapter 2

REVIEW OF RELATED LITERATURE

GROWTH AND DEVELOPMENT OF PUPIL TRANSPORTATION

The Tenth Amendment of the United States Constitution provides, in part, that education in this country is a state function. However, schools had their origin as a function of the church, and the shift from church to state control was a slow process. Once the states began to assume the responsibility for public education, pupil transportation became a concern for both the state and local school districts. Although most localities attempted to build small schools and locate them within walking distance of the pupils, some pupil transportation became necessary.

The parents were responsible for providing transportation during the early years of public education when attendance was voluntary. States, however, began to assume the position that the welfare of the state required that all children receive some education and subsequently passed compulsory attendance laws. States were then obligated to make school attendance possible by either locating a school within walking distance or providing transportation for the pupil.

Although early education laws authorized the use of public funds for education, the use of the funds for pupil transportation was not specifically included. As the need for pupil transportation increased, new laws which specifically addressed the problems of pupil transportation were needed. In the interim, local school districts often provided pupil transportation services without the legal authority to do so. Initially, such practices resulted in court cases which tested the legality of providing pupil transportation services. In early court cases, the right to transport pupils was upheld by the courts under the general powers of the school board to operate schools; while in other cases, it was denied on the basis that there was no authority to transport in the absence of specific legal authorization.[1]

Although public school leaders were interested in the concept of pupil transportation at public expense as early as 1840, it was 1869 before the State of Massachusetts enacted legislation authorizing the spending of public funds for pupil transportation. The act was important, because it established pupil transportation as a legitimate part of the tax program of a community.

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[1]Harold H. Punke, Law and Liability in Pupil Transportation (Chicago: University of Chicago Press, 1943), p. 6.

By 1880, pupil transportation at public expense had been authorized in two additional states: Vermont and Maine. And from 1881 through 1894, four more states, New Hampshire, Connecticut, Ohio and Florida, enacted similar legislation.[2]

The movement for local and state funding of pupil transportation gathered momentum as educators began to recognize pupil transportation as a fundamental component of the educational program. During the years from 1895 through 1910, twenty-five additional states passed laws authorizing the use of public funds for pupil transportation. However, many of the state laws permitted pupil transportation at public expense only as a result of school closings.

In approximately eighteen states, the legislation authorizing pupil transportation at public expense was a part of the school consolidation laws. It was not economically feasible to provide the quality of education parents wanted for their children in the small, rural schools; therefore, many states established programs designed to reorganize and consolidate school attendance areas. Most states accepted the responsibility to resolve the problem created by reorganization and consolidation of school

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[2]Everette Michael Latta, "The Statutory Beginning - Pupil Transportation in the U. S.," American School Board Journal, 154:27-28, February, 1967.

districts. That is, if small schools are closed and the pupils are required to attend another school, the state has an obligation to assist in providing transportation for the pupils affected by the change.

By the end of 1910, thirty-two states had passed laws authorizing public funds for pupil transportation, and the remaining sixteen had done so by 1919. Although it was now legal in all states, the degree of involvement by the states in pupil transportation varied considerably. The extent of state involvement in pupil transportation depends upon the degree to which the state delegates responsibilities to the local school districts.

In discharging the responsibility for public education, states found it necessary to create local administrative units, subject to the state's laws and regulations, to assist in administering the educational program. In conjunction with this concept, states had to decide which functions could best be fulfilled at the state level and which would be best served at the local level. The states vary considerably in the amount of responsibility for pupil transportation that was delegated to the local school districts. The degree of involvement ranges from virtually total control of pupil transportation at the state level to the delegation of all responsibility to the local school districts. However, most states assumed a moderate position

between these two extremes by dividing approximately equal responsibilities and control between the state and local levels.

Once the legal issue had been settled, pupil transportation programs were to become an indispensable aspect of public school programs. However, its evolution was sluggish during the years prior to the development of motor vehicles. As late as 1920, the horse-drawn wagon was the vehicle most frequently used for pupil transportation.[3] The motor-driven vehicle had limited use for pupil transportation in the early 1900s, and it was not until the twenties that the shift to the motorized school bus began to occur. Not surprisingly, the development of pupil transportation has closely paralleled the evolution of motor vehicles and the development of our road system.

In 1920, only 356,000 pupils, or 1.7 percent of the total school enrollment, were transported at public expense.[4] Pupil transportation costs and ridership increased continuously during the next thirty years; and by 1950-51, seven million pupils were served at a cost of approximately 200 million dollars. During the next seven

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[3]Everette Michael Latta, "It's Been Going for a Century," American School Board Journal, 157:5:30, November, 1969.

[4]Leo E. Buehring, "Key Words Are Still Safety and Economy," The Nation's Schools, 65:5:72, May, 1960.

years, from 1950 to 1957, the number of pupils transported increased to 11.3 million riders, which represented more than 32 percent of public school enrollments.[5] Ten years later, 1967-68, pupil transportation costs had risen to 820 million dollars, which represented 3.2 percent of the total expense for education.[6]

More recent figures indicate that in 1976, 22,757,316 pupils, or 55.1 percent of the total public school enrollment, were transported at public expense.[7] In 1977-78, national pupil transportation costs totaled $2,731,041,000, which represented 3.38 percent of the total expenditure for public education.[8] During the 1978-79 school year, 22,882,191 pupils were transported at a cost of $3,341,035,199.[9]

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[5]Ibid.

[6]E. Glenn Featherson, "School Transportation: The Things a School Board Should Know," American School Board Journal, 157:15, November, 1969.

[7]Nancy B. Dearman and Valena White Plisko, The Condition of Education, Statistical Report - National Center for Educational Statistics (Washington: Government Printing Office, 1979), p. 160.

[8]W. Vance Grant and Leo J. Eiden, Digest of Educational Statistics, 1980, National Center for Educational Statistics (Washington: Government Printing Office, 1980), p. 74.

[9]"School Bus Statistics," School Bus Fleet, 25:6:64, December/January, 1981.

Contained in Table 1 (at four-year intervals from 1940 through 1976) are the number and percent of public school pupils transported at public expense and the expenditures for the service. It should be noted that although the total number of pupils transported declined between 1972 and 1976, the percent of pupils transported and the cost for providing the service increased substantially.

Displayed in Table 2 are the number of pupils transported, the total number of buses used, and the expenditures for all states during the 1978-79 school year. Excluding the District of Columbia and United States Territories, New York had the largest and most expensive pupil transportation program. On the other end of the continuum, Alaska transported the smallest number of pupils and used the fewest buses. However, the states with the smallest expenditures for pupil transportation were Hawaii (7.6 million), Nevada (9.6 million), and Vermont (9.7 million).

FISCAL MODELS USED IN FUNDING PUPIL TRANSPORTATION

Since the inception of state aid for pupil transportation, states have experimented with various fiscal models for distributing state transportation funds. Variations in the models developed include the Morrison Theory of total state funding, the Strayer-Haig Theory of uniform local effort, and the Updegraff Theory of financial incentives for

Table 1

Number and Percent of Public School Pupils Transported at Public Expense and Current Expenditures for Transportation: School Year Ending 1940 to 1976

School year ending	All public school pupils	Pupils transported at public expense		Expenditure of public funds	
		Number	Percent of total	Total, excluding capital outlay (in thousands)	Average cost per pupil transported
1940	25,433,542	4,144,161	16.3	$ 83,283	$ 20.10
1944	23,266,616	4,512,412	19.4	107,754	23.88
1948	23,944,532	5,854,041	24.4	176,265	30.11
1952	26,562,664	7,697,130	29.0	268,827	34.93
1956	27,740,149	9,695,819	35.0	353,972	36.51
1960	32,477,440	12,225,142	37.6	486,338	39.78
1964	37,405,058	14,475,778	38.7	673,845	46.55
1968	40,827,965	17,130,873	42.0	981,006	57.27
1972	42,254,272	19,474,355	46.1	1,507,830	77.43
1976	41,274,308	22,757,316	55.1	2,371,814	104.22

Source: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, Digest of Education Statistics, 1977-78.

Note: Data on pupil transportation through 1952 are based upon enrollment; data for 1956 and subsequent years are based upon average daily attendance.

Table 2

Statistics on School Transportation
1978-1979

State	Number of Enrolled Pupils Transported at Public Expense	Total Number of Buses	Expenditure of Public Funds for Transportation Including Capital Outlay
TOTALS	22,882,191	323,333	$3,341,035,199
Alabama	460,395	6,305	40,996,697
Alaska	35,176	580	15,654,215
Arizona	173,771	2,661	35,200,761
Arkansas	269,815	4,149	30,830,186
California	854,284	17,793	189,952,849 (1
Colorado	238,000	4,200	14,605,037 (1
Connecticut	386,200	4,500	34,667,900 (3
Delaware	90,715	1,204	15,375,439
D.C. (3	2,000	142	3,439,991
Florida	749,886	6,709	91,283,458
Georgia	765,000	8,400	65,000,000
Hawaii	37,092	693	7,666,978
Idaho	113,422	1,868	14,431,022
Illinois (3	742,000	16,000	135,000,000
Indiana	685,787	8,151	70,926,079
Iowa	283,340	6,626	47,110,482
Kansas	164,902	4,750	30,679,054
Kentucky	469,703	6,947	59,222,282
Louisiana	574,346	7,008	68,402,392 (1
Maine	175,275	2,288	24,030,854
Maryland	488,479	4,810	80,742,025
Massachusetts	640,533	7,811	106,400,617 (1
Michigan	1,100,000	14,000	220,000,000
Minnesota	856,218	9,469	98,524,313
Mississippi	370,108	5,732	41,187,771
Missouri	483,059	8,715	76,379,394 (1
Montana	56,396	1,608	16,920,058
Nebraska	74,631	3,213	23,160,879
Nevada	55,248	820	9,697,709
New Hampshire	110,000 (4	1,920	10,668,030 (1

Table 2 (continued)

State	Number of Enrolled Pupils Transported at Public Expense	Total Number of Buses	Expenditure of Public Funds for Transportation Including Capital Outlay
New Jersey	650,000	11,800	116,568,828
New Mexico	125,302	2,036	21,263,388
New York	2,215,533 (2	23,034	443,255,920
North Carolina	742,734	12,129	59,543,968
North Dakota	49,485	1,589	14,330,606
Ohio	1,367,184	13,188	147,516,881
Oklahoma	292,178	5,295	41,213,312
Oregon	255,186	4,121	47,497,000
Pennsylvania	1,511,553	18,669	202,203,511
Rhode Island	83,309	1,361	14,661,991
South Carolina	403,573	6,863	35,926,259
South Dakota	50,850	1,593	10,565,666
Tennessee	607,882	6,365	52,538,804
Texas	805,765	17,482	126,821,132
Utah	108,500	1,215	15,687,100
Vermont	77,195	1,050	9,758,997
Virginia	759,652	9,060	75,117,297
Washington	391,955	5,632	86,576,508
West Virginia	292,111	2,867	44,299,067 (1
Wisconsin	548,429	7,966	86,427,685
Wyoming	38,034	946	11,104,807
Manitoba, CAN	61,302	1,800	15,495,268
Mariana Islands	1,194	10	45,000
Agana, Guam	31,000	205	3,778,901
Hato Rey, Puerto Rico	158,959	1,400	9,100,000

* Not all states reporting
(1 Does not include capital outlay
(2 Includes New York City
(3 77-78 data
(4 12 districts not reporting
(5 Estimate

Source: December/January 1981, School Bus Fleet
Note: This table was modified by deleting the number of vehicles used according to type and ownership.

increasing local financial effort.[10] In an early publication, Barr grouped the early developers of pupil transportation formulas into two groups: those concerned with measures of need and those concerned with measures of fiscal ability.[11]

Barr cited the following developers who utilized measures of need in developing pupil transportation formulas. Paul R. Mort, in 1926, developed a formula expressing the cost of providing transportation and suggested that population density might be a factor related to the need for transportation. Robert L. Burns, in 1927, developed an objective formula which included the number of pupils transported, the average daily attendance, the areas of a district, and the number of schools. Clayton D. Hutchins, in 1938, used the number of pupils transported, the density (number of pupils per mile of bus route or the number of pupils residing in a square mile) of transported pupils, and the road conditions as factors related to transportation expenditures. Asael C. Lambert, in 1938, determined transportation needs in relation to the school organization

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[10]Dewey H. Stollar and Kenneth C. Tanner, "Student Transportation Study for the State of Indiana," Indiana School Finance Study, (February, 1978), p. 12.

[11]W. Monfort Barr, American Public School Finance (New York: American Book Company, 1960), pp. 338-340.

factor, reasonable walking limits, distribution of pupils, the time factor, road conditions, bus speed, land-use pattern, and geographical patterns. William P. McClure, in 1948, developed a single measure (sparsity factor) based on the land area of a county and the average daily attendance of pupils. Francis G. Cornell and others, in 1949, used density of dwellings per square mile and concentration of population as a measure of transportation need.

Barr cited Gerichs and Wells as advocates who used various measures of local taxpaying ability as a basis of equalizing pupil transportation support. Gerichs and Wells, who conducted several Indiana studies, were instrumental in changing the state transportation formula so that it included both a sparsity factor and a fiscal capacity factor. The state grant-in-aid varied directly with sparsity of pupils and inversely with the fiscal capacity of the school district.

Featherson and Culp grouped the various methods of determining the state's share of transportation costs into four categories: First, the local entitlement is based on a fixed amount for each pupil transported; second, the local entitlement is based on part or all of the cost of transportation, usually with specific limitations; third, the local entitlement is based on the average pupil transportation cost of local school divisions over several years;

fourth, local entitlement is based on a formula containing factors that have a relationship to variations in the cost of transportation.[12]

Stollar and Tanner, in their Indiana study, presented and critiqued six models for financing pupil transportation.[13] Model one, no state aid for pupil transportation, discriminates against districts with scattered population and high transportation costs, retards school consolidation, and retards the equalization of educational opportunity.

The merit of model two, a state flat grant per pupil transported regardless of the various conditions in the district, depends on how near the flat grant approaches the average cost of transportation in the state. However, since the transportation costs may vary from district to district, this model discriminates against the district with high transportation costs and rewards a district with low transportation costs. This model has two variations: The state pays all of the flat amount guaranteed, or the state and local districts share in providing for the flat amount guaranteed. The local share of the flat amount is in proportion to the district's financial ability, which tends to equalize the cost.

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[12]E. Glenn Featherson and D. P. Culp, Pupil Transportation (New York: Harper and Row, 1965), pp. 63-64.

[13]Stollar and Tanner, pp. 12-17.

Model three, full recognition of the varying costs of transportation beyond the control of the local board of education (density, wage levels, and related factors), is a major improvement over model two. However, in order to be fully equitable, the state formula must provide the full necessary cost of student transportation as determined by an equitable formula. It eliminates the inequities among districts due to variations in the percentage of the students transported and the costs per student. However, if the full necessary costs of transportation are not provided, the formula is inequitable to the extent that it does not provide for the full cost. This program encourages efficiency, because any transportation funds saved from the transportation allocation can be used for other purposes. This model has two variations: Transportation costs are included in the foundation program, and the costs are shared by the state and the local districts according to some type of equalization formula; or, the state pays the entire cost of transportation.

Model four, state ownership and operation of the transportation system, provides for the equalization of transportation costs. It has the advantage of providing the same standard of service for all districts. However, decisions involving transportation would be removed from the local level and placed at the state level. Many authorities consider this to be an important disadvantage.

Model five, state payment of the entire approved cost of transportation, as in models three and four, has the advantage of equalizing transportation costs. The state could pay the entire cost or share the cost with local districts in accordance with an equalization formula which considers the taxpaying ability of the local school district. This model has the disadvantages of removing transportation decisions from the local level and creating a state transportation bureaucracy.

Model six, state payment of a fixed percentage of pupil transportation costs, places transportation decision-making at the local level. However, the percentage of transportation costs paid by a district is unequalized under this formula.

Jordan and Hanes, in a recent survey of state pupil transportation programs, collected data which indicated the factors used by states to calculate the distribution of state transportation funds. They listed the following factors used by states in distributing state aid for transportation in 1978: flat grant, transported pupils per square mile, transported pupils per bus route mile, assessed valuation, and per pupil expenditures.[14] Expenditures per

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[14]K. Forbis Jordan and Carol E. Hanes, "A Survey of State Pupil Transportation Programs," School Business Affairs, 44:5:134, May, 1978.

pupil appeared to be the most frequently used criterion in determining the amount of funds allocated, and efficiency or the average cost factor appeared to be in effect in nineteen states.[15]

The average cost concept utilizes the density of pupils and the average expenditure per pupil for transportation in each school district as the basis for calculating the allocation.[16] Under this concept, school districts with the same density index would receive a proportion of their predicted cost. If the actual expenditures of a school district were less, the balance of the funds could be used for other purposes, and the district would thereby be rewarded for its efficient operation of the transportation program. However, if the actual expenditures exceed the predicted costs, the district must provide the difference.

A density/cost efficiency model, which was recommended in a West Virginia study, provides for equitable treatment of school districts with varying socioeconomic and geographic conditions by adjusting for the single most important nonmanipulative factor associated with variations in noncapital outlay cost per pupil among districts

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[15]Jordan and Hanes, pp. 134-136.

[16]Ibid., p. 135.

(density).[17] Under this concept, the curve of best fit between cost and linear density should be computed annually. Also, efficiency indices for all school districts are computed by dividing predicted cost per transported pupil by actual cost.[18]

The density/cost efficiency concept provides a direct monetary incentive for efficiency in local transportation management. Since funding is based on average costs adjusted for density, districts with expenditures above the average level represented by the density/cost efficiency curve are reimbursed for a lower proportion of costs than districts whose efficiency is above average. Districts whose costs are well above or below predicted levels are identified. State assistance could be offered to districts whose pupil costs are well above the predicted level to identify possible inefficient practices. Districts with costs well below average could be checked to verify that the service is adequate.

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[17]Kern Alexander and others, "Our Children's Educational Needs: Reforming School Finance in West Virginia," Report to the Educational Finance Study Commission of the West Virginia Legislature, 1977, p. 190.

[18]Ibid., p. 188.

FACTORS AFFECTING PUPIL TRANSPORTATION COSTS

There are extreme variations among the states in the amount spent for pupil transportation. Obviously, the total expenditures for pupil transportation are closely related to the number of pupils transported. Some states transport more than 50 percent of their pupils, while other states transport only slightly more than 11 percent.[19] The variation in the percentage of pupils transported appear closely related to the extent of urbanization in the state as well as the size of administrative units and attendance areas. States with many large urban centers usually do not transport as large a percentage of students as states with extensive rural areas. However, states which are predominately rural with small administrative units and attendance areas do not transport a high percentage of pupils.

Some factors affecting pupil transportation costs are beyond the control of the local school district, while others can be controlled or influenced by the local board.[20] It is generally accepted that some school districts must pay more for student transportation than others, due to factors

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[19]Featherson and Culp, p. 58.

[20]Ibid.

beyond their control.[21] State formulas frequently include one or more factors related to costs, such as the number of pupils transported, density of transported pupils, road conditions, the number of buses used, bus miles traveled, and capital depreciation factors.

Several decades ago, road conditions had some effect on transportation costs. However, at the present time, this has ceased to be a significant factor beyond the control of the school board which affects transportation costs.[22]

Except for the number of pupils transported, the factor most often used in computing local transportation needs is the density of the pupils to be transported, which is clearly beyond the control of the local board.[23] It has been recognized that the transportation costs per pupil varies widely among districts due to variations in the density of transported pupils.

Mort, as early as 1924, in his plan for measuring educational need, introduced the concept of pupil density in determining the need for pupil transportation. He realized

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[21]Roe L. Johns, State and Local Administration of School Transportation (New York: Columbia University Teachers College Bureau of Publications, 1928), p. 25.

[22]Roe L. Johns, "The Funding of School Transportation in Tennessee," The Education Finance and Management Institute, Inc., Gainesville, Florida, 1978, p. 8.

[23]Ibid.

that fiscal equalization programs must recognize that local communities have unusual expenditures for meeting general requirements due to causes over which a local community has little or no control. This concept required a consideration of transportation costs in sparsely settled communities.[24]

Burns, in 1927, attempted to develop an index capable of measuring pupil transportation needs which would serve as the basis for distributing state aid. He discovered that the school population density and percent of the average daily attendance of transported pupils were highly related. Therefore, believing that sparsely settled areas required transportation of pupils over longer distances than more dense areas, which resulted in higher transportation costs for the sparsely settled areas, he sought a measure of the average distance pupils were transported in each school district. This was used in his index as a weighting factor to be associated with cost. His final measure of need was the square root of the quotient obtained by dividing the area of the county in square miles by the number of school buildings. He concluded that the log of density of school population is a valid criterion for predicting per pupil

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[24]Paul R. Mort, The Measurement of Educational Need (New York: Columbia University Teachers College Bureau of Publications, 1924), p. 11.

transportation costs.[25]

Johns contended that Burns' method of determining transportation needs (based on the use of an undiscovered relationship between cost variations and area per school building as a weighting factor) is out of proportion to actual cost variations independent of the control of the local community.[26] He also suggested that the state would not have adequate control over state transportation funds.

Johns tested the hypothesis that density of population, a principal factor affecting cost, can be used as an independent variable to predict cost.[27] In a study of transportation funding in five states, he recognized that a county could have a low overall population density but have most of its population in a few centers; thus, its transportation needs would be relatively small as compared with agricultural counties of the same density that do not have population centers.

In a recent West Virginia study, the relationship between per pupil transportation costs and density of

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[25]Robert L. Burns, Measurement of the Need for Transporting Pupils (New York: Columbia University Teachers College Bureau of Publications, 1927), pp. 18-19.

[26]Johns, State and Local Administration of School Transportation, p. 11.

[27]Ibid., p. 25.

transported pupils, road conditions, wage rates, dispersion of school buildings and economies of scale was examined to determine if these factors may result in variations among districts on necessary cost per transported pupil.

> Statistical analysis of these factors indicated that linear density was the best predictor of noncapital outlay cost per pupil and the relationship between cost and density in West Virginia was curvilinear with cost diminishing as density increases.[28]

In an Illinois study conducted to find methods of disbursing state aid for student transportation which would encourage cost effectiveness and efficiency, factors related to differences in transportation costs were analyzed. These factors included the number of students transported, total bus miles traveled, area of districts, and the cost to transport eligible pupils between home and school. Variables were constructed from these data items and included the cost per eligible pupil, the cost per bus route mile, area density, and linear density. There was little relationship between any of the factors and transportation cost except between the cost per bus route mile and linear density. Although the correlation between the independent variables and the cost per bus route mile was very high, the use of cost per bus route mile for use in the Illinois formula was discarded. The number of bus miles traveled was considered

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[28]K. Alexander, p. 192.

a factor which was very susceptible to manipulation at the local level. Consequently, the use of this as a predictable variable in a formula to determine reimbursement for transportation costs would be inappropriate.[29]

Johns, in his Tennessee study, indicated that the density of transported pupils is about the only factor beyond the control of local school boards which significantly affects transportation costs.[30] He reached the same conclusion in his Florida study and stated that a state formula should provide for variations in per student transportation costs due to factors beyond the control of local boards, and density of transported students per bus mile is the principal noncontrollable factor causing variations in student transportation costs.[31]

Johns and Alexander allude to a lack of development and funding of state finance formulas with correction factors for transportation which overcome the handicaps arising from

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[29]Mary P. McKeown, "An Efficiency-Oriented Funding Formula for Pupil Transportation," Journal of Education Finance, 4:227, Fall, 1978.

[30]Roe L. Johns, "The Funding of School Transportation in Tennessee," p. 8.

[31]Roe L. Johns, "An Analysis of the Present State Formula for the Allocation of State Funds for Student Transportation with Special Reference to the Transportation of Exceptional Students," The Education Finance and Management Institute, Inc., Gainesville, Florida, March, 1979, p. 31.

sparsity of population. They further contend that there are several determinants of transportation costs which have either been ignored or treated inadequately in state finance plans, and the degree of population sparsity is a major one.[32]

The density of transported students can be measured in terms of students per lineal mile of bus route or by the density of transported students per square mile. However, Johns' Tennessee study concluded that density measured by transported pupils per lineal mile of bus route is a better measure than density of transported pupils per square mile.[33]

Featherson and Culp agreed that density expressed as the number of miles of bus travel necessary for each student transported is considered to provide a more accurate picture of the transportation burden of a local school district than by computing the number of pupils per square mile.[34]

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[32]Roe L. Johns and Kern Alexander, Alternative Programs for Financing Education, National Education Finance Project, Gainesville, Florida, 1971, p. 47.

[33]Roe L. Johns, "The Funding of School Transportation in Tennessee," p. 25.

[34]Featherson and Culp, p. 58.

Another factor affecting transportation cost is the wage level of the local community. In urban and suburban areas where wages are high and employment is readily available, higher salaries are usually paid to all school board personnel. Although salaries affect transportation costs, little attempt has been made by states to incorporate this factor into distribution formulas. Also, there are authors, including Johns, who in the Tennessee study considered salaries a factor within the control of the local board.[35]

Johns, in his Florida study, contends that a state transportation formula should not provide for controllable factors which cause variations in the per pupil cost of school transportation. He listed the following controllable factors which affect transportation costs:

1. Efficiency of bus routing.

2. The number of nonhandicapped pupils transported who live less than two miles from school.

3. The extent of the use of school buses for educational trips.

4. The extent of the use of school buses for extracurricular activities.

5. The salaries paid school bus drivers.

6. The efficiency of school bus maintenance.

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[35]Johns, "The Funding of School Transportation in Tennessee," p. 9.

7. Purchasing procedures.

8. The selection and training of school bus drivers.[36]

There are two major factors which affect the cost of student transportation, and both are within the control of the local school district: the quality of service provided and the efficiency of the program.[37] A school district can reduce transportation costs by sacrificing the quality of service provided.

CRITERIA FOR EVALUATING STATE PUPIL TRANSPORTATION PROGRAMS

During the past few decades, a period which represents the major growth in pupil transportation services, states have been experimenting with various methods of funding pupil transportation. However, Serrano-type litigation and the dramatic increases in the costs for transportation have caused a number of states to reevaluate their pupil transportation programs. As a result of such studies and related research, certain criteria have evolved for the evaluation and development of state pupil transportation programs.

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[36]Johns, "Analysis of Florida's Formula with Special Reference to the Transportation of Exceptional Students," p. 32.

[37]Featherson and Culp, p. 59.

Featherson and Culp, in 1965, specified certain basic principles which state transportation formulas must take into account:

1. The formula must take into account the factors which can cause a considerable variation in the justifiable cost of the service.

2. The state plan should be as simple as possible yet maintain accuracy.

3. The local school unit must not be able to control or manipulate the factors in the state formula.

4. State allocations for pupil transportation should be based on past experience.

5. The state plan should be as objective as possible.

6. The state formula should promote efficiency of operation on the part of the local unit.[38]

Stollar, in a national study of pupil transportation services conducted in 1971, used a set of criteria to judge the quality of a transportation program.[39] His basic criterion was that any state transportation formula must take into account the factors which cause a considerable variation in the justifiable costs of the service. The density of transported pupils, road conditions, and local wage levels are examples of such factors.

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[38]Featherson and Culp, pp. 64-67.

[39]Dewey H. Stollar, "Pupil Transportation," Planning to Finance Education, Vol. III, eds. R. L. Johns, Kern Alexander, and Forbis Jordan (Gainesville: National Education Finance Project, 1971), pp. 348-349.

A second criterion used by Stollar evolved from the need for simplicity in the pupil transportation formula. Simplicity may be necessary due to the level of accounting utilized by the local school districts and state departments of education. However, the formula should provide for varying costs between districts if these costs can be accurately determined. With a simple formula, calculations are simplified, record keeping is reduced, and clerical staff may be reduced.

Stollar's third criterion was that the factors in the state transportation formula cannot be manipulated at the local level.

> If a state uses such factors as number of buses, the number of bus or pupil miles traveled, or number of pupils transported, the state must exercise sufficient authority through standards, supervision, and auditing to prevent abuses.[40]

A fourth criterion by Stollar concerned the computations of allocations based on past experience. Stollar suggested that if a formula is based on past experience, the experience may have been based on inefficient operations and the resulting cost would be unnecessarily inflated. However, if averages are used for determining the prevailing conditions, the inefficient school district will be penalized, thereby encouraging it to strive for greater efficiency.

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[40]Stollar, p. 349.

His fifth criterion was the need for a state transportation program to be as objective as possible. While Stollar recognized that some subjective decisions cannot be avoided, he suggested that decisions at the local and state levels should be within specified policy guidelines.

In a 1977 Florida school transportation study, Johns presented the following features necessary for a desirable state transportation formula:

> 1. An equitable distribution of state funds to provide transportation for all pupils who need transportation.
>
> 2. Sufficient funds to provide a safe, efficient, adequate and economical pupil transportation program.
>
> 3. Relatively easy adjustment to compensate for inflation.
>
> 4. A simple formula with limited steps in computing funds for the local districts.
>
> 5. Full state funding of the defensible costs of pupil transportation.[41]

A year later, in his Tennessee study, Johns made one change in the desirable features of a state transportation formula: He deleted the full state funding of defensible pupil transportation costs and substituted as a desirable feature the provision for variations in transportation

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[41]Roe L. Johns, State Funding of School Transportation (Institute for Educational Finance, University of Florida, January, 1977), p. 8. Adapted in part from Financing the Public Schools of Florida, A study made by the National Education Finance Project, 1973, p. 337.

costs per pupil due to factors beyond the control of boards of education. Johns indicated that there should be no provision for variations in per pupil costs due to factors which boards can control.[42]

The New Mexico State Department of Education developed criteria for judging state transportation financing. They recommended that any state plan for financing pupil transportation should:

> 1. Provide sufficient state funds to enable the local unit, with reasonable local effort, to operate a safe, economical, efficient, sound, and practical system of transportation for all pupils who should be transported.
>
> 2. Tend to compensate for the additional burden that falls upon school districts which must provide pupil transportation (many school districts cannot assume additional costs from local sources).
>
> 3. Take into account provisions for capital outlay expenditure, such as purchase of school buses, school bus equipment, and safety equipment.
>
> 4. Provide for the amortization of capital outlay expenditures for school buses and equipment that meet state specifications, beyond the current year (preferably a four-year period).
>
> 5. Tend to stimulate the attainment of desirable standards for school bus equipment, maintenance and operation, and the employment of qualified personnel.
>
> 6. Permit at the local level, ready flexibility in making adjustments in the transportation program, such as in cases of emergency increases in number of pupils, reorganization, or consolidation of schools, which require in most instances additional transportation.

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[42]Johns, "The Funding of School Transportation in Tennessee," p. 17.

7. Require the local school districts or local administrative units to maintain adequate accounting records and reports.

8. Provide for consideration of factors beyond the control of local units, such as population density, road conditions and geographical barriers.

9. Not tend to discourage desirable reorganization of local units and attendance areas.

10. Provide for distribution of all state monies for transportation on an objective formula:

Capital Outlay
Maintenance and Operation
Drivers' Salaries

11. Encourage schools to broaden and extend the school program through the use of school buses, be they school-owned or contract buses.

12. Provide for subsistence for pupils in lieu of transportation, within reasonable limitations.[43]

Bernd, in a 1975 study, identified four major criteria suitable for evaluating state transportation programs. The four criteria identified in his study were validity, reliability, objectivity, and efficiency.[44]

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[43]"Proposal for Financing School Transportation in New Mexico," prepared by the Staff of Division of Transportation, Department of Education, State of New Mexico, 1964, as quoted in Dewey H. Stollar, "Pupil Transportation," Planning to Finance Education, Vol. III, R. L. Johns, Kern Alexander, and Forbis Jordan, eds. (Gainesville: National Education Finance Project, 1971), pp. 358-359.

[44]Cloyd McKinley Bernd, "A Study of State Aided Pupil Transportation Programs for Colorado" (Doctoral dissertation, University of Colorado, 1975), p. 63.

Farley and Alexander used the following criteria to evaluate the Kentucky transportation program:

> 1. A state formula must take into account factors which cause variations in determining and justifying the cost of transportation services. (They considered the density of transported population, road conditions and the wage level of the area as factors causing cost variations.)
>
> 2. The formula should be simple but take into account variations in cost between districts, providing such costs can be accurately determined.
>
> 3. The factors used in determining transportation costs cannot be manipulated by local school personnel.
>
> 4. State transportation programs should be as objective as possible.
>
> 5. A state transportation formula should promote efficiency in the local pupil transportation program. State department personnel must monitor local programs to insure that safe, adequate service is not sacraficed for the sake of economy.[45]

Leo Casey, an advocate of equitable state funding of pupil transportation, indicated that the critical test of any state plan of financial support is not in the method of computation but is in the adequacy of allowance to those school districts which have limited local resources and substantial transportation needs.[46] Casey suggested that local transportation policies should consider the following

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[45]Gene C. Farley and M. D. Alexander, "Foundation Program Transportation Study," Financing the Public Schools of Kentucky (Gainesville: National Education Finance Project, 1973), pp. 25-26.

[46]Leo M. Casey, School Business Administration (New York: The Center for Applied Research in Education, Inc., 1967), p. 93.

criteria:

1. Safety. The first consideration of pupil travel must be the safety of the pupils. This should not be compromised in the design or operation of transportation.

2. Adequacy. The level of service, the equipment, and staffing must be adequate to provide for the needs of the community and its youth.

3. Economy. Since the program is supported by public funds, expenditures for transportation must reflect careful consideration of economy.

4. Efficiency. Related to economy is the requirement that service, personnel, and equipment be deployed in such a manner as to achieve maximum performance.

5. State laws and regulations. Local policy must support and implement the mandatory elements of state statutes and regulations.[47]

According to Jordan and Hanes, the following criteria are accepted as important considerations in the design of an equitable state support program for school district pupil transportation programs:

1. Recognition of factors contributing to the variations in transportation expenditures among school districts: school programs, geographical variations, and pupil density differences.

2. Utilization of actual expenditures data in the development of the support level and the allocation process.

3. Recognition of the costs associated with transportation of different groups of pupils: regular, handicapped, and vocational.

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[47]Ibid., pp. 93-94.

4. Utilization of a rational calculation process that reflects simplicity, accuracy, and objectivity so that equality may be maintained among all school districts in a state.

5. Utilization of a process that precludes the possibility of data manipulation by school district personnel.

6. Promotion of efficiency in the operation of school district transportation programs.[48]

Finally, from the West Virginia educational finance study:

> . . . generally recognized criteria for evaluating alternative methods of funding pupil transportation center around the critical concepts of adequacy of programs, efficiency in local transportation management, equity among districts with diverse socioeconomic and geographical conditions, and simplicity and objectivity in the administration of the funding mechanism.[49]

A SURVEY OF CURRENT STATE PUPIL TRANSPORTATION PROGRAMS

Pupil transportation information was solicited from all states in an attempt to review the funding plans and features of current state pupil transportation programs. Forty-six states responded to the initial request, and a second request resulted in returns from the remaining four

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[48]Jordan and Hanes, pp. 134-135.

[49]Kern Alexander and others, "Our Children's Educational Needs: Reforming School Finance in West Virginia," Report to the Educational Finance Study Commission of the West Virginia Legislature, 1977, p. 190.

states. The letter used to request the pupil transportation information is shown in Appendix B.

Table 4 was developed to summarize the key characteristics of the various state programs. The task of constructing a table which would capture the essence of fifty diverse state programs under limited headings proved difficult. Some program characteristics were easily categorized while other program characteristics were unique to the state and did not lend themselves to easy classification. For example, it was not uncommon for state funding plans to meet the criteria for more than one fiscal model. The information shown in Table 3 deals primarily with regular pupil transportation and does not attempt to include the special provisions for transporting handicapped pupils, vocational pupils, and the miscellaneous elements of state transportation programs.

Most of the headings used in Table 4 are self-explanatory; however, several fiscal models used as the basis for the allocation of state funds are defined to clarify their use in Table 4. The equalization concept/formula recognizes the variations in transportation costs due to factors beyond the control of the local board and attempts to equalize the distribution of funds by taking one or more of the following factors into consideration: linear density, area density, road conditions, geographic regions, assessed valuation, and variations in wage levels.

Table 3

Factors Used by States to Distribute State Aid for Pupil Transportation in 1978-79

Factors	Frequency of Use
Expenditures	29
Number of Students	24
Bus Mileage	20
Size of Bus	10
Bus Replacement	10
Number of Buses	9
Assessed Valuation	9
Area Density	8
Bus Depreciation	8
Driver Salary/Bus Hours	7
Bus Insurance	4
Road Conditions	4
Linear Density	3
Geographic Regions	2

Source: Writer's survey of state pupil transportation programs.

Table 4

Funding Characteristics of State Pupil Transportation Programs

State	Fiscal Models (Basis for Allocation)					Factors Used to Determine Local Entitlement														Distance Eligibility (Miles)		Remarks
	Equalization Concept/Formula	Percentage Grant	Flat Grant	Approved Cost	State-Owned/ Operated	Linear Density	Area Density	Road Conditions	Geographic Regions	Assessed Valuation	Bus Replacement	Number of Students Transported	Bus Depreciation	Number of Buses	Size of Buses	Bus Insurance	Bus Mileage	Driver Salaries/ Bus Hours	Expenditures	Other	Elementary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Alabama	x						x					x							x		2	2	The counties are grouped into 11 density groups.
Alaska		x		x							x								x		1½	1½	The state reimburses up to 100% of actual operational costs (including special education transportation), 90% of capital expenditures, and 50% of cost of hazardous route transportation.
Arizona			x														x				1	1½	Transportation aid is based on computations involving .27 per daily route mileage and total bus mileage.
Arkansas	x						x			x		x		x	x					[a]x	2	2	[a]The state provides aid for drivers and mechanics who attend workshops.
California	x						x			x	x		x	x	x			x	x		[c]½ [d]1	2	Districts may receive state transportation funds and, in addition, may charge students to ride the bus.
Colorado		x	x														x		x		b	b	Entitlement based on a flat grant per mile and 20% of any amount by which district's expenses exceed the per mile entitlement.
Connecticut	x	x	x							x		x							x		[c]1 [d]1½	2	Entitlement computation varies with type of board (local or regional). Within town transportation entitlement based on 50% of total cost (not to exceed $30 per pupil).

Table 4 (continued)

State	Fiscal Models (Basis for Allocation)					Factors Used to Determine Local Entitlement														Distance Eligibility (Miles)		Remarks
	Equalization Concept/Formula	Percentage Grant	Flat Grant	Approved Cost	State-Owned/ Operated	Linear Density	Area Density	Road Conditions	Geographic Regions	Assessed Valuation	Bus Replacement	Number of Students Transported	Bus Depreciation	Number of Buses	Size of Buses	Bus Insurance	Bus Mileage	Driver Salaries/ Bus Hours	Expenditures	Other	Elementary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Delaware	x			x					x												1	2	The maximum reimbursement is the amount computed on the basis of an approved district-operated formula or a contract formula.
Florida	x					x						x					x				2	2	The formula is recomputed annually.
Georgia	x		x						x		x			x	x	x	x	x	x		1½	1½	Allocations are based on information established by surveys conducted by the state transportation staff.
Hawaii					x																b	b	Pupil transportation is fully state funded and operated.
Idaho	x	x	x							x			x			x			x	[a]x	1½	1½	(a)Administrative allowance entitlement is 85% of the difference between the total allowable cost and the estimated proceeds of a tax levy of one mill applied to the adjusted value of taxable property, but it shall not exceed $10 per month per transported pupil.
Illinois	x		x							x		x	x						x		1½	1½	The minimum claim for a district is the formula amount or $16 times the ADM of transported pupils, whichever is greater.
Indiana	x					x				x		x									1	1	An eligible kindergarten pupil is counted as one-half an eligible pupil for reimbursement purposes.
Iowa				x															x		2	3	Transportation funds are included in the State Foundation Aid Formula and vary according to the district valuation.

Table 4 (continued)

State	Fiscal Models (Basis for Allocation)					Factors Used to Determine Local Entitlement														Distance Eligibility (Miles)		Remarks
	Equalization Concept/Formula	Percentage Grant	Flat Grant	Approved Cost	State-Owned/ Operated	Linear Density	Area Density	Road Conditions	Geographic Regions	Assessed Valuation	Bus Replacement	Number of Students Transported	Bus Depreciation	Number of Buses	Size of Buses	Bus Insurance	Bus Mileage	Driver Salaries/ Bus Hours	Expenditures	Other	Elementary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Kansas	x			x			x					x							x		2½	2½	Entitlement is 100% of the formula per pupil cost or 100% of the per pupil cost, whichever is lower.
Kentucky	x						x					x							x		1	1	The state is divided into nine density groups.
Louisiana			x												x		x	x			1	1	Entitlement is based on a minimum salary schedule for bus drivers, which varies according to the bus size and the mileage driven.
Maine		x									x								x		2	2	In fiscal year 1979, transportation operating costs were based on 90% of prior year (one-year old) costs; and, in fiscal year 1980, it is to be based on 100% of base year (known two-year old) costs.
Maryland	x		x					x				x		x	x	x	x	x	x	[a]x	e½ f1	1½	[a]State provides an administrative allowance which includes salaries, travel, and inservice. The age of the bus is also a factor in computing local entitlement. Density is also a factor; however, it relates to a trip mileage allowance.
Massachusetts			x	x								x							x		1½	1½	The state reimburses the district the full amount expended for regional school transportation. Cities or towns are paid the sums required for approved expenses in excess of $5 per annum per pupil in the net average membership of such town.

Table 4 (continued)

State	Fiscal Models (Basis for Allocation)					Factors Used to Determine Local Entitlement														Distance Eligibility (Miles)		Remarks
	Equalization Concept/Formula	Percentage Grant	Flat Grant	Approved Cost	State-Owned/ Operated	Linear Density	Area Density	Road Conditions	Geographic Regions	Assessed Valuation	Bus Replacement	Number of Students Transported	Bus Depreciation	Number of Buses	Size of Buses	Bus Insurance	Bus Mileage	Driver Salaries/ Bus Hours	Expenditures	Other	Elementary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Michigan		x										x		x			x		x		1½	1½	School bus depreciation and insurance are included as part of the district's allowable expenditures. The state reimburses up to 75% of allowable costs.
Minnesota	x						x			x		x	x						x	[a]x	1	1	Effective with the 1979-80 school year, the state adopted a new regression formula for computing local entitlement. Other factors considered in predicting a district's cost include area of district in square miles, ADM, and the [(a)]percent of enrollment transported.
Mississippi	x		x				x				x	x									1	1	The allocation is based on an amount per pupil according to a density rate schedule for each school district.
Missouri		x										x					x		[a]x		1	1	A district shall receive an amount not greater than 80% of the allowable costs with a ceiling of 125% of the state average of the second preceding school year. [(a)]Bus depreciation and insurance are included in the total allowable expenditures.
Montana			x												x		x			[a]x	3	3	Entitlement is based on $.40 per bus mile for fiscal year 1978 and $.45 for fiscal year 1979. [(a)]Rate may be adjusted according to size of bus and percentage of ridership in relation to bus capacity.

Table 4 (continued)

State	Fiscal Models (Basis for Allocation)					Factors Used to Determine Local Entitlement															Distance Eligibility (Miles)		Remarks
	Equalization Concept/Formula	Percentage Grant	Flat Grant	Approved Cost	State-Owned/ Operated	Linear Density	Area Density	Road Conditions	Geographic Regions	Assessed Valuation	Bus Replacement	Number of Students Transported	Bus Depreciation	Number of Buses	Size of Buses	Bus Insurance	Bus Mileage	Driver Salaries/ Bus Hours	Expenditures	Other	Elementary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Nebraska			x									x									4	4	Transportation reimbursement is included as part of the Equalization Aid. The reimbursement is based on a flat rate per pupil, and the amount varies with the grade level of the student transported.
Nevada		x																	x		b	b	Eighty-five percent of the historic expenditures for pupil transportation is provided by the state. Actual expenditures for the previous two-year period serve as the base.
New Hampshire																							There is no state aid for pupil transportation.
New Jersey		x															x		x		2	2½	In 1979-80, the state paid 90% of the district's approved transportation cost.
New Mexico	x		x					x			x		x	x	x		x	x	x	[a]x	g_1	$h_{1½}$ i_2	The state has a formula for privately owned school buses and a formula for school-owned buses. [a]Administration and supervision allowance.
New York		x																	x		1½	1½	The state pays 90% of approved transportation costs. A school district may not receive more than 107% of the transportation paid in the previous year; however, there are exceptions for excess transportation costs.

Table 4 (continued)

State	Fiscal Models (Basis for Allocation)					Factors Used to Determine Local Entitlement															Distance Eligibility (Miles)		Remarks
	Equalization Concept/Formula	Percentage Grant	Flat Grant	Approved Cost	State-Owned/ Operated	Linear Density	Area Density	Road Conditions	Geographic Regions	Assessed Valuation	Bus Replacement	Number of Students Transported	Bus Depreciation	Number of Buses	Size of Buses	Bus Insurance	Bus Mileage	Driver Salaries/ Bus Hours	Expenditures	Other	Elementary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
North Carolina				x				x				x					x			[a]x	1½	1½	[a]In effect, pupil transportation funds are allocated according to the needs of the school district.
North Dakota			x									x			x		x				b	b	The state pays a flat rate per mile and per pupil per day. The rate varies with the size of the bus.
Ohio			x								x	x					x				1	1	Local entitlement is based on a flat rate per pupil or per mile, whichever is greater. The state has a separate rate for board-operated buses and contracted service.
Oklahoma	x	x					x					x									1½	1½	1978-79 Formula: Per capita allowance x average daily haul x 110% = state aid for transportation (114% for 1979-80).
Oregon		x																	[a]x		b	b	The state pays 60% of the total approved transportation cost. [a]Bus depreciation and insurance are included in the approved cost total.
Pennsylvania	x		x							x		x	x	x	x		x	x	x	[a]x	1½	1½	The state uses two formulas: district-owned and operated transportation and pupil transportation by contract. [a]The age of the bus is a factor in the contracted reimbursement formula.

Table 4 (continued)

State	Fiscal Models (Basis for Allocation)					Factors Used to Determine Local Entitlement														Distance Eligibility (Miles)		Remarks
	Equalization Concept/Formula	Percentage Grant	Flat Grant	Approved Cost	State-Owned/ Operated	Linear Density	Area Density	Road Conditions	Geographic Regions	Assessed Valuation	Bus Replacement	Number of Students Transported	Bus Depreciation	Number of Buses	Size of Buses	Bus Insurance	Bus Mileage	Driver Salaries/ Bus Hours	Expenditures	Other	Elementary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Rhode Island	x									x									x		b	b	Transportation expenses are a factor in determining state share ratios for calculating state aid annual entitlements and are included in total local expenditures for reimbursement.
South Carolina					x																b	b	The only cost to the local school district is for supervision.
South Dakota		x	x														x		x		b	b	The district entitlement is 50% of its net transportation cost but not more than $.30 per mile.
Tennessee			x									x								[a]x	1½	1½	Sixty percent of the total state transportation appropriation is allocated on a per student basis. Forty percent is allocated on the basis of a ratio of the geographic area of each county to the total geographic area of the state, as computed in [(a)] square miles.
Texas	x		x					x						x	x		x				2	2	For 1978-79 and thereafter, the base cost reimbursement for each bus shall be 105.2% multiplied by the allowable total base cost for each bus during the 1977-78 school year. Percentage increases and reductions are allowed for road conditions and mileage which deviates from the standard state bus route.
Utah	x			x		x						x					x		x		1½	2	The state uses a regression equation formula to compute local entitlement.

Table 4 (continued)

State	Fiscal Models (Basis for Allocation)					Factors Used to Determine Local Entitlement														Distance Eligibility (Miles)		Remarks
	Equalization Concept/Formula	Percentage Grant	Flat Grant	Approved Cost	State-Owned/ Operated	Linear Density	Area Density	Road Conditions	Geographic Regions	Assessed Valuation	Bus Replacement	Number of Students Transported	Bus Depreciation	Number of Buses	Size of Buses	Bus Insurance	Bus Mileage	Driver Salaries/ Bus Hours	Expenditures	Other	Elementary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Vermont																							Vermont does not provide categorical aid for regular school transportation. Reimbursements are provided for transportation in connection with special education or vocational education services.
Virginia			x									x		x			x				1	1½	The state transportation appropriation is distributed as follows: 40% of the total on the basis of number of pupils transported, 40% of the total on the basis of miles traveled, and 20% of the total on the number of buses meeting state standards.
Washington		x									x		x				x	x	x		2	2	The reimbursement rate is calculated using total statewide reimbursable costs and total state transportation funds available. Under current regulations, this rate could not exceed 90%.
West Virginia		x									x					x			x		b	b	The transportation allowance is the sum of the following: 80% of transportation cost, exclusive of salaries; total cost of insurance; 10% of replacement value of bus fleet; 80% of cost of contracted and public utility service; and aid in lieu of transportation equal to state average per pupil.

Table 4 (continued)

State	Fiscal Models (Basis for Allocation)					Factors Used to Determine Local Entitlement														Distance Eligibility (Miles)		Remarks
	Equalization Concept/Formula	Percentage Grant	Flat Grant	Approved Cost	State-Owned/ Operated	Linear Density	Area Density	Road Conditions	Geographic Regions	Assessed Valuation	Bus Replacement	Number of Students Transported	Bus Depreciation	Number of Buses	Size of Buses	Bus Insurance	Bus Mileage	Driver Salaries/ Bus Hours	Expenditures	Other	Elementary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Wisconsin			x									x								[a]x	b	b	[a]Distance pupil transported.
Wyoming		x									x								x		b	b	The state reimburses the district for 3/4 of total operation/ maintenance cost and 1/6 of total cost for capital outlay for buses.
TOTALS	21	16	21	7	2	3	8	4	2	9	10	24	8	9	10	4	20	7	29	10			

Source: The writer's survey of current state transportation programs.

(a) Refer to the remarks column for explanation.
(b) There was no reference to eligibility distance cited in the information received from the state.
(c) Grades K-3
(d) Grades 4-8
(e) Pre-kindergarten and kindergarten
(f) Grades 1-6
(g) Grades K-6
(h) Grades 7-9
(i) Grades 10-12

The percentage grant model provides for the state to pay a fixed percentage of the district's approved transportation costs. Nationwide, the percentage of state reimbursement averages approximately 80 percent and is usually based on the previous year's expenditures.

The flat grant model provides a fixed monetary value for one or more of the following factors: the number of students transported, bus miles traveled, number of buses used, and the size of buses used.

In the approved cost model, the state pays the district's entire approved cost of pupil transportation. Under this model, the local district's approved costs are usually closely controlled by state requirements and regulations.

Among the factors used in Table 4 to determine local entitlement, several need to be clarified. Linear density is the number of transported pupils per mile of bus route. Linear density is computed by dividing the total number of eligible pupils transported by the bus route mileage. It should be noted, however, that states vary in the methods used to compute both eligible pupils and route mileage. For example, in a rather complex system, Florida determines the bus route mileage by adding one-half of the round-trip bus route mileage, one-half of the round-trip bus mileage between school centers for vocational and exceptional pupils,

and 50 percent of miles traveled without pupils. Indiana computes bus route mileage by doubling the total miles traveled from the first pickup point to the last point at which an eligible pupil disembarks at school. In another example, bus route mileage in Utah is determined by totaling bus route miles with pupils plus half of the bus route miles without pupils.

Area density is the number of transported pupils per square mile and is computed by dividing the number of eligible pupils transported by the number of square miles of the area served.

Transportation expenditures represent the transportation costs incurred by a local school district in providing transportation services to its pupils. Usually, the transportation expenditures are limited to current operation and maintenance costs; however, in a small number of states, transportation expense includes disbursements for capital outlay, bus depreciation allowances, and insurance premiums. States which include capital outlay and other costs in calculating their transportation expenditures are identified in Table 4.

Variations in wage levels of transportation employees, a component referenced in defining the equalization model, does not appear in the table, because the survey found no states using this factor in their distribution plan.

The state funding plans were categorized into one or more models: equalization, percentage grant, flat grant, approved cost, and state-owned and operated. Very few states, however, are utilizing the equalization concepts recommended in current research. Although twenty-one states used one or more of the equalization factors, only three used linear density as a factor in distributing transportation funds. Of the other equalization factors, four states continue to use road conditions, two states use geographic regions, eight states use area density, nine states use assessed valuation, and no state uses the variation in wage levels as a factor in determining local entitlement.

There are also considerable differences among states in the amount of financial support provided for pupil transportation. The degree of support ranges from no state aid in New Hampshire, state-owned and operated programs in Hawaii and South Carolina, and seven states paying basically all of the approved cost of transportation.

The percentage grant model is involved in sixteen state programs; however, only ten of the sixteen states use the percentage grant as the sole method of distributing transportation funds. Of the ten states, the percentage grant ranges from a high of 90 percent in Maine, New Jersey, New York, and Washington to a low of 60 percent in Oregon. The average percentage grant for the ten states was 82 percent.

The flat grant model is used by twenty-one states. The number of students transported and bus mileage are the factors used most frequently in conjunction with the flat grant model.

Table 3 indicates the various funding factors used by the states in 1978-79 to distribute state transportation aid and the frequency of use. Of the fourteen factors listed, expenditures, number of students, and bus mileage were by far the most frequently used. Of the ten factors that did not fit a specific classification (other), three involved an administrative allowance for transportation.

Nineteen states include pupil transportation funds in the basic support program; and in some instances, the funds are not identifiable. However, most states include pupil transportation funds in the pupil support services component of the budget.

Thirty-seven states have statutory provisions pertaining to minimum travel distances from school as a precondition for state aid. In twenty-seven states, a single minimum distance is used for all pupils; however, ten states maintain two or more distance requirements based on the grade level of the transported pupil. In four instances, states specify three distance requirements. The distance requirements range from a low of one-half mile for K-3 grades in California and pre-kindergarten and kindergarten in Maryland to a high of four miles in Nebraska. Nationwide,

travel distances average 1.5 miles for lower grades and 1.8 miles for secondary grades.

A large number of states specifically waive travel distance requirements for handicapped pupils and for students who are subjected to hazardous walking conditions. However, in most states, the minimum distance for reimbursement does not preclude a school district from providing transportation service but does result in the total cost of transporting these students coming from local funds. Also, eighteen states now make special provisions in the distribution of transportation funds to aid localities in transporting handicapped students.

The survey of current state pupil transportation programs revealed a wide variety of approaches in funding pupil transportation. Although most state programs can be considered unique, in many instances, contiguous states use similar approaches. An examination of the various methods used by the states to determine local entitlement for transportation resulted in the conclusion that many states use funding plans which are unduly complex and appear to provide little incentive for efficiency.

A trend toward efficiency-oriented, equalized funding appears to be developing. Several states have recently conducted transportation studies, and three states have adopted new efficiency-oriented funding formulas using

linear density as the major factor in predicting pupil transportation cost.

SUMMARY

This chapter reviewed the various fiscal models used in funding pupil transportation, the factors influencing pupil transportation costs, and the criteria for evaluating state transportation programs. Also included was the current status of state transportation programs throughout the country. The concepts derived from the literature provided the basis for analyzing Virginia's transportation program. The analysis of current state transportation programs provided alternative funding models which could be considered for use in Virginia.

Chapter 3

STATUS OF PUPIL TRANSPORTATION IN VIRGINIA

LEGAL BASIS

The only requirement that provides for pupil transportation in Virginia is contained in the state's compulsory attendance laws which exempt pupils from attending school unless transportation is provided for students living beyond certain distances from school. Article 4, Section 22.1-256 of the Virginia School Laws, declares:

> . . . the provisions of the compulsory attendance article shall not apply to children under ten years of age who live more than two miles from a public school, unless public transportation is provided within one mile of the place where such children live; nor to children between ten and seventeen years of age who live more than two and one-half miles from a public school, unless public transportation is provided within one and one-half miles of the place where such children live. Compulsory attendance distances are measured by the nearest practical routes, which are usable for either walking or riding, from the entrance to the school grounds or from the nearest school bus stop, to the residence of such children.[1]

The legal authority for the control and regulation of public school transportation in Virginia rests with the State Board of Education. Section 22.1-177 of the Virginia

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[1]Virginia School Laws, 1978 (Charlottesville: The Michie Company, 1978), p. 171.

School Laws grants the State Board the authority to adopt bylaws and regulations for school buses, and Section 22.1-178 authorizes the State Board to establish requirements for bus drivers.

Effective July 1, 1980, the General Assembly of Virginia amended Section 58-715 of the Virginia School Laws to include the refund to local school districts of all motor fuel taxes collected on fuel used by private contractor(s) in the transportation of students of these school districts. Each school district should receive exactly the tax revenues expended by the local contractor(s) on its behalf. All laws governing pupil transportation in Virginia are listed in Appendix A.

GROWTH AND DEVELOPMENT

School districts[2] have been providing pupil transportation in Virginia for more than seventy-eight years. Early records indicate that Accomack County, in 1902, used covered wagons for pupil transportation.[3] By 1912, twelve other school districts had begun transporting pupils.

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[2]Local administrative units in Virginia are called school divisions; however, they are identified as school districts in this study to comply with the terminology prevalent in the literature.

[3]VDE, Pupil Transportation in Virginia's School System (Richmond: State Printing Office, April, 1974), p. 1.

It was the policy of the State Board of Education that the consolidation of schools and the transportation of pupils under the County Unit Act be left to the local school boards. The County Unit Act of 1922 abolished the district system and appeared to give impetus to the growth of pupil transportation.[4] The school consolidation movement and road improvements led to further growth in pupil transportation during this period. By 1930, fifty-seven counties were providing some type of pupil transportation.[5]

The first expenditures for pupil transportation occurred in 1909-10, totaled $46,908.41, and involved forty-five counties and one city.[6] However, by 1919-20, pupil transportation expenditures had grown to over $153,000; and by 1929-30, exceeded one million dollars.

State aid was distributed through an Equalization Fund in 1930 and was designed, in part, to aid localities with transportation costs.[7] However, it was not until 1942 that Virginia appropriated funds specifically for pupil transportation ($500,000). The basis for distributing the first pupil transportation appropriation was one-half on the number of miles and one-half on the number of buses.[8]

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[4]Ibid.

[5]Ibid.

[6]Ibid., p. 2.

[7]Ibid.

[8]Ibid.

The number of pupils transported in Virginia has increased dramatically during the last four decades. Displayed in Table 5 are the number of pupils transported, the number of miles traveled, and the number of buses in operation from 1942-43 through 1978-79. Except for 1943-44, which reflected a decrease from the preceding year, the number of pupils transported increased consistently through 1976-77. However, similar to the decline in pupil population, the school years 1977-78 and 1978-79 showed decreases in the number of pupils transported. Interestingly, the number of pupils transported in 1972-73 represented approximately 70 percent of the state enrollment;[9] but in 1978-79, the percentage had increased to more than 75 percent.[10]

The total number of miles pupils have been transported has increased each year, with the exception of 1943-44. Although 1977-78 and 1978-79 had decreases in the number of transported pupils, the total bus mileage actually increased both years. Also, the number of buses increased each year, except for 1943-44. It should be noted that an unusual increase in the number of buses occurred in 1976-77. More than half of this increase can be directly attributed to the City of Norfolk changing to state-approved buses,

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[9]Ibid., p. 3.

[10]VDE, Annual Report, 1978-79 (Richmond: State Printing Office, January, 1980), p. 2.

Table 5

Virginia Pupil Transportation Statistics

Year	No. Pupils Transported	No. Miles Traveled	No. Buses
1942-43	184,102	18,805,680	2,414
1943-44	181,764	18,596,160	2,341
1944-45	188,521	19,249,020	2,349
1945-46	200,375	20,169,540	2,450
1946-47	219,414	20,779,393	2,520
1947-48	221,193	22,049,286	2,614
1948-49	233,000	23,469,421	2,710
1949-50	251,065	25,100,813	2,852
1950-51	275,544	26,947,850	3,052
1951-52	285,695	27,912,868	3,186
1952-53	301,830	29,651,327	3,351
1953-54	325,481	31,214,529	3,569
1954-55	347,369	32,906,599	3,750
1955-56	358,406	34,182,528	3,912
1956-57	376,357	35,832,041	4,089
1957-58	386,557	37,322,822	4,247
1958-59	411,104	38,673,818	4,439
1959-60	421,953	39,780,623	4,591
1960-61	445,510	41,875,609	4,834
1961-62	463,491	43,482,024	5,045
1962-63	486,933	45,168,896	5,258
1963-64	505,261	46,678,744	5,496
1964-65	524,857	48,346,744	5,769
1965-66	538,544	49,347,492	5,945
1966-67	555,829	50,824,192	6,157
1967-68	573,207	52,060,826	6,368
1968-69	598,773	54,624,083	6,599
1969-70	618,960	54,954,507	6,808
1970-71	636,172	56,600,653	7,047
1971-72	660,207	59,524,844	7,312
1972-73	669,313	61,387,385	7,521
1973-74	688,868	64,050,516	7,723
1974-75	718,831	66,365,758	8,017
1975-76	736,219	69,433,445	8,199
1976-77	762,016	72,553,030	8,681
1977-78	760,849	76,004,967	8,877
1978-79	759,652	78,276,159	9,060

Source: Virginia Department of Education
Note: This table contains some data that do not qualify for reimbursement.

which increased the total number of buses in the state by approximately 260.

Displayed in Table 6 is the amount appropriated, the net cost of operation, and the percent of reimbursement for pupil transportation from the years 1949-50 through 1978-79. Expenditures for pupil transportation in Virginia exceeded 75 million dollars during 1978-79, yet the state appropriation was less than 21 million dollars. Shown in Table 6 are data which support a continuing pattern of reduced state support for pupil transportation. Fiscal support from the state categorical transportation fund has decreased from a high of 81 percent reimbursement in 1949-50 to a low of 32 percent in 1978-79.

Contained in Table 7 are the average cost per pupil and the average cost per mile for pupil transportation in Virginia from 1949-50 to 1978-79. Except for 1954-55 and 1958-59, the average cost per pupil has increased each year. The increases from year to year were relatively small until 1973-74, when sizeable increases began to occur. A similar pattern is evident in the average cost per mile.

Table 8 indicates the rates at which pupil transportation funds have been distributed for the years 1949-50 through 1978-79. The table shows a rather erratic pattern of allocation with relatively small increases or decreases from year to year. However, in 1974-75, a fairly substantial increase was provided, which is reflected in the percentage

Table 6

Comparison of State Appropriation With Net Cost of Operating Approved School Buses in Virginia

Year	Appropriation (a)	Net Cost of Operation	Percent of Net Cost
1949-50	3,600,000.00	4,445,231.98	81.0%
1950-51	3,700,000.00	5,007,961.37	73.9%
1951-52	3,850,000.00	5,393,348,15	71.4%
1952-53	4,000,000.00	5,810,453.25	68.8%
1953-54	4,150,000.00	6,279,532.84	66.1%
1954-55	4,320,000.00	6,519,415.57	66.3%
1955-56	4,500,000.00	6,824,973.92	65.9%
1956-57	4,895,145.00	7,318,884.77	66.9%
1957-58	5,035,145.00	7,718,338.13	65.2%
1958-59	5,222,280.00	8,156,383.29	64.0%
1959-60	5,367,075.00	8,495,210.09	63.2%
1960-61	5,705,800.00	9,203,202.29	62.0%
1961-62	5,891,500.00	9,781,518.63	60.2%
1962-63	6,533,430.00	10,515,411.35	62.1%
1963-64	6,762,670.00	11,205,593.24	60.4%
1964-65	7,187,450.00	12,050,784.68	59.6%
1965-66	7,431,750.00	12,796,362.84	58.1%
1966-67	7,691,700.00	14,410,405.47	53.4%
1967-68	7,960,910.00	15,447,463.45	51.5%
1968-69	8,747,135.00	17,637,364.09	49.6%
1969-70	9,140,460.00	19,632,046.93	46.6%
1970-71	10,076,275.00	22,071,740.18	45.7%
1971-72	10,796,205.00	25,004,253.45	43.2%
1972-73	*11,800,000.00	27,188,819.87	43.4%
1973-74	*12,990,000.00	32,623,814.37	39.8%
1974-75	*15,933,889.00	39,088,906.66	40.7%
1975-76	*17,217,463.10	43,877,552.05	39.2%
1976-77	*18,631,950.00	51,474,310.55	36.2%
1977-78	*19,330,900.00	55,866,534.71	34.6%
1978-79	*20,374,210.00	63,695,847.89	32.0%

*Does not include reimbursement for transportation of pupils on transit buses in accordance with Section 22.1-186.

Source: Virginia Department of Education

(a) Categorical pupil transportation funds

Table 7

Average Per Pupil Transportation Cost
in Virginia

Year	Average Cost Per Pupil	Average Cost Per Mile
1949-50	$17.17	$ .177
1950-51	18.17	.185
1951-52	18.88	.193
1952-53	19.26	.196
1953-54	19.30	.201
1954-55	18.77	.198
1955-56	19.04	.199
1956-57	19.45	.204
1957-58	19.97	.207
1958-59	19.84	.211
1959-60	20.13	.213
1960-61	20.66	.220
1961-62	21.10	.225
1962-63	21.60	.233
1963-64	22.18	.235
1964-65	22.96	.249
1965-66	23.76	.259
1966-67	25.93	.284
1967-68	26.91	.297
1968-69	29.46	.323
1969-70	31.70	.357
1970-71	34.69	.390
1971-72	37.87	.420
1972-73	40.62	.443
1973-74	47.36	.509
1974-75	54.38	.589
1975-76	59.60	.632
1976-77	67.55	.710
1977-78	73.43	.735
1978-79	83.85	.814

Source: Virginia Department of Education

Table 8

Distribution of Categorical Pupil Transportation Funds in Virginia

Year	Per Pupil	Per Mile	Per Bus
1949-50	$ 6.18025	$ 0.06135	$ 260.11560
1950-51	5.89489	0.05896	251.78632
1951-52	5.59621	0.05732	248.54551
1952-53	5.60008	0.05732	244.94795
1953-54	5.53016	0.05649	238.99547
1954-55	5.33226	0.05565	234.91027
1955-56	5.20171	0.05507	235.99425
1956-57	5.46943	0.05752	244.02517
1957-58	5.35642	0.05641	240.28370
1958-59	5.41092	0.05613	237.53832
1959-60	5.25897	0.05607	236.08257
1960-61	5.41023	0.05744	238.98639
1961-62	5.29326	0.05633	235.04887
1962-63	5.64035	0.06015	249.74885
1963-64	5.55646	0.05993	247.89846
1964-65	5.65980	0.06137	250.60844
1965-66	5.66539	0.06165	251.71041
1966-67	5.72478	0.06247	252.22823
1967-68	5.72258	0.06267	250.19151
1968-69	5.95876	0.06648	265.58782
1969-70	6.10713	0.06733	268.95696
1970-71	6.45699	0.07241	286.54273
1971-72	6.80716	0.07538	297.33240
1972-73	7.09919	0.07771	313.12591
1973-74	7.73480	0.08280	337.37452
1974-75	9.22240	0.09696	401.10000
1975-76	9.58306	0.10180	424.44000
1976-77	9.75902	0.10227	431.54487
1977-78	10.07998	0.10319	437.54000
1978-79	10.64224	0.10371	452.18144

Source: Virginia Department of Education

of reimbursement in Table 6. Pupil transportation funds in Virginia are distributed on the basis of a flat grant per pupil, per mile, and per bus.

Virginia has a rather large pupil transportation program, which is due, in part, to the large percent of pupils transported. When compared to state programs nationwide, Virginia ranks sixteenth in total expenditures (including capital outlay) and ninth in the number of pupils transported.

PRESENT ALLOCATION METHOD

The basis for distributing pupil transportation funds in Virginia has remained relatively unchanged since 1942, when funds were appropriated specifically for pupil transportation. At that time, 50 percent of the fund was distributed on the basis of bus miles traveled, and 50 percent was distributed on the basis of the number of buses in operation. At the present time, the distribution of pupil transportation funds is based on a fixed amount per mile, per pupil transported, and per bus.

Pupil transportation funds in Virginia are distributed on the following basis:

1. Forty percent of the fund is distributed on the basis of an equal amount for each mile traveled in transporting pupils to and from the public schools in school buses meeting the standards and specifications of the State Board of Education.

Average daily mileage is computed for each bus only from the point where the first pupil is picked up in the morning to the point where the last pupil is discharged in the afternoon, including regularly scheduled trips between schools, but excluding all special trips and excursions. If the length of a bus route is changed during the year, the average of the daily mileage shall be used.

2. Forty percent of the fund is distributed on the basis of an equal amount for each pupil transported in average daily attendance (average number transported daily) in school buses meeting the standards and specifications of the State Board of Education.

3. Twenty percent of the fund is distributed on the basis of an equal amount for each school bus in daily use during the current year which meets the standards and specifications of the State Board of Education and which is operated in the transportation of pupils a minimum of twelve miles per school day; provided, that the minimum operation of twelve miles per school day shall not be applicable to small buses with a pupil capacity of twelve or less.[11]

The computation of the dollar value for pupils, miles, and buses by the state is as follows:

1. Compute 40 percent of the total appropriation for pupils.

2. Compute 40 percent of the total appropriation for miles.

3. Compute 20 percent of the total appropriation for buses.

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[11] VDE, Regulations Governing Pupil Transportation and Minimum Standards of School Buses in Virginia (Richmond: State Printing Office, July, 1975), p. 5.

4. Divide the pupil appropriation (step 1) by the total number of pupils (ADA) transported daily during the previous school year.

5. Divide the mileage appropriation (step 2) by the total miles that buses traveled (while pupils were on the bus) during the previous school year.

6. Divide the bus appropriation (step 3) by the total number of buses (meeting all requirements) operated as of November 10 of the current school year.

In addition to the categorical transportation fund, the state provides basic school aid to the local school districts. The state uses a basic aid formula to finance a minimal education program based on the local district's ability to pay with some incentive to spend more than the amount needed for a minimal program.

The method used to determine the annual cost per pupil for the minimal program takes three factors into consideration:

1. A ratio of 48 professional personnel for each 1,000 pupils in average daily membership.

2. The average annual salary of professional school employees throughout the state.

3. A certain amount per pupil for operation costs.

In calculating the per pupil cost for each year of the new biennium, actual costs for the previous two years

are determined by the state. The cost in 1978-79 was calculated by the state to be $1,060 per pupil, and the following breakdown indicates the cost factors used and the cost of each factor in determining the 1978-79 cost per pupil.

Personnel

Actual average salary	$13,867
Instructional personnel per 1,000 pupils (48)	.048
Per pupil cost of personnel	$666.00

Supporting Costs

Administrative	$ 18.49
Other instructional costs	88.42
Attendance and health services	11.54
Plant operation	128.29
Plant maintenance	68.45
Pupil transportation	56.18
School food services	11.65
Fixed charges	10.52
Per pupil cost of supporting services	$394.00

Total

Personnel cost	$ 666.00
Supporting cost	394.00
Per pupil cost	$1,060.00

It should be noted that the total per pupil cost included $56.18 per pupil for transportation; however, the local school district is not required to use this amount for pupil transportation. Also, districts that have no pupil transportation program receive basic aid grants.

The following formula is used to determine the state's share of the minimal program cost:

District's Average Daily Membership x Cost Per Pupil of Minimal Program = Cost of Minimal Program

Cost of Minimal Program - 1 Percent of District's Sales and Use Tax Based on School Age Population = Cost to be Shared by State and Locality

Cost to be Shared by State and Locality x Local District's Composite Index = Local District's Share of Cost

Cost to be Shared by State and Locality - Local District's Share = State's Share

The following regulations are relevant to the distribution of transportation funds:

1. No reimbursement shall be made for any bus which does not pass the regular inspections required by law, regulations of the State Board of Education and annual Department of Education regulation.

2. No reimbursement shall be made for buses or miles unless the bus transports pupils both from home to school and from school to home.

3. Pupils in grades kindergarten through twelve only shall be eligible for reimbursement.

4. No reimbursement shall be made for pupils or miles if transportation assistance is received from other state or federal sources.

5. Reimbursement shall be allowed for transporting pupils from an adjoining school division only when such arrangement has been mutually agreed upon by the school boards of the affected school divisions.

6. No county or city shall receive reimbursement in excess of the amount actually expended for transportation of pupils to and from the public school exclusive of capital outlay, replacement of buses, special trips, and gas refund during the preceding year.

(a) In making the distribution, calculations will be based on the number of pupils and miles for the preceding school year except in the case of the number of buses for which current figures will be used.

(b) The computation for reimbursement for school divisions during their first year of school bus operation shall be based on the number of pupils and miles for the current year.

7. Reimbursement shall be based upon the actual number of school days pupils are transported during the regular school session.[12]

Reimbursement from Special Transportation Funds is computed on the following basis:

For Counties or Towns: The amount of reimbursement for each pupil under the foregoing regulations shall not exceed the average per pupil reimbursement for the previous school year for each pupil transported by county or town school divisions that operate a school bus system.

NOTE: The average per pupil reimbursement for pupils transported by county or town school bus systems shall be determined by dividing the total reimbursement paid to all county or all town school divisions by the total average daily attendance of pupils transported in all county or town school divisions.

For Cities: The amount of reimbursement for each pupil eligible under the foregoing regulations shall not exceed the average per pupil reimbursement for the previous school year for each pupil transported by city school divisions that operate a school bus system.

NOTE: The average per pupil reimbursement for pupils transported by city school bus systems shall be determined by dividing the total reimbursement paid to all city school divisions by the total average daily attendance of pupils transported in all city school divisions.[13]

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[12]VDE, Regulations Governing Pupil Transportation and Minimum Standards of School Buses in Virginia, pp. 5-6.

[13]Ibid., p. 7.

The following regulations are pertinent to the reimbursement from Special Transportation Funds:

1. Funds will be available only for pupils attending the public schools in grades K through 12 in those school divisions not operating public school transportation systems for grades K through 12 for which other state aid is available.

2. Pupils for whom state aid from the Special Transportation Fund is requested shall be certified as enrolled and transported at public expense without cost to the individual, parents, and/or guardian.[14]

3. Reimbursement shall be available for pupils who are transported to and from public schools for the regular school session and will not be available for special trips and extracurricular activities.

4. In no case shall reimbursement exceed local school board expenditures of transporting such pupils.

5. In the event sufficient funds are not available to reimburse for the total number of pupils eligible, this fund shall be distributed on a pro rata basis.[15]

SUMMARY

This chapter provided a thorough explanation of Virginia's pupil transportation program. The legal basis for providing pupil transportation in Virginia, which is contained in the state's compulsory attendance laws, is

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[14](1979 Amendment) Local school boards shall be eligible for the same percentage of reimbursement of their expenditure for the transportation of eligible public school pupils on public transportation systems (transit) when part of the expense is borne by the pupil rider or parent.

[15]VDE, Regulations Governing Pupil Transportation and Minimum Standards of School Buses in Virginia, pp. 6-7.

reviewed. In addition, laws governing the regulation and control of the pupil transportation program in the state are presented.

Also provided in this chapter is the historical background of pupil transportation in Virginia as well as demographic, operational and fiscal data associated with its growth and development.

Chapter 4

DESIGN AND METHODOLOGY

STUDY DESIGN

The research design for the study was implemented in five phases:

1. Pupil transportation information was collected from all states in order to review the funding plans and features of current state pupil transportation programs.

2. Literature related to pupil transportation was reviewed to identify factors that contribute to variations in the cost of pupil transportation, to identify fiscal models used in funding pupil transportation, and to identify criteria for evaluating pupil transportation programs.

3. Virginia's present pupil transportation program was evaluated using the evaluation criteria developed in phase two.

4. Detailed pupil transportation data for 1978-79 were collected from all school districts in Virginia and analyzed. From the statewide pupil transportation data, the dependent/criterion and independent variables were selected for analysis. The best predictor(s) of cost was determined by using appropriate statistical analysis (such as Pearson product-moment correlation, stepwise multiple

regression, multiple regression, scattergrams, linear and quadratic equations) to examine the relationship between the selected dependent/criterion variable and various independent variables that contribute to variations in cost. The best predictor(s) of cost was used in an alternative funding formula(s).

5. Computer simulation was used to analyze the fiscal implications of the alternate plan(s) on the school districts and the state.

POPULATION

Comparative data were compiled for 126 of Virginia's 141 school districts. Fifteen cities and towns were excluded from the study, because they did not receive regular state aid for pupil transportation.[1] These districts did not qualify for regular state pupil transportation funds for the following reasons:

1. Other school districts provided transportation.
2. School buses utilized were not state approved.

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[1]The following Virginia school divisions did not receive regular state aid for pupil transportation during 1978-79:

James City	Buena Vista	Radford
Cape Charles	Emporia	Salem
Fries	Fairfax City	South Boston
Saltville	Harrisonburg	Staunton
Bedford	Hopewell	Waynesboro

3. City transit systems were utilized for pupil transportation.

4. No provisions were made by the school district for pupil transportation.

After analyzing the data from 126 school districts, eleven additional districts were deleted for various reasons.[2]

DATA COLLECTED

The following data for public-owned and contracted pupil transportation for the 1978-79 school year were collected and analyzed for all school districts. The data were grouped into three categories: allocation information, expenditure information, and geographic/population data related to factors affecting pupil transportation costs.

Allocation Data

1. The ADA of transported pupils for each school district.

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[2]Galax, Grayson County, Halifax County, and Norton were deleted due to involvement in inter-district busing which distorts their data. Bristol, Clifton Forge, Colonial Heights, and Lexington were not considered due to the extremely small size of their programs. Hampton was deleted because their secondary pupils are transported by the local transit company, and the data for the pupils are not included in the state report. Fredericksburg and Norfolk were deleted due to extensive contract busing service.

2. The total number of school buses in operation for each school district.

3. The total number of miles pupils were transported on regular routes of each school district.

4. The total number of days buses were operated for each school district.

5. The amount allocated by the state per mile, per bus, and for each pupil transported.

6. The total reimbursement of pupil transportation for each school district.

7. The percent of each school district's pupil transportation operation cost received from state funds.

8. Each school district's rank based on the percentage of operation cost received from the state.

Expenditure Data

1. The total pupil transportation operating cost (less gas tax refund) for each school district.

2. The total cost of pupil transportation (including bus replacement cost and capital outlay) for each school district.

3. The average cost for pupil transportation per pupil per year for each school district.

4. The average cost per mile for each school district.

5. The insurance cost, driver salaries, and other operation and maintenance costs.

Geographic/Population Data

1. The ADA of pupils for each school district.

2. The percentage of students transported for each school district.

3. The average miles traveled per bus per day for each school district.

4. The average number of pupils per bus for each school district.

5. The linear density of transported pupils for each school district.

6. The local composite index of each school district.

7. The area density of transported pupils for each school district.

Information regarding state pupil transportation programs, including funding formulas, was collected from all states.

SOURCES OF DATA

Data pertaining to pupil transportation in Virginia were collected from the following Virginia Department of Education reports, forms, and publications:

1. Annual Report of Pupil Transportation, 1978-79.

2. "Distribution of Pupil Transportation Fund, 1978-79," (School Budget Form No. 6).

3. "Annual Report of Pupil Transportation at Public Expense."

4. Superintendent's Memo No. 110, December 8, 1978.

5. Superintendent's Memo No. 67, March 24, 1978.

6. Superintendent's Memo No. 180, November 2, 1979.

7. "Funds Budgeted to Meet Required Expenditures for Operation," (School Budget Form No. 1).

Information regarding state pupil transportation programs was solicited and received from the fifty state superintendents of public instruction.

TREATMENT OF DATA

Data for this study were treated according to the following procedures:

1. The researcher reviewed the pupil transportation information received from the states; identified and categorized the funding models used; summarized the factors used to determine local entitlement; identified the distance eligibility used by the various states (state aid is only available for pupils who live beyond prescribed walking distances from school); and noted other pertinent state program characteristics. A table was used in Chapter 2 to display a summary of each state's program characteristics. The summary was used to aid in the identification of state

programs which could be considered for use in Virginia.

2. The researcher reviewed pupil transportation literature to identify sources which provided criteria for evaluating pupil transportation programs. A table was developed in Chapter 5 to display the various criteria identified in the literature. A criterion that was recommended by five or more sources was considered valid for use in evaluating pupil transportation programs. These criteria were used to evaluate Virginia's present pupil transportation program.

3. The pupil transportation data collected from the school districts were displayed in two tables for comparison and analysis. From this data, the dependent/criterion variable and the independent variables were selected and analyzed. The following procedures were used in the analysis:

a. The intercorrelations were computed among the variables by using Pearson product-moment correlation coefficient.

b. Stepwise multiple regression analysis and multiple regression using SPSS REGRESSION for OS/360, Version M, Release 8.1[3] and BMD 02R[4] programs were conducted

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[3]Norman H. Nie and others, Statistical Package for the Social Sciences (New York: McGraw Hill, 1975).

[4]W. J. Nixon, BMD, Biomedical Computer Programs (Berkeley, California: University of California Press, 1973).

to analyze the statistical relationship (strength of the relationship) between the dependent/criterion variable and the independent variables to determine the best predictor(s) of cost.

The following series of regressions were conducted:

(1) Stepwise multiple regression of all independent variables with data of all variables in the original form (untransformed) was conducted.

(2) Residuals were obtained on selected combinations of the best predictor variables from step one. Data of all variables were in the original form (untransformed).

(3) Stepwise multiple regression was conducted with selected independent variables omitted from the analysis. Data of all variables were in the original form (untransformed).

(4) Residuals were obtained on selected combinations of the best predictor variables from step three. Data of all variables were in the original form (untransformed).

(5) The same sequence of regressions (steps 1 through 4) was conducted but with all variable data transformed into common logarithm form.

(6) Multiple regressions were conducted on the best , second best, and combinations (pairs) of the best predictors of cost with all variable data transformed into the following forms: inverse, quadratic and logarithm.

(7) Stepwise multiple regression was conducted on the three independent variables used in the Virginia distribution formula. Data of all variables were in the original form (untransformed).

c. Scattergrams of the independent variables versus the dependent variable were plotted to check the forms of the relationship. The Y coordinate was used for the dependent/criterion variable, and the X coordinate was used for the independent variables.

d. Finally, using the best predictor of cost equation(s), the predicted cost was computed for each school district, compared with the actual cost, and the resulting residual listed to show the fiscal implications of each equation on all school districts used in the analysis.

SUMMARY

This chapter described the study design, identified the study population, outlined the data collected, indicated the sources of data, and explained the treatment of data.

Chapter 5

ANALYSIS OF DATA

SELECTION OF EVALUATIVE CRITERIA

From the review of literature, ten sources (listed in Table 9) were identified which provided specific criteria for judging the quality of pupil transportation programs. Among the sources were recognized authorities in the field of pupil transportation funding, the New Mexico State Department of Education, the National Educational Finance Project and the Educational Finance and Management Institute.

Table 9 summarizes the various evaluative criteria recommended for the evaluation of state pupil transportation programs. Eleven evaluative criteria were identified: adequacy, reliability, equity, simplicity, efficiency, objectivity, flexibility, program expansion, stimulation of state standards, utilization of expenditure data, and utilization of past experience. In most instances, the terminology used in the literature corresponded with the terms used in Table 9; however, in cases where the terminology differed, the concepts are comparable.

An evaluative criterion that was recommended by five or more sources was considered valid for use in this study. There were six terms that met this criterion:

Table 9

Selection of Criteria for Evaluating State Pupil Transportation Programs

Sources	Criteria										
	Adequacy	Reliability	Equity	Simplicity	Efficiency	Objectivity	Flexibility	Provide for Program Expansion	Stimulate State Standards	Utilize Expenditure Data	Utilize Past Experiences
1	2	3	4	5	6	7	8	9	10	11	12
D. H. Stollar and K. C. Tanner (Indiana Study)		x	x	x	x	x					
R. L. Johns (Tennessee Study)	x		x	x			x				
New Mexico State Department of Education	x	x	x			x	x	x	x		
C. K. Bernd (Colorado Study)		x	x		x	x					
G. C. Farley and M. D. Alexander (Kentucky Study)		x	x	x	x	x					
L. M. Casey	x				x				x		
K. F. Jordan and C. E. Hanes		x	x	x	x	x				x	
K. Alexander and others (West Virginia Study)	x		x	x	x	x					
E. G. Featherson and D. P. Culp		x	x	x	x	x					x
K. Alexander and J. Hale (Arkansas Study)	x		x	x	x	x					
TOTALS	5	6	9	7	8	8	2	1	2	1	1

Source: Writer's review of pupil transportation literature. See Chapter 2 for complete reference to all sources.

Note: Any criterion used five or more times was considered valid for use in this study. All valid criteria are defined in Chapter 5, Evaluation of Virginia's Pupil Transportation Program.

adquacy, reliability, simplicity, efficiency, objectivity, and equity.

EVALUATION OF VIRGINIA'S PUPIL TRANSPORTATION PROGRAM

The six evaluative criteria established in Table 9 were used to evaluate Virginia's pupil transportation program. Adequacy was the first criterion used in the evaluation process. When evaluating a program in terms of adequacy, the state plan should provide sufficient state funds to enable the local unit, with reasonable local effort, to operate a safe, economical, efficient, sound, and practical system of transportation for all pupils who should be transported.[1] With adequate state funding, local districts are not forced to divert funds from needed instructional programs to support an unreasonable share of the cost of pupil transportation. An adequate state program should also include provisions for funding capital outlay.

Two quantitative measures were used to judge the adequacy of Virginia's pupil transportation program. The

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[1]"Proposal for Financing School Transportation in New Mexico," prepared by the staff of Division of Transportation, Department of Education, State of New Mexico, 1964, as quoted in Dewey H. Stollar, "Pupil Transportation," Planning to Finance Education, Vol. III; eds., R. L. Johns, Kern Alexander and Forbis Jordan (Gainesville: National Education Finance Project, 1971), p. 358.

first measure was a nationwide comparison of state support for pupil transportation in terms of the percentage of reimbursement provided by the state. In a survey conducted by the American Association of School Business Officials' School Finance Research Committee, over 50 percent of the total transportation expenditures was provided by the state in thirty of the fourty-four states in which state transportation aid could be identified. The most frequent decile was the 60th; nine states provided 60-69 percent of total expenditures for pupil transportation.[2] Virginia's categorical transportation fund provided reimbursement for only 32 percent of the cost of pupil transportation in 1978-79.

The second measure used to judge adequacy was the percent of the state's education budget that is allocated for pupil transportation. In 1978-79, twenty-seven states provided categorical aid for pupil transportation. As a percent of the total education budgets of these states, categorical pupil transportation aid averaged 4.92 percent.[3] Virginia ranked twenty-second among the twenty-seven states by allocating only 2.54 percent of the state education budget for categorical pupil transportation funds.

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[2]K. Forbis Jordan and Carol E. Hanes, "A Survey of State Pupil Transportation Programs," School Business Affairs, 44:5:134, May, 1978.

[3]Esther O. Tron, Public School Finance Programs, 1978-79, Washington: U. S. Government Printing Office, 1980.

Comparatively speaking, Virginia's categorical transportation aid provides substantially less financial support than other states. As a result, it appears the local school districts in Virginia are required to provide an inordinate share of the cost.

Reliability was the second criterion used to evaluate the Virginia program. When evaluating in terms of reliability, the state plan should not permit the manipulation or control of the distribution factors at the local level. Reliability was measured qualitatively in relation to two questions. First, are reimbursement factors manipulable at the local level? Second, are reimbursement factors verified by audit?

Stollar contends that when factors such as the number of buses, number of miles, and the number of transported pupils are used, the state must exercise sufficient control through supervision and auditing to prevent abuses.[4] Also, a study of pupil transportation in Illinois recognized a high correlation between independent variables and the cost per bus route mile; however, the use of cost per bus route mile in the Illinois formula was terminated, because they did not want a manipulable factor in the formula.

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[4]Dewey H. Stollar, "Pupil Transportation," Planning to Finance Education, Vol. III, eds., R. L. Johns, Kern Alexander and Forbis Jordan (Gainesville: National Educational Finance Project, 1971), p. 349.

> The number of bus miles travelled is a variable which is very susceptible to manipulation at the local level. Consequently, the use of this as the predicted variable in a formula to determine reimbursement for the costs of transporting pupils would be inappropriate.[5]

Virginia's pupil transportation reimbursement is based on a fixed amount per mile, pupil and bus. The number of school buses used by each school district is audited annually by the state transportation staff during the annual school bus inspections. The number of buses, pupils transported and bus miles traveled are reported to the state by each school district on three forms: EB007, School Transportation Inventory and Record; EB008, Annual Report of Pupil Transportation at Public Expense; and EB012, Certificate of Pupil Transportation Data On Which State Funds Will Be Distributed.

In addition, much of the district's pupil transportation financial data and number of pupils transported are compared with the data on the state superintendent's annual report. However, the state does not conduct an on-site audit of the district's bus mileage or the number of pupils transported. It is not suggested that these factors are being manipulated; however, they are subject to manipulation at the local level.

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[5]Mary P. McKeown, "An Efficiency-Oriented Funding Formula for Pupil Transportation," Journal of Education Finance, 4:227, Fall, 1978.

The Virginia Department of Pupil Transportation has a staff of six (five administrators and one secretary). In a recent study of Kentucky's pupil transportation program, it was recommended that the Kentucky transportation staff be increased to fourteen.[6] The Kentucky program is considerably smaller than Virginia's--469,000 pupils transported as compared to 759,000 in Virginia during the 1978-79 school year. If proper auditing is to take place in Virginia, a larger staff will be required. However, a larger staff would not eliminate the possibility of manipulating the mileage factor at the local level.

Simplicity was the third criterion used in the evaluation. The state plan should be as simple as possible yet maintain accuracy.[7] With a simple formula, calculations are easily made, record keeping is reduced, and a clerical staff may be held to a minimum.

Virginia uses only three factors in the regular reimbursement plan: miles, pupils, and buses. Calculations involving these factors are simple, errors in computations should be minimal, and record keeping reduced when compared

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[6]Gene C. Farley and M. D. Alexander, "Foundation Program Transportation Study," Kentucky School Finance Study, 1973, p. 28.

[7]K. Alexander and others, p. 179.

to more complex plans. Therefore, it was concluded that the Virginia plan met this standard.

Efficiency was the fourth evaluation criterion to be considered. In terms of efficiency, the state plan should discourage extravagant expenditures and promote efficiency of operation on the part of the local school district by providing a direct monetary incentive for efficiency in local programs.[8] The state should also promote efficiency by establishing state purchasing contracts for buses, parts, and supplies. In addition, the state can aid local districts by disseminating information on efficient practices through inservice for transportation personnel.

Efficiency in local transportation programs may be promoted by utilizing some aspect of a state average cost in the state plan.[9] When funding is based on adjusted state average costs, districts with expenditures above the average are reimbursed for a lower proportion of costs than districts with below-average expenditures.[10] The same concept applies when the state uses an equalization formula to predict costs.

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[8]K. Alexander and others, p. 179.

[9]E. Glen Featherson and D. P. Culp, Pupil Transportation (New York: Harper and Row, 1965), p. 66.

[10]K. Alexander and others, p. 190.

The Virginia plan does not utilize the average cost or predicted cost concepts. Also, since all school districts receive an identical sum for each pupil, mile, and bus, the Virginia plan offers little or no monetary incentive for efficiency, because the state allocation is not based on a state cost average and is not equalized by taking other cost factors into consideration. The total state transportation appropriation is distributed by allocating 40 percent of the total for miles, 40 percent for pupils, and 20 percent for buses. The Virginia plan does aid efficiency, especially for the small districts, by establishing a state contract for the purchase of school buses which should lower their capital outlay and bus replacement cost. In addition, the state provides inservice training for transportation personnel, publishes comparative statistical data annually, and administers a safety program. It was concluded that Virginia's program partially fulfilled the efficiency criterion.

Objectivity was the fifth criterion used to evaluate Virginia's pupil transportation program. The state plan should be as objective as possible. Decisions at the local and state levels should be within broad policy guidelines, thereby avoiding decisions which reflect the values of the individual.[11] An objective state plan should allocate funds

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[11]Stollar, p. 349.

according to a predetermined formula which leaves no discretionary power in the hands of state officials.[12]

Virginia's pupil transportation reimbursement plan is very specific in the data to be submitted by the local school districts and the calculations used to compute local entitlement. The plan leaves little or no discretionary decisions in the hands of local or state officials. Therefore, it was concluded that Virginia's program met the objectivity criterion.

Equity was the final criterion used to evaluate Virginia's transportation program. To be equitable, the state plan must take into account the factors beyond the control of local school districts which cause a substantial variation in the justifiable cost of the service.[13] The density of transported pupils, road conditions, and local wage levels are examples of such factors. Recent studies in West Virginia, Illinois, Tennessee, Florida, Arkansas, and Indiana concluded that among the equity factors identified, linear density was the principal noncontrollable factor causing variations in pupil transportation costs.

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[12]Cloyd McKinley Bernd, "A Study of State Aided Pupil Transportation Programs for Colorado" (Doctoral dissertation, University of Colorado, 1975).

[13]Stollar, p. 348.

Virginia's reimbursement plan does not utilize any of the equity factors cited in current literature. It was, therefore, concluded that Virginia's program does not meet the equity criterion; however, specific findings related to factors affecting costs are discussed in greater detail later in this chapter.

In summary, Virginia's current allocation plan met the requirements for simplicity, objectivity, and partially fulfilled the requirements for efficiency but did not meet the standards for adequacy, reliability and equity. However, after analyzing the transportation data throughout the state and reviewing the plan in operation, certain aspects of the evaluation are discussed in greater detail in Chapter 6.

ANALYSIS OF FACTORS RELATED TO COST

In order to analyze the various factors that might influence the cost of pupil transportation, data were gathered from the 126 school districts that provided pupil transportation during 1978-79. Two tables were developed to depict the data.

Table 10 contains the following comparative data for each school district:

1. Average daily attendance of transported pupils (ADT)

2. Average daily transported as a percent of the district's total average daily attendance

3. Total number of buses in daily use which meet state standards

4. Average number of pupils per bus

5. Total miles pupils were transported on regular routes

6. Average miles per bus per day

7. Number of pupil transportation employees

8. Area density

9. Linear density

The data in Table 10 revealed an extremely wide range in the size of pupil transportation programs in Virginia. Fairfax County had the largest program: 81,791 pupils transported, 651 buses, and 8,436,240 route miles. In contrast, Colonial Heights had an ADT of 18 pupils and utilized one bus. However, most districts transported a very high percentage of their pupils.

Sixty-three districts transported more than 90 percent of their pupils; and in eight of these districts, the ADT was greater than 100 percent of the district's total ADA. In two instances, the districts were involved in intra-district busing, and the transported pupils from the other districts were included in their ADT data. The other districts did not provide an explanation.

Table 10

Comparative Pupil Transportation Data by District for 1978-79

District	ADA of Transported Pupils	ADT as a Percent of ADA	Total Number of Buses	Average Number of Pupils Per Bus	Total Miles Pupils Transported Regular Routes	Average Miles Per Bus Per Day	Number of Pupil Transportation Administrative and Service Personnel (Equated Full-Time)	Area Density	Linear Density
1	2	3	4	5	6	7	8	9	10
Accomack County	4,734	88.7	79	60	837,720	59	83.1	9.95	2.03
Albemarle County	8,845	95.6	155	57	1,288,620	46	167.0	11.95	2.47
Alexandria	3,279	28.1	41	80	205,416	28	49.0	218.60	5.75
Alleghany County	3,012	95.7	39	77	314,388	45	42.0	6.78	3.45
Amelia County	1,572	99.3	24	66	253,440	59	27.0	4.30	2.23
Amherst County	4,860	93.9	67	72	520,200	43	71.0	10.34	3.36
Appomattox County	2,534	97.5	43	59	336,700	43	45.0	7.34	2.71
Arlington County	7,030	42.4	59	119	429,359	40	74.0	270.38	5.89
Augusta County	10,331	98.8	136	76	916,884	37	149.5	10.46	4.06
Bath County	1,106	98.2	22	50	234,685	59	12.5	2.05	1.70
Bedford County	7,226	98.1	108	67	1,103,170	57	117.5	10.04	2.36
Bland County	1,169	100.3 (d)	18	65	131,940	41	21.5	3.02	3.19
Botetourt County	4,210	92.7	63	67	561,600	50	62.5	7.68	2.70
Bristol	22	.6	1	22	9,000	50	2.0	2.00	.88
Brunswick County	2,891	96.3	60	48	577,080	53	64.0	4.99	1.80
Buchanan County	7,691	91.9	109	71	621,270	32	119.0	15.14	4.46
Buckingham County	2,492	95.8	43	58	422,352	55	47.0	4.28	2.12
Campbell County	9,066	97.2	118	77	1,090,400	52	132.0	17.74	2.99
Caroline County	3,614	94.6	63	57	535,842	47	37.0	6.63	2.43
Carroll County	4,601	90.4	72	64	637,920	49	77.0	9.31	2.60
Charles City County (a)	1,463	93.2	27	54	200,484	41	30.0	8.08	2.63
Charlotte County	2,620	95.3	48	55	476,946	55	53.0	5.57	1.98
Charlottesville	3,160	58.8	27	117	182,448	38	.0 (c)	316.00	6.24
Chesapeake	18,375	73.8	188	98	1,367,478	40	207.0	53.89	4.84
Chesterfield County	28,356	96.2	270	105	2,504,142	52	301.0	64.15	4.08
Clarke County	1,674	90.8	17	98	177,984	58	17.1	9.62	3.39
Clifton Forge	25	2.7	1	25	10,800	60	1.0	6.25	.83
Colonial Beach	272	55.3	2	136	14,040	39	2.0	136.00	6.97
Colonial Heights	18	.5	1	18	11,880	66	.0	2.25	.54
Covington	791	44.2	3	264	27,774	51	3.0	197.75	10.25

Table 10 (continued)

District	ADA of Transported Pupils	ADT as a Percent of ADA	Total Number of Buses	Average Number of Pupils Per Bus	Total Miles Pupils Transported Regular Routes	Average Miles Per Bus Per Day	Number of Pupil Transportation Administrative and Service Personnel (Equated Full-Time)	Area Density	Linear Density
1	2	3	4	5	6	7	8	9	10
Craig County	664	87.1	10	66	115,452	64	12.0	1.98	2.07
Culpepper County	3,900	81.8	69	57	533,880	43	77.0	10.03	2.63
Cumberland County	1,532	94.4	26	59	297,180	63	28.0	5.26	1.86
Danville	1,362	17.7	17	80	103,500	34	23.5	75.67	4.74
Dickenson County	4,053	95.2	58	69	359,460	34	64.0	12.21	4.06
Dinwiddie County	4,358	93.3	91	48	755,100	46	97.0	8.68	2.08
Essex County	1,583	89.2	28	56	353,646	70	31.0	6.33	1.61
Fairfax County	81,791	66.1	651	126	8,436,240	72	751.0	204.99	3.49
Falls Church	501	39.5	6	84	18,720	17	6.1	250.50	9.63
Fauquier County	6,657	93.0	100	67	732,096	41	105.0	10.09	3.27
Floyd County	1,951	91.8	38	51	398,682	58	42.5	5.09	1.76
Fluvanna County	2,077	96.4	34	61	263,754	43	37.5	7.21	2.83
Franklin City	1,306	76.2	16	82	94,356	33	16.3	326.50	4.98
Franklin County	6,280	94.5	98	64	881,460	50	107.0	8.77	2.56
Frederick County	7,113	99.3	73	97	849,294	65	86.0	17.83	3.02
Fredericksburg (a)	773	32.6	8	97	47,700	33	3.0	128.83	5.83
Galax	475	36.5	6	79	30,240	28	6.6	67.86	5.65
Giles County	3,450	91.7	41	84	294,840	40	47.3	9.50	4.21
Gloucester County	2,921	85.1	54	54	638,100	65	63.0	12.81	1.65
Goochland County	1,991	91.6	39	51	394,038	56	42.0	6.89	1.82
Grayson County	2,789	121.0 (d)	48	58	338,958	39	48.0	6.18	2.96
Greene County	1,468	94.8	23	64	133,044	32	25.0	9.59	3.97
Greensville County	3,089	94.7	34	91	460,656	75	37.0	10.33	2.41
Halifax County	6,621	103.3 (d)	116	57	953,640	46	127.0	8.32	2.50
Hampton	7,011	27.2	91	77	673,200	41	106.5	127.47	3.75
Hanover County	9,328	88.1	114	82	911,970	44	125.0	20.06	3.68
Henrico County	25,069	77.8	223	112	1,688,220	42	268.0	109.47	5.35
Henry County	10,477	86.8	147	71	1,059,318	40	161.0	27.50	3.56
Highland County	402	89.1	10	40	107,064	59	10.0	.97	1.35
Isle of Wight County	4,107	96.5	72	57	491,339	38	79.5	12.96	3.01

Table 10 (continued)

District	ADA of Transported Pupils	ADT as a Percent of ADA	Total Number of Buses	Average Number of Pupils Per Bus	Total Miles Pupils Transported Regular Routes	Average Miles Per Bus Per Day	Number of Pupil Transportation Administrative and Service Personnel (Equated Full-Time)	Area Density	Linear Density
1	2	3	4	5	6	7	8	9	10
King George County	2,183	96.7	38	57	306,200	45	42.0	12.40	2.57
King and Queen County	982	98.7	21	47	291,420	77	23.0	3.09	1.21
King William County	1,338	99.9	25	54	223,380	50	27.0	4.83	2.16
Lancaster County	1,587	88.2	30	53	266,940	49	32.0	11.58	2.14
Lee County	4,299	83.9	58	74	400,500	38	62.5	9.82	3.86
Lexington (b)	199	21.8	1	199	4,680	26	.0	66.33	15.31
Loudoun County	9,227	69.9	137	67	1,013,922	41	152.0	17.85	3.28
Louisa County	3,183	89.6	54	59	557,100	57	58.6	6.16	2.06
Lunenburg County	2,339	94.9	45	52	452,520	56	49.0	5.29	1.86
Lynchburg	8,744	83.3	67	131	538,380	45	75.0	174.88	5.85
Madison County	1,982	95.7	33	60	250,308	42	36.0	6.06	2.85
Manassas	2,014	75.9	14	144	87,372	34	15.5	251.75	8.29
Manassas Park	839	49.9	7	120	47,682	38	7.0	419.50	6.33
Martinsville	2,339	68.4	21	111	133,560	35	23.5	212.64	6.30
Mathews County	1,216	90.8	23	53	210,420	51	24.0	13.66	2.08
Mecklenburg County	6,002	103.9 (d)	100	60	969,948	53	107.5	9.81	2.23
Middlesex County	1,205	92.3	20	61	166,158	46	23.0	9.27	2.61
Montgomery County	7,611	86.3	89	86	619,740	39	96.0	19.32	4.42
Nelson County	2,422	97.1	55	44	564,840	57	65.0	5.14	1.54
New Kent County	1,624	99.2	35	46	345,942	55	37.0	7.73	1.69
Newport News	21,867	82.5	244	90	1,867,500	43	293.0	316.91	4.22
Norfolk (a)	22,916	59.0	287	80	1,821,065	35	72.0	457.77	4.53
Northampton County	2,455	97.4	38	65	308,040	45	41.5	11.16	2.87
Norton	613	60.2	4	153	27,900	39	5.0	76.63	7.91
Northumberland County	1,366	86.9	37	37	315,000	47	39.0	7.19	1.56
Nottoway County	2,469	85.2	34	73	251,748	41	38.0	8.02	3.53
Orange County	3,216	87.1	52	62	430,020	46	56.0	9.06	2.69
Page County	3,135	84.7	35	90	282,798	45	38.0	9.92	3.99
Patrick County	3,030	88.6	50	61	412,920	46	54.5	6.53	2.64
Petersburg	4,663	60.4	58	80	275,760	26	.0 (c)	211.95	6.09

Table 10 (continued)

District	ADA of Transported Pupils	ADT as a Percent of ADA	Total Number of Buses	Average Number of Pupils Per Bus	Total Miles Pupils Transported Regular Routes	Average Miles Per Bus Per Day	Number of Pupil Transportation Administrative and Service Personnel (Equated Full-Time)	Area Density	Linear Density
1	2	3	4	5	6	7	8	9	10
Pittsylvania County	12,061	90.2	212	57	1,833,300	48	219.5	12.06	2.37
Poquoson	1,919	93.4	20	96	108,180	30	22.0	112.88	6.38
Portsmouth	12,556	65.4	110	114	627,096	32	122.0	432.97	7.21
Powhatan County	2,199	98.8	39	56	268,992	38	42.0	8.17	2.94
Prince Edward County	2,073	100.1 (d)	34	61	357,732	58	38.0	5.81	2.09
Prince George County	5,015	98.6	77	65	740,160	53	85.5	18.78	2.44
Prince William County	24,592	73.8	300	82	3,102,550	57	330.0	72.97	2.85
Pulaski County	6,359	86.2	74	86	623,453	47	79.3	19.39	3.67
Rappahannock County	1,056	93.5	18	59	199,350	62	19.9	3.96	1.91
Richmond City	17,190	56.2	158	108	1,580,040	56	184.0	286.50	3.92
Richmond County	1,233	86.8	22	56	194,436	49	23.5	6.49	2.28
Roanoke City	11,827	73.5	83	142	770,940	52	116.0	275.05	5.52
Roanoke County	17,060	87.6	164	104	1,387,080	47	195.0	69.35	4.43
Rockbridge County	3,264	93.3	46	71	393,624	47	49.0	5.43	2.99
Rockingham County	9,084	87.5	122	74	861,534	39	130.0	10.50	3.80
Russell County	5,666	91.3	65	87	487,800	41	70.5	11.73	4.18
Scott County	4,458	89.8	68	66	635,580	52	72.0	8.27	2.53
Shenandoah County	4,892	93.5	67	73	469,512	39	78.0	9.65	3.75
Smyth County	6.008	89.7	47	128	368,136	44	47.0	13.75	5.88
Southampton County	3,138	88.5	78	40	639,648	46	84.5	5.21	1.77
Spotsylvania County	7,549	104.1 (d)	92	82	772,056	47	100.0	18.46	3.52
Stafford County	8,819	104.6 (d)	106	83	793,332	42	116.0	32.66	4.00
Suffolk	7,575	78.8	86	88	983,160	64	94.0	18.48	2.77
Surry County	1,281	96.1	22	58	178,956	45	24.0	4.62	2.58
Sussex County	2,198	88.8	40	55	464,604	65	42.5	4.45	1.70
Tazewell County	9,078	88.8	89	102	653,490	41	95.5	17.39	5.00
Virginia Beach	49,277	95.2	375	131	2,910,661	43	397.0	190.26	6.09
Warren County	3,365	84.7	37	91	271,422	41	42.0	15.37	4.46
Washington County	8,154	92.4	83	98	728,082	49	90.0	14.43	4.03
West Point	633	89.4	6	106	39,060	36	6.0	633.00	5.83

Table 10 (continued)

District	ADA of Transported Pupils	ADT as a Percent of ADA	Total Number of Buses	Average Number of Pupils Per Bus	Total Miles Pupils Transported Regular Routes	Average Miles Per Bus Per Day	Number of Pupil Transportation Administrative and Service Personnel (Equated Full-Time)	Area Density	Linear Density
1	2	3	4	5	6	7	8	9	10
Westmoreland County	2,290	98.2	42	55	361,801	48	44.1	10.09	2.28
Williamsburg	4,211	93.2	61	69	727,560	66	74.0	35.09	2.08
Winchester	1,960	60.6	13	151	118,080	50	12.2	217.78	5.98
Wise County	7,665	84.0	95	81	559,530	33	102.0	18.79	4.93
Wythe County	4,375	86.4	51	86	332,748	36	56.0	9.51	4.73
York County	9,195	104.0 (d)	101	91	871,602	48	113.0	82.10	3.80

Source: Virginia Department of Education
The ADT as a percent of the ADA and the area density were computed by the writer.

Note: In contrast to the format of state reports, counties, towns and cities are combined and listed alphabetically. The district's data reflect both public-owned and contracted service, when applicable, except for the number of pupil transportation personnel. Personnel involved in contracted service are not included in the district's number of personnel. Also, a district's nonreimbursable transportation is not included.

(a) Districts with contract service and public-owned service.
(b) Districts with contract service only.
(c) Districts own the buses but contract the service; therefore, no pupil transportation employees are listed.
(d) The ADT exceeds the ADA of the district. Two districts provided explanation: Grayson County transported pupils for the City of Galax and included them in their ADT, and Halifax County did the same for the City of South Boston. The other districts were contacted but did not provide an explanation. The ADA of transported pupils was taken from the 1978-79 transportation report, which was based on the 1977-78 school year; therefore, it was necessary to use 1977-78 ADA data.

Lexington and Covington had the highest linear density, 15.31 and 10.25 respectively. However, Covington managed to average the highest number of pupils per bus (264). Lexington's average number of pupils per bus (199) represents the total number of pupils transported, and they only operate one bus. King and Queen County utilized the highest average miles per bus per day (77), and, excluding districts with only one bus, King and Queen County also had the lowest linear density in the state (1.21). Highland County had the lowest area density (.97). Of the data listed in Table 10, factors 1, 3, 4, 5, 6, 8, and 9 were selected for analysis.

Table 11 reports the state's transportation allocations in relation to district expenditures. The following data were compiled for each school district:

1. Average cost per pupil per year
2. Average cost per mile
3. Total cost of operation (less gas tax refund)
4. Amount allocated to the district by the state
5. Percent of operating cost received from state funds
6. District's ranking in relation to number five
7. District's 1978-79 local composite index

A wide variation in program costs is evidenced in Table 11. Colonial Heights had the highest average cost per

Table 11

Analysis of 1978-79 State Allocations In Relation to District Expenditures

District	Average Cost Per Pupil Per Year	Average Cost Per Mile	Total Cost of Operation (Less Gas Tax Refund)	State Allocation	Percent of Operating Cost Received From State Funds	State Ranking (In Relation to Column 6)	1978-79 Composite Index[a]
1	2	3	4	5	6	7	8
Accomack County	$ 94.56	$ .596	$ 499,281.12	$ 177,518.00	35.55	64	.8198
Albemarle County	110.87	.761	980,639.82	293,834.00	29.96	103	1.1057
Alexandria	135.32	2.162	443,698.56	140,111.00	17.41	124	2.1148
Alleghany County	81.94	.785	246,794.58	79,832.00	32.35	90	.5777
Amelia County	89.64	.556	140,912.64	54,492.00	38.67	34	.8023
Amherst County	84.92	.793	412,717.75	131,909.00	31.96	94	.6895
Appomattox County	89.02	.670	225,589.00	77,884.00	34.52	75	.7451
Arlington County	122.15	2.000	857,718.00	146,575.00	17.07	126	2.3861
Augusta County	74.19	.836	766,515.02	275,382.00	35.93	60	.7803
Bath County	149.17	.703	164,983.55	42,190.00	25.57	116	1.0451
Bedford County	83.71	.548	604,924.51	238,309.00	39.40	28	.7123
Bland County	89.16	.790	104,232.60	34,062.00	32.68	88	.6232
Botetourt County	88.70	.665	373,464.00	128,244.00	34.34	77	.7948
Bristol	346.44	.850	7,621.72	1,689.00	22.16	121	.8873
Brunswick County	115.17	.577	332,975.16	119,948.00	36.02	58	.7580
Buchanan County	93.38	1.156	718,188.12	193,060.00	26.88	112	.9499
Buckingham County	90.33	.533	225,113.62	90,242.00	40.09	22	.8529
Campbell County	61.09	.508	553,923.20	271,733.00	49.06	4	.6435
Caroline County	104.08	.702	376,168.43	122,003.00	32.43	89	.8559
Carroll County	79.03	.570	363,614.70	152,724.00	42.00	13	.5942
Charles City County	104.74	.776	153,233.93	53,424.00	34.86	71	.6636
Charlotte County	102.30	.562	268,017.00	102,578.00	38.27	38	.6573
Charlottesville	60.05	1.040	189,745.92	68,562.00	36.13	56	1.3369
Chesapeake	60.52	.813	1,112,111.84	425,552.00	38.26	39	.6773
Chesterfield County	77.45	.877	2,196,132.53	662,853.00	30.18	102	.9613
Clarke County	78.89	.742	132,064.13	45,233.00	34.25	78	1.2139
Clifton Forge	217.29	.503	5,432.40	2,535.00	46.66	5	.8162
Colonial Beach	31.33	.607	8,522.28	5,416.00	63.55	1	1.1281
Colonial Heights	472.26	.715	8,500.62	1,961.00	23.07	118	.8829
Covington	26.86	.765	21,247.11	12,370.00	58.22	2	.9374

Table 11 (continued)

District	Average Cost Per Pupil Per Year	Average Cost Per Mile	Total Cost of Operation (Less Gas Tax Refund)	State Allocation	Percent of Operating Cost Received From State Funds	State Ranking (In Relation to Column 6)	1978-79 Composite Index[a]
1	2	3	4	5	6	7	8
Craig County	$ 104.15	$ .599	$ 69,155.74	$ 23,006.00	33.27	84	.7733
Culpeper County	96.10	.701	374,249.88	131,257.00	35.07	68	1.0226
Cumberland County	95.83	.494	146,806.92	58,824.00	40.07	23	.6494
Danville	65.66	.864	89,424.00	30,949.00	34.61	73	.9560
Dickenson County	100.66	1.135	407,987.10	108,524.00	26.60	113	.6707
Dinwiddie County	104.87	.609	459,855.90	165,518.00	35.99	59	.7038
Essex County	132.97	.595	210,492.03	64,393.00	30.59	101	1.2122
Fairfax County	92.87	.900	7,596,257.69	1,988,373.00	26.18	114	1.2878
Falls Church	72.32	1.935	36,236.52	8,452.00	23.32	119	2.7461
Fauquier County	88.30	.803	587,873.08	194,324.00	33.06	87	1.2890
Floyd County	131.77	.645	257,098.97	76,842.00	29.89	104	.7989
Fluvanna County	88.89	.700	184,627.80	65,857.00	35.67	63	1.1149
Franklin City	45.94	.636	60,010.41	26,829.00	44.71	6	.7770
Franklin County	87.86	.626	551,793.96	200,627.00	36.36	52	.6678
Frederick County	76.53	.640	544,397.45	197,524.00	36.28	53	.9350
Fredericksburg	92.65	1.500	71,623.60	15,186.00	21.20	123	1.4429
Galax	62.19	.977	29,544.48	10,797.00	36.54	50	1.2255
Giles County	75.89	.888	261,817.92	86,736.00	33.13	85	.7839
Gloucester County	136.04	.622	397,379.59	118,194.00	29.74	107	1.0633
Goochland County	108.06	.546	215,144.75	80,804.00	37.56	43	1.2434
Grayson County	82.19	.668	226,460.01	86,831.00	38.34	37	.6224
Greene County	84.10	.928	123,464.83	39,645.00	32.11	92	.7205
Greensville County	78.73	.528	243,226.37	96,828.00	40.63	18	.6430
Halifax County	90.61	.629	599,956.70	222,353.00	37.06	47	.6133
Hampton	88.65	.923	621,493.43	175,233.00	28.04	109	.7669
Hanover County	71.83	.735	670,158.11	248,291.00	37.05	48	1.0100
Henrico County	61.48	.913	1,541,344.86	543,689.00	35.27	67	1.2365
Henry County	78.05	.772	817,793.49	308,599.00	37.74	41	.6325
Highland County	162.72	.611	65,416.10	20,164.00	30.82	100	1.3598
Isle of Wight County	87.12	.734	360,642.82	129,023.00	35.78	61	.8921

Table 11 (continued)

District	Average Cost Per Pupil Per Year	Average Cost Per Mile	Total Cost of Operation (Less Gas Tax Refund)	State Allocation	Percent of Operating Cost Received From State Funds	State Ranking (In Relation to Column 6)	1978-79 Composite Index[a]
1	2	3	4	5	6	7	8
King George County	$ 96.40	$ .687	$ 210,451.19	$ 71,408.00	33.93	81	.8926
King and Queen County	133.24	.449	130,847.58	51,012.00	38.99	31	1.0464
King William County	106.00	.633	141,348.73	49,553.00	35.06	69	1.1554
Lancaster County	107.22	.637	170,154.72	69,593.00	40.90	17	1.2321
Lee County	87.75	.942	377,271.99	124,776.00	33.07	86	.4991
Lexington	35.27	1.500	7,020.00	2,777.00	39.56	27	1.0566
Loudoun County	95.38	.868	880,084.30	275,909.00	31.35	99	1.2733
Louisa County	87.51	.500	278,550.00	116,440.00	41.80	15	1.4370
Lunenburg County	104.85	.542	245,265.84	93,168.00	37.99	40	.7264
Lynchburg City	53.62	.871	468,928.98	186,315.00	39.73	25	1.1127
Madison County	99.64	.789	197,493.01	63,394.00	32.10	93	.8590
Manassas City	47.28	1.090	95,235.91	33,699.00	35.38	65	1.1909
Manassas Park	52.79	.929	44,296.58	17,545.00	39.61	26	.5379
Martinsville	62.64	1.100	146,513.85	49,687.00	33.91	82	1.0080
Mathews County	97.34	.562	118,360.75	44,338.00	37.46	45	1.1818
Mecklenburg County	82.26	.509	493,703.53	208,446.00	42.22	12	.7074
Middlesex County	118.45	.859	142,731.13	39,525.00	27.69	111	1.2595
Montgomery County	68.64	.843	522,440.82	181,946.00	34.83	72	.7790
Nelson County	142.23	.609	344,488.79	108,460.00	31.48	98	.7888
New Kent County	131.00	.615	212,754.33	67,387.00	31.67	97	1.0520
Newport News	79.83	.936	1,747,980.00	555,040.00	31.75	96	.9046
Norfolk	138.90	1.748	3,182,989.11	551,852.00	17.34	125	.9452
Northampton County	82.94	.661	203,614.37	76,608.00	37.62	42	.7519
Norton	39.55	.869	24,245.10	10,744.00	44.31	7	.8880
Northumberland County	145.04	.629	198,135.00	66,347.00	33.49	83	1.1841
Nottoway County	73.72	.723	182,013.80	66,485.00	36.53	51	.7281
Orange County	91.19	.682	293,273.64	104,723.00	35.71	62	.9643
Page County	60.06	.665	188,301.90	79,772.00	42.36	11	.8326
Patrick County	94.71	.695	286,979.40	101,332.00	35.31	66	.6637
Petersburg	114.49	1.936	533,871.36	115,306.00	21.60	122	.8631

Table 11 (continued)

District	Average Cost Per Pupil Per Year	Average Cost Per Mile	Total Cost of Operation (Less Gas Tax Refund)	State Allocation	Percent of Operating Cost Received From State Funds	State Ranking (In Relation to Column 6)	1978-79 Composite Index[a]
1	2	3	4	5	6	7	8
Pittsylvania County	$ 95.15	$ .626	$ 1,147,645.80	$ 414,676.00	36.14	55	.5735
Poquoson	38.00	.674	72,913.32	40,118.00	55.02	3	.6240
Portsmouth	62.92	1.260	790,140.70	251,766.00	31.86	95	.7895
Powhatan County	79.77	.652	175,430.57	67,354.00	38.39	36	.8012
Prince Edward County	76.83	.445	159,262.00	64,379.00	40.42	20	1.0377
Prince George County	112.00	.759	561,665.48	162,686.00	28.96	108	.6479
Prince William County	116.91	.924	2,867,504.93	750,104.00	26.16	115	.8982
Pulaski County	67.94	.693	432,052.93	149,196.00	34.53	74	.7038
Rappahannock County	104.77	.555	110,639.25	38,644.00	34.93	70	1.3271
Richmond City	112.11	1.220	1,927,249.13	434,773.00	22.56	120	1.3431
Richmond County	88.47	.561	109,078.60	48,216.00	44.20	8	.9739
Roanoke City	53.77	.825	636,025.50	246,185.00	38.71	33	1.0923
Roanoke County	59.60	.733	1,016,729.64	410,519.00	40.38	21	.8742
Rockbridge County	78.87	.654	257,430.10	99,431.00	38.62	35	.7680
Rockingham County	71.00	.749	644,946.46	251,662.00	39.02	30	.8844
Russell County	80.06	.930	453,654.00	145,934.00	32.17	91	.6810
Scott County	87.97	.617	392,152.86	141,945.00	36.20	54	.5642
Shenandoah County	81.57	.850	399,085.20	137,445.00	34.44	76	1.0035
Smyth County	52.85	.863	317,546.00	128,752.00	40.55	19	.6406
Southampton County	146.48	.719	459,680.13	137,129.00	29.83	106	.7286
Spotsylvania County	63.23	.618	477,345.53	197,318.00	41.34	16	.9301
Stafford County	65.43	.727	576,990.36	208,375.00	36.11	57	.8090
Suffolk	66.58	.513	504,361.08	219,943.00	43.61	9	.7670
Surry County	120.00	.859	153,723.10	45,911.00	29.87	105	3.0400
Sussex County	97.87	.463	215,111.65	92,982.00	43.22	10	.9060
Tazewell County	67.59	.939	613,627.11	209,865.00	34.20	79	.6742
Virginia Beach	51.38	.870	2,532,275.07	986,010.00	38.94	32	.8882
Warren County	69.45	.861	233,694.34	79,806.00	34.15	80	1.1550
Washington County	68.40	.766	557,710.81	205,098.00	36.77	49	.6323
West Point	50.34	.816	31,868.48	13,375.00	41.97	14	1.0997

Table 11 (continued)

District	Average Cost Per Pupil Per Year	Average Cost Per Mile	Total Cost of Operation (Less Gas Tax Refund)	State Allocation	Percent of Operating Cost Received From State Funds	State Ranking (In Relation to Column 6)	1978-79 Composite Index[a]
1	2	3	4	5	6	7	8
Westmoreland County	$ 92.42	$ .585	$ 211,655.52	$ 84,335.00	39.85	24	.8640
Williamsburg	127.34	.737	536,211.72	150,153.00	28.00	110	4.3167
Winchester	50.36	.836	98,714.88	38,647.00	39.15	29	1.2894
Wise County	91.90	1.259	704,448.27	176,197.00	25.01	117	.6475
Wythe County	64.59	.849	282,579.66	106,019.00	37.52	44	.6880
York County	70.53	.744	648,534.52	242,802.00	37.44	46	.9393

Source: Virginia Department of Education

Note: This table reflects corrections to the state pupil transportation report. The corrections were confirmed by the State Department of Education and involved the ranking of school districts according to the percent of operating cost received from state funds.

(a) The composite index is a measure of a locality's ability to pay for public education. The method of computation is detailed in Chapter 1, definition of terms.

pupil per year ($472.26); however, the district operated only one bus. Excluding other programs with only one bus, Highland County, at $162.72, had the highest cost per pupil. Excluding Lexington ($35.27), which operated one bus, and Colonial Beach ($31.33), which operated two buses, Poquoson had the lowest cost per pupil ($38.00). However, Prince Edward County had the lowest cost per mile ($.445), while Alexandria was the highest at $2.162 per mile.

Fairfax County, at $7,596,257.69, had the highest operating cost in the state and received the largest allocation from the state ($1,988,373.00); however, the state allocation was only 26.18 percent of their operating cost, which ranked them 114th in the state. Colonial Beach was ranked first in the state in the percent of operating cost received from state funds (63.55 percent), while Arlington received only 17.07 percent and was ranked last. Colonial Beach operated a pupil transportation program with an average per mile cost of $.607 and an average per pupil cost of $31.33. Whereas, Arlington's program cost $2.00 per mile and $122.15 per pupil. Arlington's high program cost is due primarily to extremely high salaries. Williamsburg had the highest local composite index (4.3167), and Lee County had the lowest at 0.4991.

From the data listed in Table 11, factors one (average cost per pupil per year) and eight (local composite

index) were selected for analysis. The nine variables selected for analysis are as follows:

Abbreviation (for use in formulas)	Computer Code	
A	V1	ADA of transported pupils
B	V2	Total number of buses
P	V3	Average number of pupils per bus
M	V4	Total miles pupils were transported on regular routes
D	V5	Average miles per bus per day
S	V6	Area density of transported pupils
L	V7	Linear density of transported pupils
C	V8	Average cost per pupil per year
I	V9	Composite index of the school district (1978-79)

Of the eight most frequently used distribution factors identified in the survey of state programs (listed in Table 3), six are used to analyze Virginia's pupil transportation costs. (Virginia's reimbursement factors--pupils, miles, and buses--are included.) Two of the eight factors, bus size and bus replacement, are not used in the cost analysis. In Virginia, approximately 80 percent of the school buses are of standard size (64 to 66 passenger) and therefore do not represent a major cost variance. Also, smaller buses are usually utilized for special education transportation, which is a special situation generally requiring special

funding provisions. Bus replacement was not used because the costs fluctuate considerably from year to year, depending on the age of the district's bus fleet. This fact is readily apparent when reviewing Virginia's annual pupil transportation report.

Expenditures, the most frequently used factor in the nationwide survey, are identified as the average cost per pupil per year in the analysis. Assessed valuation is identified as the local composite index in the analysis.

In addition to the six variables selected from the eight most frequently used reimbursement factors, the review of literature indicated other factors that should be considered. Recent studies in Florida, Illinois, Louisiana, Tennessee, Utah, and West Virginia have shown that transportation costs are more realistically related to cost variables other than those presently used by most states.[14] For Illinois, Utah, Tennessee, and West Virginia, in particular, multiple regression and other analysis, using a broad spectrum of variables, indicated a close relationship between cost and the demographic variable of linear density. With the former two states, a strong inverse relationship between cost and linear density was found. With the latter two states,

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[14]Detailed information concerning the studies are cited in Chapter 2.

an even stronger relationship between cost and a negative power of linear density (log-log relationships) was demonstrated. West Virginia, for instance, was able to account for 65.7 percent of the criterion variance (cost) by linear density through such a relationship. However, adding one other variable (road conditions) increased the explanation of cost ($V = 100 \times R^2$) only to 66.3 percent (an increase of only 0.6 percent), while the addition of still other variables failed to appreciably increase the explanation of cost.

Linear density, although infrequently used in current state reimbursement plans, was included in the analysis based on the findings of recent research studies. Area density, although not considered as accurate a predictor of cost as linear density in recent studies, was also included. The average number of pupils per bus, a factor that should be closely associated with population density, was also included in the analysis.

Of the noncontrollable cost factors identified in Tables 3 and 4, road conditions and geographic regions were not used in the analysis. In addition to the unavailability of data, recent studies have discouraged the inclusion of such factors in a funding formula.

Currently, only four states use road conditions and two states use geographic regions as factors in determining local entitlement. Although the two factors may

affect pupil transportation costs, recent studies have rejected their use in a distribution formula for two reasons. First, the factors did not add significantly to the percent of variance in noncapital outlay cost per transported pupil. At the present time, practically all of the roads used by buses are hard-surfaced; therefore, this has ceased to be a significant factor affecting transportation costs. Second, current research recommends simple formulas containing a minimum of factors; and, since road and geographic data are difficult to obtain and do not add significantly to the variation in cost, the factors are usually omitted from proposed funding formulas.

Following the compilation and review of district pupil transportation data, eleven school districts were deleted from the analysis.[15] In the analysis of the cost variables, the average cost per transported pupil was selected as the dependent variable. There were two basic reasons for this selection. First, current operating

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[15]Galax, Grayson County, Halifax County, and Norton were deleted due to involvement in inter-district busing which distorts their data. Bristol, Clifton Forge, Colonial Heights, and Lexington were not considered due to the extremely small size of their programs. Hampton was deleted because their secondary pupils are transported by the local transit company, and the data for these pupils are not included in the state report. Fredericksburg and Norfolk were deleted due to extensive contract busing service.

expenses provide an accurate analysis of the effects of various factors on daily pupil transportation operations. Second, the average cost per transported pupil provides a good common denominator for an analysis of cost, regardless of the size of the school district.

SELECTION OF ALTERNATE FORMULAS

The first step in the analysis was to compute the intercorrelations among the variables using Pearson product-moment correlation coefficient.[16] The average cost per pupil per year was used as the dependent variable. The results are displayed in Table 12. For purposes of this study, a level of .05 was considered significant. An examination of the correlation table shows that neither V1, V2, nor V4 (pupils, buses and miles pupils transported--factors used in Virginia's reimbursement) were significantly correlated with the dependent variable and that they were significantly intercorrelated with each other.

On the other hand, both V3 and V7 (average number of pupils per bus and linear density) were highly and significantly correlated both with the dependent/criterion variable (V8) and with each other. A further comparison of V3 and V7

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[16]George A. Ferguson, Statistical Analysis in Psychology and Education (New York: McGraw Hill, 1976), p. 102.

Table 12

Pearson Correlation Coefficients Between Selected Variables

	V1 ADA of Transported Pupils	V2 Total Number of Buses	V3 Average Number of Pupils Per Bus	V4 Total Miles Pupils Transported	V5 Average Miles Per Bus Per Day	V6 Area Density of Transported Pupils	V7 Linear Density of Transported Pupils	V8** Average Cost Per Pupil Per Year	V9 Composite Index of the School District
V1 ADA of Transported Pupils	*1.0000	*0.9677	*0.3059	*0.9554	0.1163	*0.1643	0.1407	-0.1426	-0.0066
V2 Total Number of Buses		*1.0000	*0.1870	*0.9632	0.1188	0.0867	0.0360	-0.0695	-0.0510
V3 Average number of Pupils Per Bus			*1.0000	*0.1697	*-0.1917	*0.4749	*0.8317	*-0.6863	0.0461
V4 Total Miles Pupils Transported				*1.0000	*0.2531	0.0880	-0.0312	-0.0117	-0.0089
V5 Average Miles Per Bus Per Day					*1.0000	*-0.1862	*-0.6362	*0.3871	0.0297
V6 Area Density of Transported Pupils						*1.0000	*0.5240	*-0.2303	*0.5130
V7 Linear Density of Transported Pupils							*1.0000	*-0.6753	0.1102
V8** Average Cost Per Pupil Per Year								*1.0000	*0.2581
V9 Composite Index of the School District									*1.0000

*$p \leq 0.05$, one-tailed

**dependent variable (V8)

indicates the one correlating most highly with V8 (which was V3) would provide a better predictor of cost (assuming its standard error was also the smaller of the two). However, if the separate predictor-criterion correlations and standard error of estimates of these two were close, the practical aspects of linear density (V7), which is less susceptible to local manipulation and possible abuse, might prove to be the better of the two on future attempts to validate the pair of predictor equations.

The correlation of linear density (V7) with area density (V6) was significant (area density correlated rather poorly with the dependent variable). Thus, area density (V6) also possesses some potential of proving to be superfluous. Finally, from the inspection of correlation alone, it is noted that the composite index (V9) would appear potentially useful as a predictor of cost, especially in proper combination with one or more other variables.

The second step in the analysis involved a series of multiple regressions of the independent variables on the dependent variable to determine the best predictor(s) of cost. The regressions were conducted with the data of the variables in their original form (untransformed) and with the data of the variables transformed into inverse, quadratic and logarithm form.[17] Table 13 shows the results

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[17]R. J. Harris, A Primer of Multivariate Statistics (New York: Academic Press, 1975), pp. 49-50.

of the multiple regressions.

The stepwise multiple regression analysis pointed to several conclusions. With stepwise regression using all variables (data in original form), the independent variables V3 (average number of pupils per bus), V9 (composite index), and V5 (average miles per bus per day) were ranked first, second, and third, respectively, in the analysis (Table 13, No. 1). The cumulative R^2 of these independent variables was .6173, thus accounting for 61.73 percent of the dependent variance. The remaining independent variables in the analysis accounted for less than 1 percent of the dependent variance. These figures change to 55.51 percent (V3 and V9) with V5 deleted and to 47.10 percent with V3 alone. It should be noted that V7 (linear density) failed to be entered in the stepwise analysis. Residuals were obtained for the V3-V9-V5, V3-V9, and V3.

Variables V3 (pupil per bus) and V7 (linear density) were significantly correlated both with the dependent variable and with each other, and V7 was not entered in the stepwise multiple regression. Therefore, stepwise regression with all variable data in original form was conducted with V3 preselected for omission in the analysis. The results of the analysis (Table 13, No. 2) show that V7 (linear density) replaced V3 (pupils per bus) as the best predictor of cost, and V9 (composite index) and V5 (miles

Table 13

Multiple Regression Analysis of Independent Variables on the Dependent Variable

Independent Variables Entered	Multiple R	R^2	Increase in R^2	Standard Error
(1) All Variables (Stepwise - data in original form)				
V3 (average number of pupils per bus)	0.6863	0.4710	0.4710	19.2242
V9 (composite index)	0.7451	0.5551	0.0841	17.7080
V5 (average miles per bus per day)	0.7857	0.6173	0.0621	16.4991
V4 (total miles pupils transported)	0.7866	0.6188	0.0015	16.5408
V1 (ADA of transported pupils)	0.7871	0.6196	0.0008	16.5995
V6 (area density)	0.7876	0.6203	0.0008	16.6597
V2 (total number of buses)	0.7878	0.6206	0.0003	16.7317
(F-Level insufficient for further computation)				
(2) All Variables Except V3 (Stepwise - data in original form)				
V7 (linear density	0.6753	0.4560	0.4560	19.4950
V9	0.7536	0.5680	0.1119	17.4511
V5	0.7602	0.5778	0.0099	17.3280
V6	0.7605	0.5784	0.0005	17.3953
V1	0.7606	0.5785	0.0001	17.4722
V4	0.7623	0.5811	0.0026	17.4987
(F-Level insufficient for further computation)				
(3) V1-V4-V2 (factors used in Virginia) (Stepwise - data in original form)				
V1	0.1426	0.0203	0.0203	26.1620
V4	0.4451	0.1981	0.1778	23.7749
V2	0.4493	0.2019	0.0038	23.8257
(4) Inverse of V3 Only	0.7859	0.6176	0.6176	16.3450
(5) Inverse of V7 Only	0.7651	0.5854	0.5854	17.0202

Table 13 (continued)

Independent Variables Entered	Multiple R	R^2	Increase in R^2	Standard Error
(6) V3 + $V3^2$ (quadratic of V3)				
V3	0.6863	0.4710	0.4710	19.2242
$V3^2$	0.7439	0.5534	0.0823	17.7435
(7) V7 + $V7^2$ (quadratic of V7)				
V7	0.6753	0.4560	0.4560	19.4950
$V7^2$	0.7244	0.5248	0.0688	18.3021
(8) All Variables - Log_{10} Transform (Stepwise)				
V3 (L3)	0.7974	0.6358	0.6358	0.0840
V9 (L9)	0.8358	0.6986	0.0628	0.0767
V4 (L4)	0.8662	0.7504	0.0518	0.0702
V2 (L2)	0.8689	0.7550	0.0047	0.0698
V6 (L6)	0.8690	0.7552	0.0002	0.0701
(F-Level insufficient for further computation)				
(9) All Variables Except V3 (L3) - Log_{10} Transform (Stepwise)				
V7 (L7)	0.7620	0.5806	0.5806	0.0901
V5 (L5)	0.8092	0.6547	0.0741	0.0821
V9 (L9)	0.8464	0.7163	0.0616	0.0748
V4 (L4)	0.8685	0.7544	0.0380	0.0699
V6 (L6)	0.8686	0.7545	0.0001	0.0702
(F-Level insufficient for further computation)				
(10) V7 and V9 (Log_{10} Transform)				
V7 (L7)	0.7620	0.5806	0.5806	0.0901
V9 (L9)	0.7990	0.6384	0.0578	0.0841

F-Level for inclusion .010000
F-Level for deletion .005000
Tolerance level .001

Note: Differences in standard errors of 8, 9, and 10, as compared to 1 through 7, are due to log transformation of data.

per bus) remained second and third. The cumulative R^2 of the three variables was .5778, thus accounting for 57.78 percent of the dependent variance. However, V5, V6, V1 and V4 combined accounted for less than 2 percent of the criterion variance. The variables V7 and V9 accounted for 56.80 percent of the dependent variance, and V7 alone accounted for 45.60 percent of the dependent variance. Residuals were obtained for V7-V9-V5, V7-V9, and V7.

The next step in the analysis was to conduct a stepwise regression on all independent variables but with the data of all variables transformed into logarithm form. This transformation of data was achieved with the BMD 02R program and the use of control cards. The analysis (Table 13, No. 8) resulted in V3 (pupils per bus) and V9 (composite index) remaining first and second; however, V4 (miles pupils transported) replaced V5 (miles per bus per day) as the third best predictor of cost. The cumulative R^2 of those variables was .7504, thus accounting for 75.04 percent of the dependent variance.

Variables V3 and V9 accounted for 69.86 percent of the dependent variance, and V3 alone accounted for 63.58 percent. Residuals were obtained for V3-V9-V4, V3-V9, and V3.

Stepwise multiple regression with data transformed to logarithm form was conducted on all independent variables

except V3, which was preselected for omission in the analysis. Table 13, number 9, shows the results of the analysis. The variable V7 (linear density) remained the best predictor, but V5 (miles per bus per day) replaced V9 (composite index) as the second best predictor. The variable V9 (composite index) became the third best predictor while V4 (miles pupils transported) was fourth. The cumulative R^2 of the best four predictors (V7, V5, V9, V4) was .7544, thus accounting for 75.44 percent of the dependent variance. However, V7 alone accounted for 58.06 percent of the dependent variance. Residuals were obtained for V7-V5-V9, V7-V5, and V7.

Having identified V3 (pupils per bus), V7 (linear density), and V9 (composite index) as the best predictors of cost, further multiple regressions were conducted on these variables. The inverse of V3 only (Table 13, No. 4) resulted in an R^2 of .6176, thereby accounting for 61.76 percent of the dependent variance. The inverse of V7 alone (Table 13, No. 5) resulted in an R^2 of .5854, which accounted for 58.54 percent of the dependent variance.

When analyzing the four best cost predictor variables (V3, V7, V9, V5) the combination of V7 (linear density) and V9 (composite index) appeared to hold possibilities when analyzed in terms of the evaluation criteria established in this study. Therefore, a multiple regression was conducted on V7 and V9 with the data transformed to logarithm

form. The results are shown in Table 13, number 10. The variables V7 and V9 had a cumulative R^2 of .6384, which accounted for 63.84 percent of the dependent variance.

Finally, a stepwise multiple regression with variable data in original form was conducted on the three independent variables used in Virginia's distribution formula (V1 - ADA of transported pupils, V2 - number of buses, and V4 - miles pupils transported). The combination of V1, V4, and V2 yielded an R^2 of only .2019, which accounted for only 20.19 percent of the dependent variance.

In compliance with the simplicity criterion established in the literature, a maximum of two independent variables was established for use in a distribution equation. In all instances, the pair of cost predictors to be given serious consideration for inclusion in a distribution equation provided sufficient explanation of the dependent variance to validate this position.

In reviewing all of the multiple regressions, the following summary was compiled to rank the best pair of cost predictors and the best single predictors of cost.

Ranking of two-variable combinations (Table 13):

V3-V9	Data in logarithm form	R^2 69.86%
V7-V5	Data in logarithm form	R^2 65.47%
V7-V9	Data in logarithm form	R^2 63.84%
V7-V9	Data in original form	R^2 56.80%
V3-V9	Data in original form	R^2 55.51%
V1-V4	Data in original form	R^2 19.81%

Ranking of single variables (Table 13):

V3	Data in logarithm form	R^2	63.58%
V3	Data in inverse form	R^2	61.76%
V7	Data in inverse form	R^2	58.54%
V7	Data in logarithm form	R^2	58.06%
V3	Data in quadratic form	R^2	55.34%
V7	Data in quadratic form	R^2	52.48%
V3	Data in original form	R^2	47.10%
V7	Data in original form	R^2	45.60%
V1	Data in original form	R^2	02.03%

Scattergrams of the best independent variables versus the dependent variable were plotted to check the forms of the relationships. The relationship between V3 (pupils per bus) and V8 (cost per pupil) and between V7 (linear density) and V8 (cost per pupil) were curvilinear (Figures 1 and 2). However, the relationship between V5 (miles per bus per day) and V8 (cost per pupil) and between V9 (composite index) and V8 (cost per pupil) failed to indicate curvilinearity (Figures 3 and 4).

Before considering the use of the best cost predictors in alternate funding formulas, it was necessary to consider these variables in relation to the evaluative criteria established in this study. It was strongly suggested in the literature and confirmed in this study that factors associated with the number of pupils (V3) and the number of miles (V5) hold the possibility of manipulation at the local level. Therefore, V3 and V5 did not meet the reliability criterion and were deleted from further analysis.

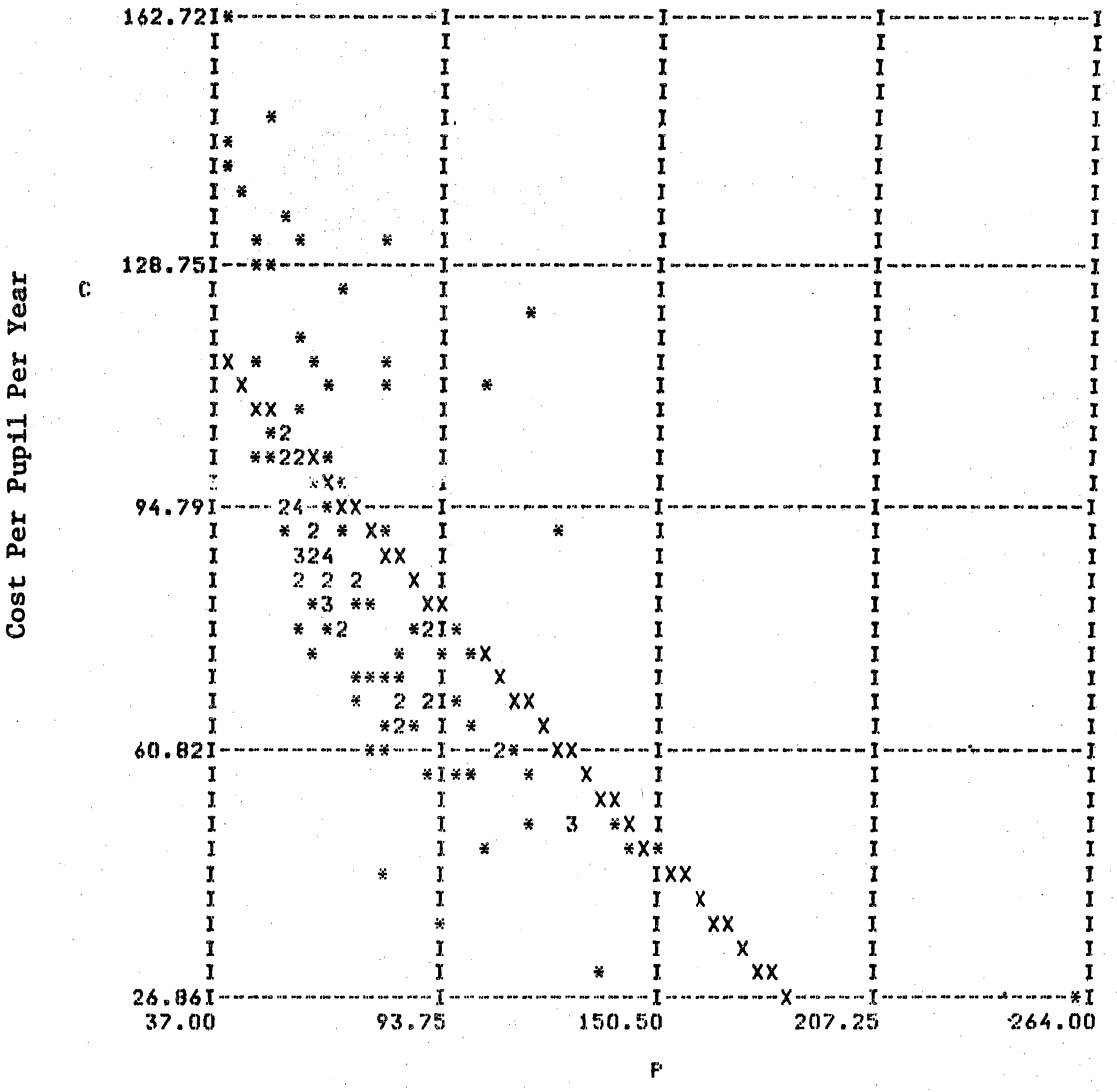

Figure 1

Relationship Between Average Number of Pupils Per Bus and the 1978-79 Average Cost Per Pupil Per Year

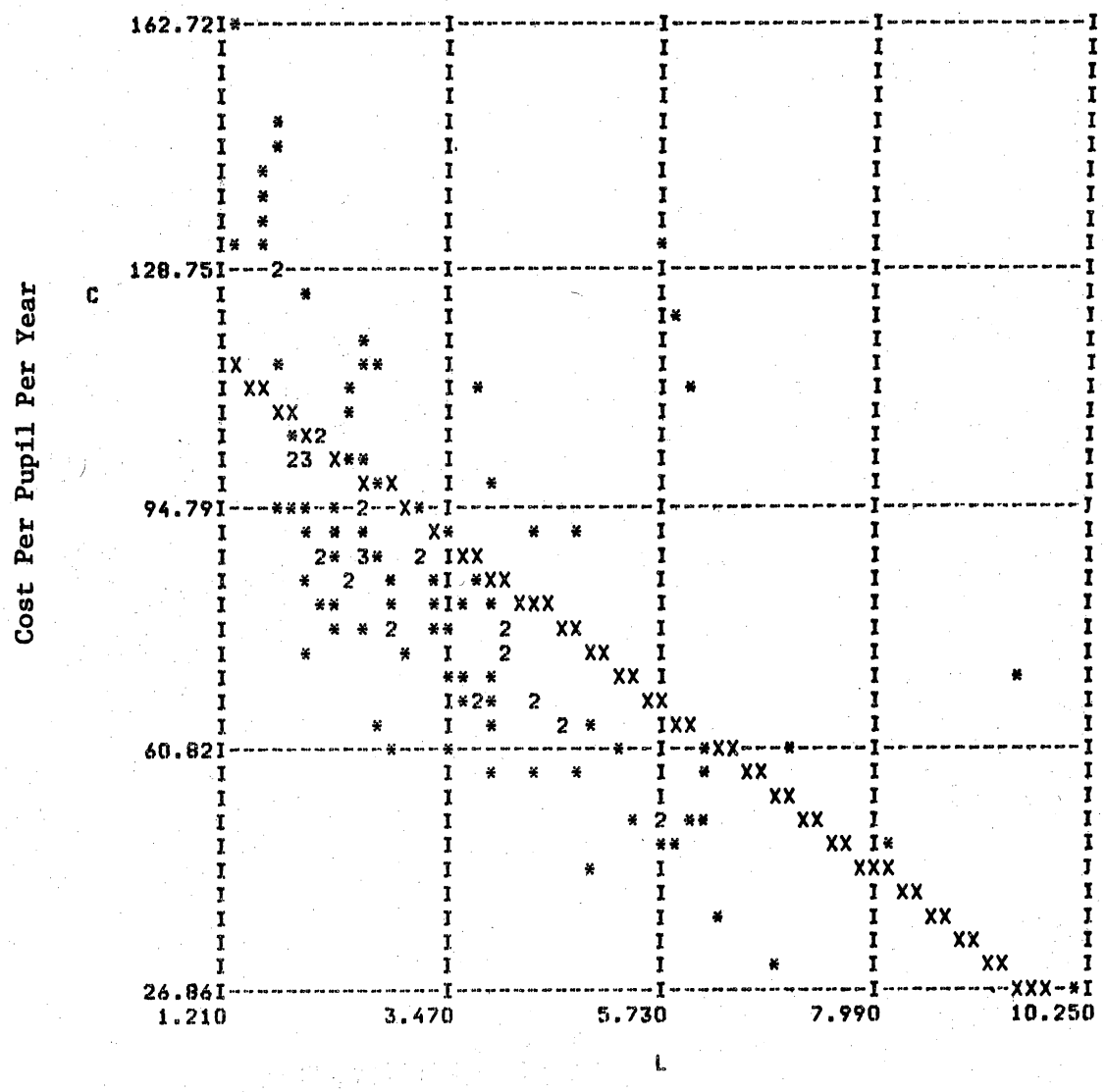

Figure 2

Relationship Between Linear Density and the
1978-79 Average Cost Per Pupil
Per Year

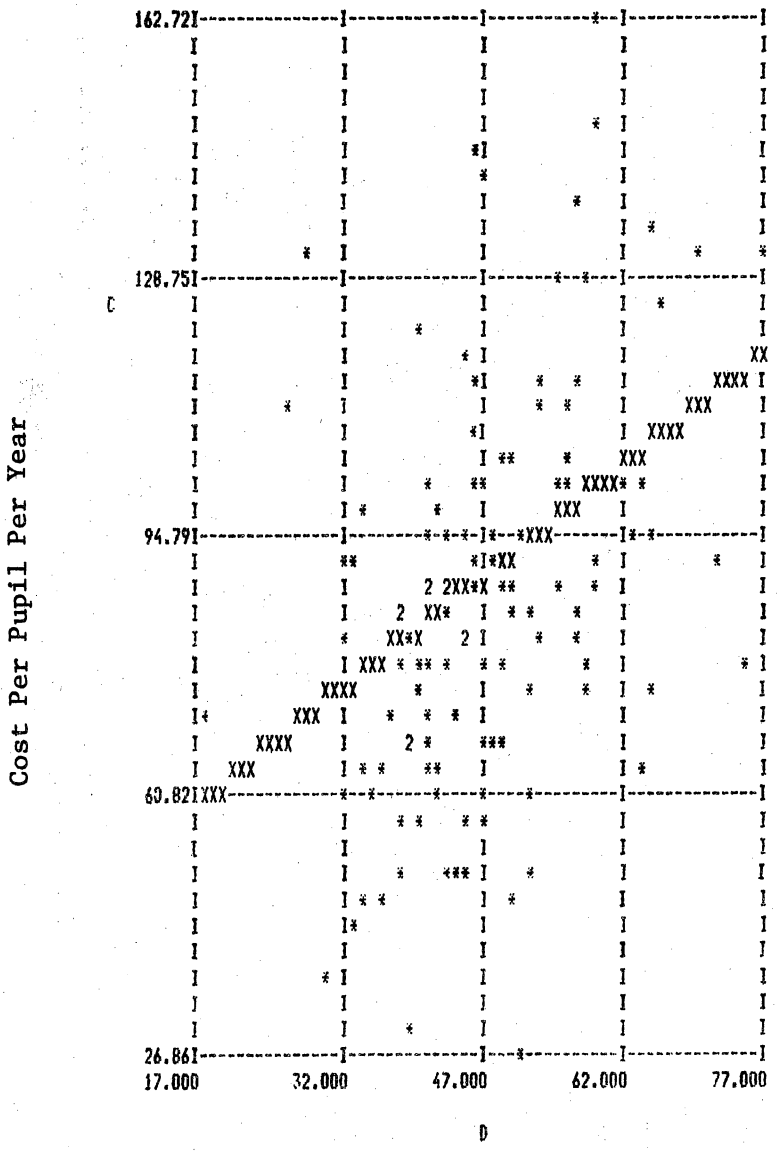

Figure 3

Relationship Between Average Miles Per Bus Per Day and the 1978-79 Average Cost Per Pupil Per Year

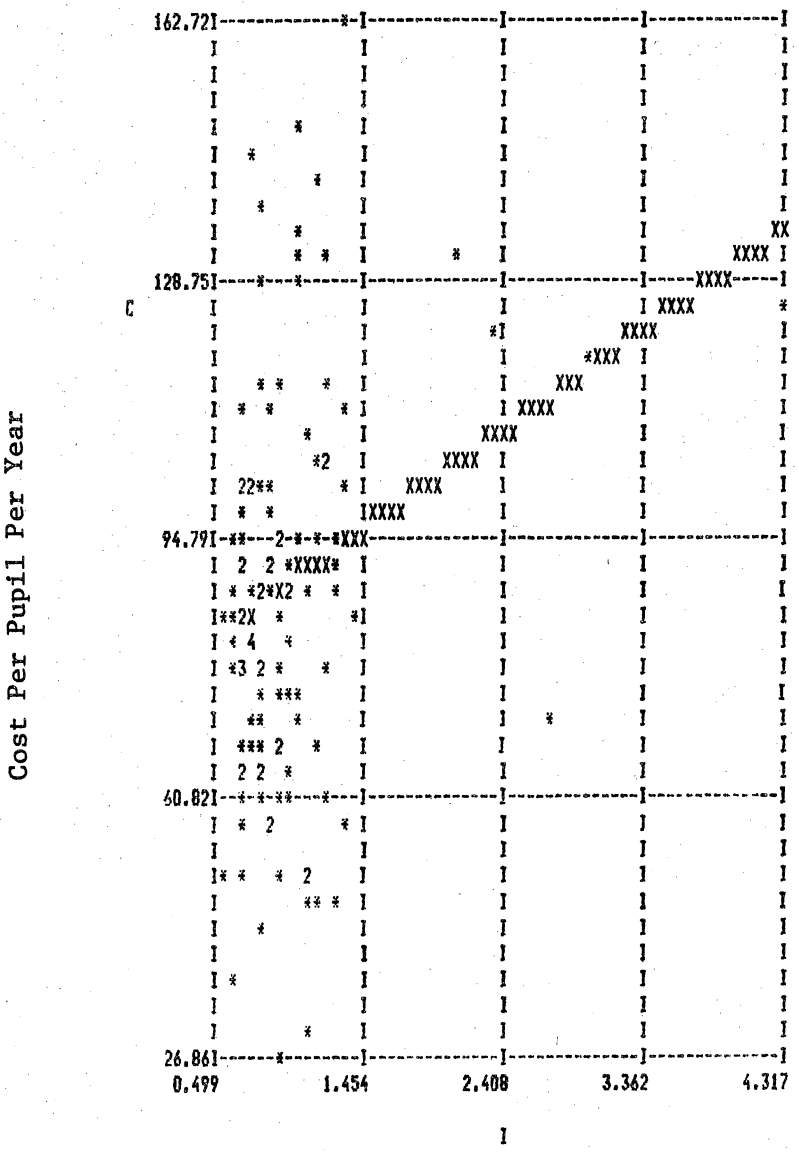

Figure 4

Relationship Between Composite Index and the 1978-79 Average Cost Per Pupil Per Year

The variables V7 (linear density) and V9 (composite index) did not appear to violate any of the evaluative criteria at this stage of the analysis. Therefore, V7 and V9 were considered for use in alternate funding formulas.

After eliminating the two-variable combinations of V3-V9 and V7-V5 due to the unreliability of variables V3 and V5, the next best combination was V7-V9 (linear density and composite index) with data in logarithm form. With the elimination of V3 as the best single predictor of cost, V7 (linear density) in inverse form became the next best single cost predictor. However, since V7 in logarithm form was so close to V7 (inverse form) in explaining the dependent variance (58.54 vs. 58.06), V7 in logarithm form was also retained as an alternate variable.

Multiple regressions with the selected variables produced the following equations:

Alternate Equation No. 1 (Table 13, No. 10)
V7 (linear density) and V9 (composite index) logarithm form

$$\hat{C} = B_o \, L^{B_1} \, I^{B_2}$$

$$\hat{C} = 161.5500 \times L^{(-0.5468)} \times I^{(+0.2202)}$$

$R^2 = 63.84$, $R = 0.7990$, F Ratio = F 98.86, Degrees of Freedom = 2, 112, Standard Error = 15.8960

Alternate Equation No. 2 (Table 13, No. 9)
V7 (linear density) logarithm form

$$\hat{C} = B_o \, L^{B_1}$$

$$\hat{C} = 156.8484 \times L^{(-0.5391)}$$

R^2 = 58.06, R = 0.7620, F Ratio = F 156.436, Degrees of Freedom = 1, 113, Standard Error = 17.0640

Alternate Equation No. 3 (Table 13, No. 5)
V7 (linear density) inverse form

$\hat{C} = b_o + b_1 (^1/L)$

$\hat{C} = 41.1964 + (135.6395/L)$

R^2 = 58.54, R = 0.7651, F Ratio = F 159.527, Degrees of Freedom = 1, 113, Standard Error = 17.0202

FISCAL IMPLICATIONS OF THE ALTERNATE FORMULAS

The three alternate equations were used to predict pupil transportation cost for each school district. The predicted costs were compared with the district's actual cost, and the resulting residuals were noted. Table 14 shows how each equation would impact on the school districts of the state.

Funding under alternate 1, as shown in Table 14, would impact substantially on several school districts. Of the 115 districts involved in the analysis, the predicted cost of 59 districts would be more than their 1978-79 average cost per pupil, and the predicted cost for 56 districts would be less.

Alexandria ($62.11) and Petersburg ($56.25) represent the greatest variance, in terms of actual cost exceeding predicted cost, under alternate 1. Louisa County (-$30,35) and Prince Edward County (-$32.01) would be the

Table 14

Comparison of Predicted Cost Per Pupil Using Three Alternate Equations
1978-79 Data

District	Actual Cost Per Pupil	Predicted Cost Alt. 1	Residual Alt. 1	Predicted Cost Alt. 2	Residual Alt. 2	Predicted Cost Alt. 3	Residual Alt. 3
1	2	3	4	5	6	7	8
Accomack County	94.56	104.99	-10.43	107.09	-12.53	108.01	-13.45
Albemarle County	110.87	100.74	10.13	96.34	14.53	96.11	14.76
Alexandria	135.32	73.21	62.11	61.09	74.23	64.79	70.53
Alleghany County	81.94	72.74	9.20	80.46	1.48	80.51	1.43
Amelia County	89.64	99.26	-9.62	101.80	-12.16	102.02	-12.38
Amherst County	84.92	76.73	8.19	81.61	3.31	81.57	3.35
Appomattox County	89.02	87.79	1.23	91.64	-2.62	91.25	-2.23
Arlington County	122.15	74.20	47.95	60.30	61.85	64.23	57.92
Augusta County	74.19	71.10	3.09	73.70	0.49	74.61	-0.42
Bath County	149.17	122.04	27.13	117.83	31.34	120.98	28.19
Bedford County	83.71	93.75	-10.04	98.73	-15.02	98.67	-14.96
Bland County	89.16	77.20	11.96	83.93	5.23	83.72	5.44
Botetourt County	88.70	89.22	-0.52	91.82	-3.12	91.43	-2.73
Brunswick County	115.17	110.21	4.96	114.26	0.91	116.55	-1.38
Buchanan County	93.38	70.52	22.86	70.06	23.32	71.61	21.77
Buckingham County	90.33	103.43	-13.10	104.61	-14.28	105.18	-14.85
Campbell County	61.09	80.55	-19.46	86.91	-25.82	86.56	-25.47
Caroline County	104.08	96.07	8.01	97.19	6.89	97.02	7.06
Carroll County	79.03	85.43	-6.40	93.71	-14.68	93.37	-14.34
Charles City County	104.74	86.99	17.75	93.13	11.61	92.77	11.97
Charlotte County	102.30	101.38	0.92	108.53	-6.23	109.70	-7.40
Charlottesville	60.05	63.28	-3.23	58.45	1.60	62.93	-2.88
Chesapeake	60.52	62.60	-2.08	67.03	-6.51	69.22	-8.70
Chesterfield	77.45	74.24	3.21	73.50	3.95	74.44	3.01
Clarke County	78.89	86.48	-7.59	81.22	-2.33	81.21	-2.32
Colonial Beach	31.33	57.38	-26.05	55.07	-23.74	60.66	-29.33
Covington	26.86	44.61	-17.75	44.73	-17.87	54.43	-27.57
Craig County	104.15	102.55	1.60	105.96	-1.81	106.72	-2.57
Culpepper County	96.10	95.68	0.42	93.13	2.97	92.77	3.33
Cumberland County	95.83	104.63	-8.80	112.25	-16.42	114.12	-18.29

Table 14 (continued)

District	Actual Cost Per Pupil	Predicted Cost Alt. 1	Residual Alt. 1	Predicted Cost Alt. 2	Residual Alt. 2	Predicted Cost Alt. 3	Residual Alt. 3
1	2	3	4	5	6	7	8
Danville	65.66	68.31	-2.65	67.79	-2.13	69.81	-4.15
Dickenson County	100.66	68.76	31.90	73.70	26.96	74.61	26.05
Dinwiddie County	104.87	100.18	4.69	105.69	-0.82	106.41	-1.54
Essex County	132.97	129.90	3.07	121.34	11.63	125.44	7.53
Fairfax County	92.87	86.23	6.64	79.96	12.91	80.06	12.81
Falls Church	72.32	58.49	13.83	46.26	26.06	55.28	17.04
Fauquier County	88.30	89.38	-1.08	82.81	5.49	82.68	5.62
Floyd County	131.77	112.87	18.90	115.65	16.12	118.26	13.51
Fluvanna County	88.89	93.69	-4.80	89.52	-0.63	89.13	-0.24
Franklin City	45.94	63.52	-17.58	66.01	-20.07	68.43	-22.49
Franklin County	87.86	88.40	-0.54	94.50	-6.64	94.18	-6.32
Frederick County	76.53	86.98	-10.45	86.44	-9.91	86.11	-9.58
Giles County	75.89	69.77	6.12	72.27	3.62	73.41	2.48
Gloucester County	136.04	124.52	11.52	119.74	16.30	123.40	12.64
Goochland County	108.06	122.16	-14.10	113.58	-5.52	115.72	-7.66
Greene County	84.10	70.72	13.38	74.59	9.51	75.36	8.74
Greensville County	78.73	90.61	-11.88	97.62	-18.89	97.48	-18.75
Hanover County	71.83	79.41	-7.58	77.71	-5.88	78.06	-6.23
Henrico County	61.48	67.66	-6.18	63.51	-2.03	66.55	-5.07
Henry County	78.05	72.94	5.11	79.11	-1.06	79.30	-1.25
Highland County	162.72	146.70	16.02	133.42	29.30	141.67	21.05
Isle of Wight County	87.12	86.24	0.88	86.60	0.52	86.26	0.86
King George County	96.40	94.04	2.36	94.30	2.10	93.97	2.43
King and Queen County	133.24	147.02	-13.78	141.54	-8.30	153.30	-20.06
King William County	106.00	109.46	-3.46	103.56	2.44	103.99	2.01
Lancaster County	107.22	111.58	-4.36	104.08	3.14	104.58	2.64
Lee County	87.75	66.24	21.51	75.73	12.02	76.34	11.41
Loudoun County	95.38	88.99	6.39	82.68	12.70	82.55	12.83
Louisa County	87.51	117.86	-30.35	106.24	-18.73	107.04	-19.53
Lunenburg County	104.85	107.24	-2.39	112.25	-7.40	114.12	-9.27

Table 14 (continued)

District	Actual Cost Per Pupil	Predicted Cost Alt. 1	Residual Alt. 1	Predicted Cost Alt. 2	Residual Alt. 2	Predicted Cost Alt. 3	Residual Alt. 3
1	2	3	4	5	6	7	8
Lynchburg	53.62	62.96	-9.34	60.52	-6.90	64.38	-10.76
Madison County	99.64	88.12	11.52	89.19	10.45	88.79	10.85
Manassas City	47.28	52.81	-5.53	50.15	-2.87	57.56	-10.28
Manassas Park	52.79	51.38	1.41	58.00	-5.21	62.62	-9.83
Martinsville	62.64	59.15	3.49	58.15	4.49	62.73	-0.09
Mathews County	97.34	112.30	-14.96	105.69	-8.35	106.41	-9.07
Mecklenburg County	82.26	96.55	-14.29	101.80	-19.54	102.02	-19.76
Middlesex County	118.45	100.59	17.86	93.52	24.93	93.17	25.28
Montgomery County	68.64	67.84	0.80	70.40	-1.76	71.88	-3.24
Nelson County	142.23	121.08	21.15	124.28	17.95	129.27	12.96
New Kent County	131.00	122.62	8.38	118.21	12.79	121.46	9.54
Newport News	79.83	71.91	7.92	72.18	7.65	73.34	6.49
Northampton County	82.94	85.24	-2.30	88.85	-5.91	88.46	-5.52
Northumberland County	145.04	131.48	13.56	123.42	21.62	128.14	16.90
Nottoway County	73.72	75.59	-1.87	79.47	-5.75	79.62	-5.90
Orange County	91.19	93.29	-2.10	92.01	-0.82	91.62	-0.43
Page County	60.06	72.81	-12.75	74.39	-14.33	75.19	-15.13
Patrick County	94.71	86.81	7.90	92.94	1.77	92.58	2.13
Petersburg	114.49	58.24	56.25	59.23	55.26	63.47	51.02
Pittsylvania County	95.15	89.17	5.98	98.51	-3.36	98.43	-3.28
Poquoson	38.00	52.86	-14.86	57.76	-19.76	62.46	-24.46
Portsmouth	62.92	52.07	10.85	54.07	8.85	60.01	2.91
Powhatan County	79.77	85.31	-5.54	87.70	-7.93	87.33	-7.56
Prince Edward County	76.83	108.84	-32.01	105.42	-28.59	106.10	-29.27
Prince George County	112.00	90.15	21.85	96.97	15.03	96.79	15.21
Prince William County	116.91	88.99	27.92	89.19	27.72	88.79	28.12
Pulaski County	67.94	73.44	-5.50	77.82	-9.88	78.16	-10.22
Rappahannock County	104.77	120.70	-15.93	110.66	-5.89	112.21	-7.44
Richmond City	112.11	81.68	30.43	75.10	37.01	75.80	36.31
Richmond County	88.47	102.34	-13.87	100.59	-12.12	100.69	-12.22

Table 14 (continued)

District	Actual Cost Per Pupil	Predicted Cost Alt. 1	Residual Alt. 1	Predicted Cost Alt. 2	Residual Alt. 2	Predicted Cost Alt. 3	Residual Alt. 3
1	2	3	4	5	6	7	8
Roanoke City	53.77	64.72	-10.95	62.45	-8.68	65.77	-12.00
Roanoke County	59.60	69.50	-9.90	70.31	-10.71	71.81	-12.21
Rockbridge County	78.87	83.75	-4.88	86.91	-8.04	86.56	-7.69
Rockingham County	71.00	75.78	-4.78	76.37	-5.37	76.89	-5.89
Russell County	80.06	67.91	12.15	72.55	7.51	73.65	6.41
Scott County	87.97	85.73	2.24	95.10	-7.13	94.81	-6.84
Shenandoah County	81.57	78.48	3.09	76.92	4.65	77.37	4.20
Smyth County	52.85	55.59	-2.74	60.36	-7.51	64.26	-11.41
Southampton County	146.48	110.26	36.22	115.30	31.18	117.83	28.65
Spotsylvania County	63.23	79.90	-16.67	79.59	-16.36	79.73	-16.50
Stafford County	65.43	72.25	-6.82	74.29	-8.86	75.11	-9.68
Suffolk	66.58	87.30	-20.72	90.56	-23.98	90.16	-23.58
Surry County	120.00	122.90	-2.90	94.10	25.90	93.77	26.23
Sussex County	97.87	118.27	-20.40	117.83	-19.96	120.98	-23.11
Tazewell County	67.59	61.43	6.16	65.87	1.72	68.32	-0.73
Virginia Beach	51.38	58.60	-7.22	59.23	-7.85	63.47	-12.09
Warren County	69.45	73.63	-4.18	70.06	-0.61	71.61	-2.16
Washington County	68.40	68.15	0.25	73.99	-5.59	74.85	-6.45
West Point	50.34	62.91	-12.57	60.64	-10.30	64.46	-14.12
Westmoreland County	92.42	99.68	-7.26	100.59	-8.17	100.69	-8.27
Williamsburg	127.34	149.37	-22.03	105.69	21.65	106.41	20.93
Winchester	50.36	64.26	-13.90	59.81	-9.45	63.88	-13.52
Wise County	91.90	61.36	30.54	66.37	25.53	68.71	23.19
Wythe County	64.59	63.61	0.98	67.87	-3.28	69.87	-5.28
York County	70.53	76.79	-6.26	76.37	-5.84	76.89	-6.36

districts most favorably impacted by alternate 1. There would be eight districts with less than one dollar per pupil per year variance between actual and predicted per pupil cost under alternate 1.

When analyzing the impact of alternate 1 (linear density and composite index) on wealthy districts (high composite index) vs. poor districts (low composite index), a pattern was detected which tended to favor the wealthy districts. For example, Alexandria, Arlington, Falls Church, Surry County and Williamsburg (high composite index districts) received a substantially higher predicted cost under alternate 1 than under alternates 2 and 3. Conversely, Alleghany County, Russell County, Scott County, Washington County, Wise County and Wythe County (low composite index districts) received substantially lower predicted cost under alternate 1 when compared to alternates 2 and 3.

The predicted cost under alternate 2 would be greater than actual cost in 64 districts, and the predicted cost would be less than actual cost in 51 districts. The three districts with the greatest variance (predicted cost less than actual cost) were Alexandria ($74.23), Arlington County ($61.85), and Petersburg ($55.26). The districts that would benefit most from alternate 2 were Prince Edward County ($28.59), Campbell County ($25.82), Suffolk ($23.98), and Colonial Beach ($23.74). The predicted cost for seven

districts would be within one dollar of actual cost under alternate 2.

Under alternate 3 funding, the predicted cost for 69 districts would be more than their actual cost, and the predicted cost for 46 districts would be less. Districts slated to be most favorably impacted by alternate 3, in terms of predicted cost exceeding actual cost per pupil per year, would be Colonial Beach (-$29.33), Covington (-$29.57) and Prince Edward County (-$27.27). Alexandria ($70.53), Arlington ($57.92) and Petersburg ($51.02) would be the districts most negatively affected under alternate 3. There would be six districts with less than one dollar per pupil per year variance between actual and predicted cost under alternate 3: Augusta County, Fluvanna County, Isle of Wight County, Martinsville, Orange County, and Tazewell County.

The final step in evaluating the fiscal implications of alternate formulas is to select a preferred formula and evaluate its impact on the school districts when used to allocate funds at various funding levels. Table 15 shows the evaluation of the three alternate funding formulas using the five evaluative criteria established in this study. Alternate 1 passed all of the criteria but equity. The analysis of data in Table 14 revealed that the formula dealt inequitably with poor districts. Alternates two and three

Table 15

Evaluation of Alternate State Funding Formulas Using Selected Criteria

Plan	Adequacy	Reliability	Simplicity	Efficiency	Objectivity	Equity
Alternate One	Yes	Yes	Yes	Yes	Yes	No
Alternate Two	Yes	Yes	Yes	Yes	Yes	Yes
Alternate Three	Yes	Yes	Yes	Yes	Yes	Yes

passed all of the evaluative criteria; however, alternate three is the preferred formula. It explains a higher percent of the dependent variance, and it is somewhat simpler because it does not require data transformation.

The fiscal impact of alternate three on the school districts and the state at two levels of funding is displayed in Table 16. Table 16 displays each district's total cost of operation, total predicted cost under alternate three, the state allocation for 1978-79, and the amount of state funding under alternate three at two levels of funding.

Interestingly, the actual transportation cost (column 2) is only slightly more than the predicted cost (column 3) using alternate equation 3 ($58,909,968 vs. $57,550,338). The total allocation based on the 32 percent funding level was slightly less than the state allocation ($19,355,276 vs. $18,416,109). To fund transportation at the 40 percent level, using alternate formula 3 as the distribution formula, would only require an additional $3,664,868 beyond the amount allocated by the state in 1978-79.

SUMMARY

The first section of this chapter was devoted to the review and selection of evaluative criteria suitable for judging the quality of pupil transportation programs.

Table 16

State Funding Based on Alternate Formula 3
1978-79 Data

District	Total Cost of Operation (Less Gas Tax Refund)	Total Predicted Cost Alt. 3	State Allocation	State Allocation Based on Alt. 3 at 32 Percent Funding Level[a]	State Allocation Based on Alt. 3 at 40 Percent Funding Level[b]
1	2	3	4	5	6
Accomack County	$ 499,281	$ 511,319	$ 177,518	$ 163,622	$ 204,528
Albemarle County	980,640	850,093	293,834	272,030	340,037
Alexandria	443,699	212,446	140,111	67,983	84,978
Alleghany County	246,795	242,496	79.832	77,599	96,998
Amelia County	140,913	160,375	54,492	51,320	64,150
Amherst County	412,718	396,430	131,909	126,858	158,572
Appomattox County	225,589	231,228	77,884	73,993	92,491
Arlington County	857,718	451,537	146,575	144,492	180,615
Augusta County	766,515	770,796	275,382	246,655	308,318
Bath County	164,984	133,804	42,190	42,817	53,522
Bedford County	604,925	712,989	238,309	228,156	285,196
Bland County	104,233	97,869	34,062	31,318	39,148
Botetourt County	373,464	384,920	128,244	123,174	153,968
Brunswick County	332,975	336,946	119,948	107,823	134,778
Buchanan County	718,188	550,753	193,060	176,241	220,301
Buckingham County	225,114	262,109	90,242	83,875	104,844
Campbell County	553,923	784,753	271,733	251,121	313,901
Caroline County	376,168	350,630	122,003	112,202	140,252
Carroll County	363,615	429,595	152,724	137,470	171,838
Charles City County	153,234	135,723	53,424	43,431	54,289
Charlotte County	268,017	287,414	102,578	91,972	114,966
Charlottesville	189,746	198,859	68,562	63,635	79,544
Chesapeake	1,112,112	1,271,918	425,552	407,014	508,767
Chesterfield County	2,196,133	2,110,821	662,853	675,463	844,328
Clarke County	132,064	135,946	45,233	43,503	54,378
Colonial Beach	8,522	16,500	5,416	5,280	6,600
Covington	21,247	43,054	12,370	13,777	17,222
Craig County	69,156	70,862	23,006	22,676	28.345
Culpepper County	374,250	361,803	131,257	115,777	144,721
Cumberland County	146,807	174,832	58,824	55,946	69,933

Table 16 (continued)

District	Total Cost of Operation (Less Gas Tax Refund)	Total Predicted Cost Alt. 3	State Allocation	State Allocation Based on Alt. 3 at 32 Percent Funding Level[a]	State Allocation Based on Alt. 3 at 40 Percent Funding Level[b]
1	2	3	4	5	6
Danville	$ 89,424	$ 95,081	$ 30,949	$ 30,426	$ 38,032
Dickenson County	407,987	302,394	108,524	96,766	120,958
Dinwiddie County	459,856	463,735	165,518	148,395	185,494
Essex County	210,492	198,572	64,393	63,543	79,429
Fairfax County	7,596,258	6,548,187	1,988,373	2,095,420	2,619,275
Falls Church	36,237	27,695	8,452	8,862	11,078
Fauquier County	587,873	550,401	194,324	176,128	220,160
Floyd County	257,099	230,725	76,842	73,832	92,290
Fluvanna County	184,628	185,123	65,857	59,239	74,049
Franklin City	60,010	89,370	26,829	28,598	35,748
Franklin County	551,794	591,450	200,627	189.264	236,580
Frederick County	544,397	612,500	197,524	196,000	245,000
Giles County	261,818	253,265	86,736	81,045	101,306
Gloucester County	397,380	360,451	118,194	115,344	144,180
Goochland County	215,145	230,399	80,804	73,728	92,160
Greene County	123,465	110,628	39,645	35,401	44,251
Greensville County	243,226	301,116	96,828	96,357	120,446
Hanover County	670,158	728,144	248,291	233,006	291,258
Henrico County	1,541,345	1,668,342	543,689	533,869	667,337
Henry County	817,793	830,826	308,599	265,864	332,330
Highland County	65,416	56,951	20,164	18,224	22,780
Isle of Wight County	360,643	354,270	129,023	113,366	141,708
King George County	210,451	205,137	71,408	65,645	82,055
King and Queen County	130,848	150,541	51,012	48,173	60,216
King William County	141,349	139,139	49,553	44,524	55,656
Lancaster County	170,155	165,968	69,593	53,110	66,387
Lee County	377,272	328,186	124,776	105,020	131,274
Loudoun County	880,084	761,689	275,909	243,740	304,676
Louisa County	278,550	340,708	116,440	109,027	136,283
Lunenburg County	245,266	266,927	93,168	85,417	106,771

Table 16 (continued)

District	Total Cost of Operation (Less Gas Tax Refund)	Total Predicted Cost Alt. 3	State Allocation	State Allocation Based on Alt. 3 at 32 Percent Funding Level[a]	State Allocation Based on Alt. 3 at 40 Percent Funding Level[b]
1	2	3	4	5	6
Lynchburg	$ 468,929	$ 562,939	$ 186,315	$ 180,140	$ 225,176
Madison County	197,493	175,982	63,394	56,314	70,393
Manassas City	95,236	115,926	33,699	37,096	46,370
Manassas Park	44,297	52,538	17,545	16,812	21,015
Martinsville	146,514	146,725	49,687	46,952	58,690
Mathews County	118,361	129,395	44,338	41,406	51,758
Mecklenburg County	493,704	612,324	208,446	195,944	244,930
Middlesex County	142,731	112,270	39,525	35,926	44,908
Montgomery County	522,441	547,079	181,946	175,065	218,832
Nelson County	344,489	313,092	108,460	100,189	125,237
New Kent County	212,754	197,251	67,387	63,120	78,900
Newport News	1,747,980	1,603,726	555,040	513,192	641,490
Northampton County	203,614	217,169	76,608	69,494	86,868
Northumberland County	198,135	175,039	66,347	56,012	70,016
Nottoway County	182,014	196,582	66,485	62,906	78,633
Orange County	293,274	294,650	104,723	94,288	117,860
Page County	188,302	235,721	79,772	75,431	94,288
Patrick County	286,979	280,517	101,332	89,765	112,207
Petersburg	533,871	295,961	115,306	94,708	118,384
Pittsylvania County	1,147,646	1,187,164	414,676	379,892	474,866
Poquoson	72,913	119,861	40,118	38,356	47,944
Portsmouth	790,141	753,486	251,766	241,116	301,394
Powhatan County	175,431	192,039	67,354	61,452	76,816
Prince Edward County	159,262	219,945	64,379	70,382	87,978
Prince George County	561,665	485,402	162,686	155,329	194,161
Prince William County	2,867,505	2,183,524	750,104	698,728	873,410
Pulaski County	432,053	497,019	149,196	159,046	198,808
Rappahannock County	110,639	118,494	38,644	37,918	47,398
Richmond City	1,927,249	1,303,002	434,773	416,961	521,201
Richmond County	109,079	124,151	48,216	39,728	49,660

Table 16 (continued)

District	Total Cost of Operation (Less Gas Tax Refund)	Total Predicted Cost Alt. 3	State Allocation	State Allocation Based on Alt. 3 at 32 Percent Funding Level[a]	State Allocation Based on Alt. 3 at 40 Percent Funding Level[b]
1	2	3	4	5	6
Roanoke City	$ 636,026	$ 777,862	$ 246,185	$ 248,916	$ 311,145
Roanoke County	1,016,730	1,225,079	410,519	392,025	490,032
Rockbridge County	257,430	282,532	99,431	90,410	113,013
Rockingham County	644,946	698,469	251,662	223,510	279,388
Russell County	453,654	417,301	145,934	133,536	166,920
Scott County	392,153	422,663	141,945	135,252	169,065
Shenandoah County	399,085	378,494	137,445	121,118	151,398
Smyth County	317,546	386,074	128,752	123,544	154,430
Southampton County	459,680	369,751	137,129	118,320	147,900
Spotsylvania County	477,346	601,882	197,318	192,602	240,753
Stafford County	576,990	662,395	208,375	211,966	264,958
Suffolk	504,361	682,962	219,943	218,548	273,185
Surry County	153,723	120,119	45,911	38,438	48,048
Sussex County	215,112	265,914	92,982	85,092	106,366
Tazewell County	613,627	620,209	209,865	198,467	248,084
Virginia Beach	2,532,275	3,127,611	986,010	1,000,836	1,251,044
Warren County	233,694	240,968	79,806	77,110	96,387
Washington County	557,711	610,327	205,098	195,305	244,131
West Point	31,868	40,803	13,375	13,057	16,321
Westmoreland County	211,656	230,580	84,335	73,786	92,232
Williamsburg	536,212	448,093	150,153	143,390	179,237
Winchester	98,715	125,205	38,647	40,066	50,082
Wise County	704,448	526,662	176,197	168,532	210,665
Wythe County	282,580	305,681	106,019	97,818	122,272
York County	648,535	707,004	242,802	226,241	282,802
TOTALS	$58,909,968	$57,550,338	$19,355,276	$18,416,109	$23,020,144

(a) Virginia provided reimbursement for an average of 32 percent of the pupil transportation cost in 1978-79.
(b) Virginia has considered increasing pupil transportation funding to the 40 percent level.

The criteria selected were adequacy, reliability, equity, simplicity, efficiency, and objectivity. These criteria were used to evaluate Virginia's present pupil transportation program. Virginia's program met the requirements for simplicity, objectivity, and partially fulfilled the requirements for efficiency. However, Virginia did not meet the standards for adequacy, reliability and equity.

Pupil transportation data were collected from all districts which provided pupil transportation during 1978-79. Data related to pupil transportation cost were analyzed, and the variables to be used in the analysis were selected. Those selected were:

1. The ADA of transported pupils
2. The total number of buses
3. The average number of pupils per bus
4. The total miles pupils were transported
5. The average miles per bus per day
6. The area density of the district
7. The linear density of the district
8. The average cost per pupil per year
9. The district's composite index for 1978-79

The average cost per pupil per year was selected as the dependent/criterion variable.

The next step in the analysis was to compute the intercorrelation among the variables. The average number

of pupils per bus and linear density were the most highly correlated of the independent variables with the dependent variable.

A series of multiple regressions of the independent variables on the dependent variable was conducted to determine the best cost predictor(s). The regressions were conducted with the data of the variables in their original form and with the variable data transformed into inverse, quadratic, and logarithm forms. Multiple regressions computed with the data in logarithm and inverse forms produced the best results in explaining the dependent variance.

After analyzing the best cost predictor variables, the following variables were selected for consideration as alternate funding formulas:

1. Linear density with the composite index (logarithm form)
2. Linear density (logarithm form)
3. Linear density (inverse form)

Scattergrams of the independent variables versus the dependent variable were conducted to check the forms of relationship. Only the average number of pupils per bus and linear density suggested curvilinearity.

Finally, the fiscal implications of the three alternate equations were reviewed for all districts used in the

analysis, and the preferred alternate formula was used to compute pupil transportation allocations at two levels of funding.

Chapter 6

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

The preceding chapters established the need for a study of pupil transportation funding in Virginia and presented certain questions for study and analysis. Also presented was a comprehensive review of pupil transportation throughout the Nation and the problems inherent in developing equitable funding plans. The examination of various state pupil transportation programs and the review of literature provided the foundation and framework needed to analyze Virginia's pupil transportation program. In conjunction with the analysis, a thorough review and study of Virginia's present transportation program was presented.

Appropriate methodology was developed to answer the questions raised in the study and to facilitate the analysis of selected cost variables. Evaluative criteria were selected and used to evaluate Virginia's pupil transportation program. In addition, factors related to pupil transportation cost in Virginia were analyzed with appropriate statistical procedures. Alternative state aid formulas for pupil transportation in Virginia were developed, and the fiscal effects of these formulas on Virginia's school districts were presented.

CONCLUSIONS

The main purpose of this study was to examine Virginia's pupil transportation program and to develop alternate funding formulas suitable for use in Virginia. Specific questions relative to the purpose of this study were presented, and the conclusions of the study are presented in response to these questions. The following questions were presented:

1. What types of funding plans are used for pupil transportation in other states, and what are the valid, established criteria which may be used to evaluate state pupil transportation programs?

The writer's survey of current state pupil transportation programs revealed a wide variety of approaches in funding pupil transportation. Most state programs are characterized by individuality, and many are unduly complex.

From the survey information, key characteristics of the various state programs were grouped and summarized. The fiscal models used as the basis for allocating funds were grouped into five models: equalization concept/formula, percentage grant, flat grant, approved cost, and state-owned/operated. The equalization concept/formula recognizes variations in transportation costs due to factors beyond the control of the local board and attempts to equalize the distribution of funds by taking one or more of the factors

into consideration. The percentage grant model provides for the payment of a fixed percentage of the district's approved transportation costs. The flat grant model provides a fixed monetary value for one or more cost factors. In the approved cost model, the state pays the district's entire approved cost of pupil transportation.

States frequently used combinations of two or more fiscal models in distributing pupil transportation funds. Twenty-one states used some type of equalization plan; sixteen states used a percentage grant; twenty-one states used the flat grant model; seven states used approved cost; and two states own and operate the transportation systems.

Factors used by states to determine local entitlement were grouped into fourteen categories:

1. Linear density (3)
2. Area density (8)
3. Road conditions (4)
4. Geographic regions (2)
5. Assessed valuation (9)
6. Bus replacement (10)
7. Number of pupils transported (24)
8. Bus depreciation (8)
9. Number of buses (9)
10. Size of buses (10)
11. Bus insurance (4)
12. Bus mileage (20)

13. Driver salaries/bus hours (7)

14. Expenditures (29)

The frequency of use by the states is noted to the right of each factor.

From the review of literature, statements and terms related to evaluating state pupil transportation programs were identified. The sources included recognized authorities in the field of pupil transportation funding, the New Mexico State Department of Education, the National Educational Finance Project, and the Educational Finance and Management Institute.

The explanatory statements and terms were grouped into twelve summary terms. A term that was recommended by five or more sources was considered valid for use in this study. The following terms met this criterion:

Adequacy

To meet the adequacy criterion, the state plan should provide sufficient state funds to enable the local unit, with reasonable local effort, to operate a safe, economical, and efficient system of transportation for all pupils who should be transported.

Reliability

To meet the reliability criterion, the state plan should not permit the manipulation or control of the distribution factors at the local level.

Simplicity

The simplicity criterion specifies that the state plan should be as simple as possible yet maintain accuracy.

Efficiency

The state plan should discourage extravagant expenditures and promote efficiency of operation on the part of the local school district by providing a direct monetary incentive for efficiency in local programs.

Objectivity

The state plan should be as objective as possible. Decisions at the local and state levels should be within broad policy guidelines, thereby avoiding decisions which reflect the values of the individual. Also, funds should be allocated according to a predetermined formula which leaves no discretionary power in the hands of state officials.

Equity

The state plan must take into account factors beyond the control of local school districts which cause a substantial variation in the justifiable cost of the service.

2. How adequately does the Virginia pupil transportation program meet valid, established evaluation criteria?

The six evaluation criteria established in this study were used to evaluate Virginia's pupil transportation program. Virginia's current allocation plan met the requirements for simplicity, objectivity, and partially fulfilled

the requirements for efficiency, but Virginia did not meet the standards for adequacy, reliability and equity.

Adequacy was measured in terms of the support provided by the state (percent of transportation costs reimbursed by the state and transportation funding as a percent of the total state education budget). Comparatively speaking, Virginia's categorical transportation aid is substantially less than the national average.

Reliability was judged in terms of the potential for manipulation of reimbursement factors at the local level and the auditing of reimbursement factors. Of the three reimbursement factors used by Virginia, only the number of school buses is audited. The review of current research indicated that the other two factors (miles and pupils transported) are subject to manipulation at the local level.

Virginia met the criterion for simplicity. By using a flat grant amount for miles, pupils, and buses, calculations are simplified and record keeping is held to a minimum.

The Virginia plan partially fulfilled the requirements for efficiency. The Virginia plan does not provide a direct monetary incentive for efficiency in local programs. Efficiency is encouraged by basing the allocation of funds on an adjusted average cost/cost efficiency equalization formula. However, the Virginia plan aids efficiency by establishing state contracts, providing inservice training, and operating a safety program.

Virginia's reimbursement plan is very specific in the data to be submitted by the local school districts and the calculations used to compute local entitlement. If properly administered, the plan meets the objectivity criterion.

Virginia failed the equity criterion, because it fails to take into account any of the factors beyond the control of the local school districts which cause a substantial variation in the cost of pupil transportation. The density of transported pupils and the fiscal capacity of the district are examples of such factors.

3. What factors cause variations in the necessary cost of pupil transportation among the school districts of Virginia, and which factor(s) is the best predictor of pupil transportation cost?

There are extreme variations among the school districts of Virginia in the amount spent for pupil transportation. However, total expenditures are usually related to the number of pupils transported, which directly affects the number of buses, number of employees, and other operational costs.

Many cost factors were reviewed, including those identified in the survey of state pupil transportation programs. Special consideration was given to those cost factors which are beyond the control of the local school

district. After careful evaluation, nine cost factors were selected for analysis:

1. The average daily attendance of transported pupils
2. The total number of buses
3. The average number of pupils per bus
4. The total miles pupils were transported on regular routes
5. The average number of miles per bus per day
6. The area density of transported pupils
7. The linear density of transported pupils
8. The average cost per pupil per year
9. The composite index of the school district (1978-79)

The three reimbursement factors currently used by Virginia are included in the analysis. In analyzing the cost factors, the average cost per pupil per year was selected as the dependent variable. The district's average cost per pupil per year provides a good common denominator for an analysis of cost, regardless of the size of the school district.

Computation of the intercorrelations among the variables revealed that the reimbursement factors currently in use in Virginia were not significantly correlated with the dependent variable. The average number of pupils per bus and linear density had the highest correlation with the

dependent variable.

A series of multiple regressions of the independent variables on the dependent variable pointed to several conclusions. When using stepwise regression with all variables, the average number of pupils per bus was the best predictor of cost. The composite index was second. However, during the analysis of correlations, it was noted that a high correlation existed between the average number of pupils per bus and linear density. Therefore, when the average number of pupils per bus is removed from the stepwise regression, linear density became the best predictor of cost, with the composite index second. However, the percentage of variance explained by the average number of pupils per bus was slightly higher than linear density. When using logarithmic transformation of data, the average miles per bus per day replaced the composite index in second place when running stepwise regression with the average number of pupils per bus removed.

The most practical formulas for predicting cost were developed by using either two-variable combinations or single variables; however, the highest percent of the variance in per pupil cost was explained with two-variable combinations. The use of three or more variables in a formula was not considered, because the additional variables did not add significantly to the prediction of cost.

The average number of pupils per bus, when combined with the composite index, explained the highest percent of the variation in pupil transportation cost. Linear density, when combined with the average miles per bus per day, was second. The combination of linear density and the composite index was third. Next, the single variables of the average number of pupils per bus provided the fourth highest predictor of cost followed by linear density.

The four best cost predictor variables (V3 - number of pupils per bus, V7 - linear density, V5 - miles per bus per day and V9 - composite index) were reviewed in terms of the evaluative criteria established in this study. The number of pupils per bus (V3) and the miles per bus per day (V5) were eliminated from further analysis because they are subject to manipulation at the local level. Linear density (V7) and the composite index (V9) did not appear to violate any of the evaluative criteria at this stage of the analysis.

After eliminating the two-variable combinations of V3-V9 and V7-V5 due to the unreliability of variables V3 and V5, the next best combination was V7-V9 with the data in logarithm form. With the elimination of V3 as the best single cost predictor, V7 (linear density) in inverse form became the next best single cost variable followed by V7 in logarithm form.

4. What alternate funding plans can be considered for use in Virginia, and what are the fiscal implications of such plans on the school districts and the state?

One purpose of this study was to develop alternate funding formulas which may be more suitable than the present Virginia plan. The alternate formulas should meet the evaluation criteria established in this study. Also, the review of literature strongly recommended utilizing cost factors that are beyond the control of the local school district.

Based on the findings of this study, several alternate formulas appear to be superior to the present Virginia reimbursement plan. The analysis of cost factors revealed that the three reimbursement factors used by Virginia (miles, pupils and buses) did not correlate significantly with per pupil cost. In fact, they had the lowest correlation of the entire group of variables. They were also significantly intercorrelated with each other. Therefore, it these had been the only variables available as predictor candidates, one would have an equation of low effectiveness. Also, scattergrams of these variables with the dependent variable were not very definitive in explaining the form of relationship with the dependent variable.

In stepwise regression, none of Virginia's reimbursement factors added significantly to the explanation

of the variance in per pupil cost. When regression was run with only miles, pupils and buses, they only accounted for 20 percent of the explanation of the variance in per pupil cost. Whereas, the average number of pupils per bus alone accounted for 47.10 percent (63.58 percent with log transformation), and linear density alone accounted for 45.60 percent (58.54 percent - inverse form) of the variance in per pupil cost. The two-pair combinations represented in Table 13 further increased the explanation of the variance in per pupil cost.

Before considering the alternate formulas for use in Virginia, it was necessary to evaluate each formula using the evaluative criteria established in this study. The results of the evaluations are shown in Table 15. Alternate 1 (linear density and composite index) met all of the criteria but equity. An analysis of the impact of alternate 1 on districts with high composite indexes versus districts with low composite indexes revealed that it tended to favor the high composite index districts. Therefore, it did not meet the equity criterion. Alternates 2 and 3 met all of the evaluative criteria. However, alternate 3 was selected as the preferred formula. Alternate 3 explained a higher percentage of the dependent variance, and it was simpler because transformation of data was not required.

All of the alternate equations developed in this study are better predictors of transportation costs than the

present Virginia plan. Further, alternate plan 3 represents the average cost/cost efficiency approach to funding pupil transportation. The concept is simple, objective and promotes efficiency. Alternate 3 can provide for the equitable treatment of school districts by adjusting for the important nonmanipulable factor associated with variations in per pupil cost among districts (linear density).

The fiscal implications of the three alternate equations on Virginia's school districts are shown in Table 14. The predicted cost per pupil per year for each school district was computed with each alternate equation and compared with the district's actual cost. Several districts would be impacted rather dramatically, regardless of the alternate used. For example, the predicted cost per pupil per year for Arlington County is considerably less than the actual cost in all equations: alternate 1 ($47.95), alternate 2 ($61.85), and alternate 3 ($57.92). In contrast, the predicted cost per pupil per year for Poquoson is more than the actual cost in all three equations: alternate 1 (-$14.86), alternate 2 (-$19.76), and alternate 3 (-$24.46). Arlington County had a composite index of 2.3861 compared to .6240 for Poquoson; a linear density of 5.89 compared to 6.38; and an average cost per pupil per year of $122.15 compared to $38.00 for Poquoson.

The preferred formula (alternate 3) was used in Table 16 to compute the state allocation at two levels of funding. The total predicted cost at a funding level of 32 percent was less than the state allocation for 1978-79. The state allocation at a funding level of 40 percent would require an additional 3.6 million dollars in state funding.

Although the alternate equation explained a relatively high percentage of the variation in per pupil cost, other factors obviously influence transportation costs. A major proportion of the unexplained variance is probably due to efficiency and quality variations among school districts, which should not be considered in a pupil transportation funding formula.

Realistically, the alternate formula would impact the state only to the extent to which the state wishes to fund pupil transportation. If the state funded the predicted cost computed by alternate 3, a substantial increase in funds would be required. Should the state continue its present level of funding, the school districts would probably receive a percentage of their predicted cost per pupil per year. The percentage would probably be commensurate with the state's pupil transportation budget. Hopefully, the average cost/cost efficiency concept under alternate 3 might influence the state to increase pupil transportation funding to a level closer to the average cost of pupil transportation in the state.

RECOMMENDATIONS

Overall, the State of Virginia has a good pupil transportation program; and, considering the limited size of the state's staff, is well administered. However, this writer offers several recommendations based on the findings of this study. First, the state should move toward funding a larger percentage of pupil transportation cost, eventually providing the full funding of predicted cost.

Second, the state should adopt alternate equation 3 for the distribution of pupil transportation funds. Alternate 3 met all evaluative criteria and explained a high percentage of the cost variance. In addition, the linear density variable used in the formula is currently computed for each school district by the state. However, since linear density is dependent upon mileage as a component in the computation of the index, it is recommended that the state include an on-site audit of mileage when the staff conducts the annual school bus inspections. This could be accomplished by checking only two or three routes (random sample) per district.

Alternate 3 would provide for equitable funding by adjusting the most important, nonmanipulative factor associated with variations in per pupil cost (linear density). It would also provide a direct monetary incentive

for efficiency in local pupil transportation management. Since funding would be based on average cost adjusted for linear density, districts with expenditures above the average level represented by the linear density curve would be reimbursed for a lower proportion of costs than districts with above average efficiency.

Alternate 3 would provide a relatively simple and objective method of allocating pupil transportation funds. While regression analysis is rather complex, standard statistical software programs are available to facilitate the computations. The coefficient of the formula should be recomputed for each new biennium to adjust for changes which would affect cost and linear density.

The final recommendation involves the cost of transporting special education pupils in special buses. Since this study excluded the analysis of special education transportation, it is suggested that a study be conducted to determine if special funding provisions are needed for this service and, if necessary, to recommend an appropriate funding plan.

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APPENDIXES

APPENDIX A

VIRGINIA PUPIL TRANSPORTATION LAWS

VIRGINIA SCHOOL LAWS
Title 22.1
Education

Chapter 9

SCHOOL PROPERTY

Article 1

General Provisions

Chapter 12

PUPIL TRANSPORTATION

Article 1

General Provisions

Article 2

Insurance Provisions

Chapter 13

PROGRAMS, COURSES OF INSTRUCTION AND TEXTBOOKS

Article 2

Special Education

Section 22.1-221 Transportation of handicapped children attending public or private special education programs.

Chapter 14

PUPILS

Article 1

Compulsory School Attendance

Section 22.1-256 Children exempted from article. - A. The provisions of this article shall not apply to:

2. Children under ten years of age who live more than two miles from a public school unless public transportation is provided within one mile of the place where such children live;

3. Children between ten and seventeen years of age who live more two and one-half miles from a public school unless public transportation is provided within one and one-half miles of the place where such children live;

B. The distances specified in paragraphs A2 and A3 of this section shall be measured or determined from the entrance to the school grounds or the school bus stop nearest the entrance to the residence of such children by the nearest practical

routes which are usable for walking or riding.

Title 46.1

Motor Vehicles

Chapter 1

General Provisions

Section 46.1-1 Definitions. (37) School bus.

Chapter 4

REGULATION OF TRAFFIC

Article 1

Section 46.1-169 Age limit for drivers of school buses.

Section 46.1-169.1 Operation of yellow motor vehicles of certain seating capacity on State highways prohibited; exceptions; penalty.

Section 46.1-169.2 School buses to be routed so as to avoid necessity of pupils' crossing divided highways.

Article 3

Section 46.1-190 Reckless driving; specific instances.

Section 46.1-193 Maximum and minimum speed limits

Article 4

Section 46.1-213 Following too closely.

Article 6

Section 46.1-245 When drivers of certain vehicles to stop, look and listen at railroad

crossings and cross tracks without shifting gears.

Section 46.1-250 Stopping on highways; to discharge cargo or passengers; school buses.

Section 46.1-255 Flares and other signals when vehicle disabled in highway after dark.

Section 46.1-257 Same; when red flags required instead of flares, etc.

Article 8

Section 46.1-286.1 Paint and lettering on school bus.

Section 46.1-287 Warning devices on school buses; use thereof.

Section 46.1-287.1 Vehicles hired to transport children to or from school, camp, etc.

Section 46.1-287.2 Safety belts to be worn by certain bus drivers.

Chapter 5

Article 4

Section 46.1-370 Qualifications of school bus drivers; examination.

Chapter 13

MOTOR FUEL TAX

Section 58-715 Refund of tax on motor fuel.

APPENDIX B

LETTER REQUESTING PUPIL TRANSPORTATION INFORMATION FROM THE STATES

COLLEGE OF EDUCATION

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

DIVISION OF ADMINISTRATIVE AND EDUCATIONAL SERVICES

November 22, 1979

Dear

We are currently conducting pupil transportation studies in the states of Virginia and Louisiana. In conjunction with these studies, we would like to solicit your cooperation in obtaining information about your state's transportation program, especially information pertaining to the formula for the distribution of pupil transportation funds.

We would appreciate information for the year 1977-78 such as methods of calculation, law pertaining to transportation, and other information that would be helpful in understanding and comparing your method of financing pupil transportation.

Your cooperation will be greatly appreciated.

Sincerely yours,

M. David Alexander

C. H. Burnett

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A STUDY OF THE FUNDING OF PUPIL TRANSPORTATION IN VIRGINIA

by

Clyde Hunter Burnett, Ed.D.

(ABSTRACT)

Purpose of the Study

The purpose of this study was to examine the pupil transportation program in Virginia relative to those used in the fifty states, to examine variations in transportation costs among Virginia's school districts, and to analyze Virginia's present pupil transportation funding method and alternative funding plans in relation to recognized principles of pupil transportation finance.

Design of the Study

The research design for this study was implemented in five phases. First, pupil transportation information was collected from all states in order to review current state pupil transportation programs. Second, pupil transportation literature was reviewed to identify cost factors, fiscal models and evaluation criteria. Third, Virginia's present pupil transportation program was evaluated. Fourth, pupil transportation data for the 1978-79 school year were collected from all school districts in Virginia and analyzed. The best predictor(s) of cost was determined by using

appropriate statistical analysis (such as correlation, stepwise multiple regression analysis, and scattergrams) to examine the relationship between per pupil transportation costs (dependent variable) and various independent variables that contribute to variations in cost. The best predictors of cost were used in alternate funding formulas. Finally, computer simulation was used to analyze the fiscal implications of the alternate formulas on the school districts and the state.

Conclusions and Recommendations

State pupil transportation programs are characterized by diversity and individuality. This writer grouped the fiscal models used by the states to allocate pupil transportation funds into five models: equalization concept/formula, percentage grant, flat grant, approved cost, and state-owned/operated.

From the review of literature, statements and terms related to evaluating state pupil transportation programs were grouped into twelve summary terms. The following terms were considered valid for use in this study: adequacy, reliability, simplicity, efficiency, objectivity, and equity. Virginia's current allocation plan met the requirements for simplicity, objectivity, and partially fulfilled the requirements for efficiency but did not meet the standards for adequacy, reliability and equity.

Nine factors that cause variations in the cost of pupil transportation were selected for analysis. The average cost per pupil per year was selected as the dependent/ criterion variable. The analysis concluded that linear density was the best predictor of pupil transportation costs in Virginia.

Three alternate funding formulas were developed, and all were judged to be better predictors of cost than Virginia's present reimbursement plan. However, only two of the three plans met all of the evaluative criteria established in the study.

Based on the findings of this study, three recommendations were offered. First, Virginia should adopt alternate equation 3 (regression equation utilizing linear density - inverse form - as the cost predictor) for use in distributing pupil transportation funds. Second, Virginia should provide more funds for pupil transportation, eventually providing the full funding of predicted cost. Third, Virginia should conduct a study to determine if special funding provisions are needed for the cost of transporting special education pupils in special buses and, if necessary, develop an appropriate funding plan.