# COST-EFFECTIVENESS IN PUPIL TRANSPORTATION: A COMPARISON OF IN-HOUSE AND CONTRACTED SERVICES

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# I. PROBLEM IDENTIFICATION

## Background

The pupil transportation industry is the largest transportation carrier of people in the United States. In the 2005-2006 school year, 24,834,880 pupils were transported nationally, and in Michigan 809,916 pupils were transported (School Transportation: 2006-07 School Year, 2009). During the 2006-2007 school year the pupil transportation industry spent more than $16.6-billion nationally and more than $631-million in the state of Michigan (School Transportation: 2006-07 School Year, 2009). Not surprisingly, this traditionally public ran service has garnered the attention of the private industry and entrepreneurs all over the United States. In fact, the nation's largest privately owned pupil transportation carrier, Cincinnati based First Student Inc., transported 3.3 million students in 1,500 districts with a fleet of 60,300 buses (Atkinson, 2008). In Michigan, the nation's seventeenth largest privately owned and operated pupil transportation carrier, Lansing based Dean Transportation Inc., transported 15,500 in 75 districts with a fleet of 745 buses (Atkinson, 2008). However, even with these large companies breaking into the pupil transportation business the majority of students are still transported via traditional in-house, district ran, transportation services.

There is plenty of literature written about privatization and contracting of services; however, there are few papers written on the subject of contracted pupil transportation. This is very surprising since most costs associated with pupil transportation are straightforward. McGuire and van Cott agree that the

conditions under which pupil transportation is produced are conducive to good tests in the private versus public debate (1984). In order to provide pupil transportation, there are: (1) human resource costs, (2) capital costs, (3) operational costs, and (4) maintenance costs. These cost are relatively easy to determine and therefore make cost comparisons between contracted and in-house services relatively easy to compare. Furthermore, the regulations applicable to pupil transportation are the same for both public and private service providers; each must maintain minimal standards set by perspective states. Moreover, these standards do not change from district to district, therefore in-state comparisons are relatively easy to make.

There have been very few empirical analyses of pupil transportation services. Of the five total studies, three report cost savings with the use of contractors and the other two favor district run pupil transportation services. The first of these studies, completed by Bails in 1979, statistically concluded that the private production of pupil transportation services is less costly than district provided services. The second study by McGuire and van Cott reported an average of 12-percent cost-per-mile differential in favor of contractor provided services (1984). The third study published in 1999 by Hutchinson and Pratt, and probably the most influential in this area of study, examined 19 school districts in Tennessee and determined that contracted services provided significant cost savings in 15 of the school districts with a cost savings of 27-percent for those 15 districts; however, the other four districts produced a cost savings of 21-percent if the services were provided in-house. The fourth study, presented in 2000 by

Cassell, reported that in Ohio from 1994 to 1998, districts that contracted services had a significantly higher median cost per mile and median cost per pupil than those that provided services in-house. The last study, a second performed by Hutchinson and Pratt in 2007 reported different findings than their first. They concluded that in Louisiana, district ran school pupil transportation services operate at a statistically significant lower cost than those performed by contractors. The mixed findings of these five empirical analyses are likely the result of differences in institutions, location, regulations, or structural factors (Ott & Hartley, 1991; and Vickers & Yarrow, 1991).

## Definitions

While this paper focuses on "contracting," the term "privatization" may appear as well and the two can be used interchangeably. However, for the purposes of this paper, we'll combine Lieberman's definition of "privatization" and Crawford's definition of "privatization through outsourcing." Lieberman defines privatization as "transferring activities, functions, or services generally performed by public employees to private" (1989). The key test for Lieberman's definition is whether or not public or private institutions employ the persons providing the service. Crawford's definition of "Privatization through outsourcing" is when "government outsources a service to another provider, but retains responsibility for that service" (2002). Since we're using service delivery as the primer to determine whether or not a service is indeed "contracted out," quite a few districts will not fall into the "contracted services" category. Furthermore, the

terms “district run” and “in-house” services are used interchangeably to described services provided by the host’s school district. Partial-contracted services refer to pupil transportation services that are provided in part by a contractor in conjunction with the hosts school districts. Finally, the terms “pupil,” “rider,” and “student” are all terms used to describe a person receiving transportation services; this is independent on the service provider.

## Project Scope

The goal of this quantitative research project is to examine the cost effectiveness of pupil transportation services. This research examines which pupil transportation service provider costs less: contractor operated or district operated. The cost effectiveness of pupil transportation services will be based on lowest cost services in two primary categories: cost-per-pupil and cost-per-mile. These two standards have been used in previous studies and serve as an equalizer in determining costs. Next, this research project will examine what, if any, correlations exist between the following variables: total expenditures, total ridership, total expenditures per student, average ridership per regular education student, average ridership per special education student, and total miles. This study will examine only school districts in the State of Michigan, and will focus exclusively on the eight intermediate school districts where contracting occurs.

This research is pertinent today given the current economic recession and reduction in tax dollars for education services. Given these factors, school districts are forced to do more with less. Naturally, if schools can decrease

support services costs, in this case pupil transportation, they will have more money to use on educational resources and instructional services. Thus, giving them a greater ability to exercise their primary purpose and mission of educating.

# II. THEORETICAL DISCUSSIONS

## Costs Reduction

The primary reason school districts use contractors is to reduce costs. The primary advantages of contracting include: cost savings, bypassing personnel issues, and acquiring capacities not easily obtained in the public sector (Butler, 1991; Hunter, 1995; and Savas, 1985). "Due to inflation, rising labor costs, fiscally conscious taxpayers, tight school budgets, and perceived greater efficiency of the private sector, coupled with the general privatization movement, school boards, are generally quite sensitive to getting the maximum benefit from school budget dollars" (Lyons, 1995). The importance of cost savings is exacerbated since transportation budgets account for five-to-ten percent of a school districts budget (Zeitlan, 1989). Since contractors, in theory, compete for business on the basis of price and services, they will provide the same service for lower costs. Even though contractors provide identical services and have the same expenses as district run transportation – vehicles, salaries, tires, fuel – many districts find that contractors can be less expensive than operating their own services (Finkel, 1990).

One of the highest costs school districts face is employment cost. Public employees are often entrenched in a plethora of job protection policies, procedures, and institutionalized practices; therefore it is harder to reduce their staff, which leads to higher costs (Lyons, 1995). However, these same protections and practices often hinder employee performance. Former public

school bus drivers can find the same employment with the contracted companies, and many of them are through the use of right to first refusal. According to an Ohio school superintendent, Tucker Self, former public employees prefer working for private sector companies since the private company provides a better family atmosphere, more training, greater opportunities for advancement, and performance based incentives (1995). However, due to economic interests, business competition, and profit motive, contractors are more likely to terminate employees when their services are no longer required (Lyons, 1995).

Operational costs are another area in which school districts can see reduced costs. Superintendent Self reports that his school district alone saved $215,000 in the first two-years of their contract due to fixed annual costs (1995). Furthermore, contractors have the opportunity to operate under economies of scales since they have the ability to provide their services outside of just one school district, which leads to a reduction in administrative overhead costs. However, these economies of scale can be achieved through district consolidation, as realized in New York (Bowen & Penska, 1993). Moreover, contractors tend to be more business-minded than school districts. According to Ed Donn, director of transportation for Washington County schools in Hagerstown, MD., “Schools tend to promote drivers and mechanics and then don’t give them much training. As the school grows, that individual comes to operate a multimillion dollar business with little preparation” (Harrington-Lueker, 1990). As a result, district employed transportation managers tend to fail more

often than their private-sector counterparts. Furthermore, contractors generally have substantial technical expertise and specialization since this is their line of business, and they have developed considerable experience overtime by providing such services (Lyons, 1995).

## Effectiveness of Contracting

The issue of safety is without a doubt a primary concern of both school administrators and parents when pupil transportation services are delivered regardless of who is delivering the services. However, as Hutchinson points out, all bus services operate under the same safety regulations and inspection systems and provide services during the same hours and seasons of the year. Therefore, both in-house and contracted services produce similar products in regards to service, reliability, and safety (1999). In fact, Tom J. Zimmerer, associate superintendent for business for Lewisville Independent School District (Texas) said, “I think [contracting] would work for the majority of districts by increasing safety and mechanical condition of buses” (Finkel, 1996). Zimmerer also admits that contractors have greater resources to stay current with laws, regulations, and the latest safety research (Finkel, 1996).

Opponents of contracting and privatization point to quality of service and reliability as reasons to retain district operated transportation services. It is believed that privately owned companies are only concerned with reducing costs and maximizing profit (Lyons, 1995). However, as Finkel points out, contractors

compete on the basis of costs as well as service (1990). Therefore, if the contractor fails to deliver quality services they are likely to lose their contract.

Another concern with contracting services is, what happens to the district if a contractor may abruptly cease services due to bankruptcy, financial problems, staffing problems, or other reasons (Lyons, 1995). While bankruptcy and financial problems seldom plague school districts and prevent them from delivering services, they still face the same staffing problems as their private sector counterparts. Furthermore, if the district establishes contracts with reputable vendors that have a longstanding history of service they then are not very likely to encounter issues of bankruptcy.

When contractors are faced with adversity, they have the ability to step-up and take control of the situation according to Timoutheus Weeks, controller and assistant superintendent for Pontiac (MI) School District. “Weeks was impressed by his contractors ability to overcome adversity. When the company’s local manager was killed in a tragic accident, the regional manager was sitting at her desk within 24 hours and transportation operations continued without inconveniencing students or their parents. Until a permanent replacement could be brought in, the Pontiac district was never without a professional transportation manager on-site” (Finkel, 1996). Additionally, there is little evidence that suggest huge turnover amongst contractors, and this seems to be the case regardless of the size of the contract (Hutchinson & Pratt, 1999).

Contracting out can also provide a greater quality of service compared to that of district run pupil transportation. According to Finkel, contractors tend to

invest a great deal of time, effort, and money in training – keeping drivers', mechanics', and other employees' skills at their highest levels (1996). Furthermore, contracted personnel have incentive programs to motivate them to do an excellent job whereas their public-employed counterparts do not. In fact, employees of contracted services often get performance based incentive bonuses for being accident-free and having on-time service (Finkel, 1996). Marilyn Layman, superintendent for DeSoto Public Schools in DeSoto, Kansas gives contracting high remarks as well, exclaiming: "It works so well. They take care of training, the drivers, doing drug checks and safety checks" (Spoor, 1998). Additionally, according a survey done in 2007 by LaFaive, almost 91-percent of districts reported that "they were satisfied with the results of their contracting."

## The Hidden Costs Problem

In order to compare costs, it is important to look at all costs associated with pupil transportation services. However, often there are several "hidden costs" that are not reflected in comparisons. Examples of hidden costs include administrative overhead and support services, fringe benefits, insurance, capital equipment, and utilities. Two main contributors of hidden costs are charges to district wide accounts and 'sunk costs.' Frequently, utility costs (water, solid waste, disposal, electricity, telephone, and disposal of toxic materials) are unknown or understated because these costs are included in, and charged to, district wide accounts instead of being charged directly to the transportation department (Taggart, 1990).

To make matters worse, capital costs (probably the largest of all hidden costs) associated with buses, service vehicles, maintenance facilities, equipment, fuel storage tanks, and real estate are treated as 'sunk costs' or cost incurred at a specific point in time when the asset was actually purchased instead of being assessed to the transportation department and assessed throughout their useful life (Taggart, 1990). These hidden costs can be so great that they can change the outcome of analysis by a wide margin. In Damask's critique of Cassell's "Taking Them for a Ride: An Assessment of the Privatization in Ohio's Public School Districts" he discovers that contracting services is actually 11-percent less expensive than district run services; a reverse to Cassell's findings that in-house services costs 33-percent less than contracted services (Damask, 2000; and Cassell, 2000).

A final hidden cost often underestimated or ignored completely are costs associated with fringe benefits. Fringe benefits (medical, dental, retirement, etc...) are often rolled into district wide accounts because they are paid by the district for all employees and are not associated with individual cost centers. The costs of fringe benefits can range from 15- to 35-percent of all salary costs (Taggart, 1990). In one Ohio school district they predicted that personnel benefits were the lion's share of the cost, increasing by 17-percent per year; at that rate they expected benefits to outpace wages within two-years (Self, 1995). Obviously, this would have a dramatic effect on the overall costs associated with in-house transportation services.

The problem with hidden costs are that they can dramatically effect the decision making process for school districts in establishing whether or not contracting out is cost effective. Lewisville ISD (TX) discovered that including services for payroll, purchasing, grounds maintenance, and all the rest; the actual costs per mile had dropped considerably since contracting out services - it saved the district more than $1.5-million over a seven-year period (Finkel, 1996). As a result, districts should seek out hidden costs and include them in their transportation budgets prior to conducting costs assessments.

## The Contracting Process

The most important part of contracting pupil transportation services, without a doubt, is establishing a good contract through the contracting process. A good contract is one that works for both the district and the contractor in tandem. A contract is the agreement of how the contractor will deliver the services and how the school district will monitor those services being delivered. While there is much debate on whether or not contracting pupil transportation is effective and worthwhile, there is much consensus among administrators and transportation professionals on the contracting process. During the Request for Proposal (RFP) and contracting process, school districts should consider the following: (1) defining roles and expectations, (2) insurance and liability, (3) contractors performance and financial stability, (4) other districts' contracts, (5) cost-benefit analysis, and (6) establish contract costs/pricing and length.

The most important part of the contract for the school district is determining roles and expectation. Often the control factor is one of the biggest fears of school boards; school boards become worried about losing direct control over service delivery and the personnel providing it (Lyons, 1995). School administrators can maintain a quality control component of their transportation, regardless if the service is contracted out. A good way to do this is to establish on-time performance measures. A good example of this is in San Diego, there school officials have specified that contractor's must have an on-time performance record of 97-percent or better; if this is not maintained, the school district can cancel out the contract (Harrington-Lueker, 1990). The districts also have state regulations to back them up. Each state establishes their own sets of laws, rules, and regulations that govern pupil transportation services; both the contractors and school districts must follow these laws. Therefore, districts can expect contractors to maintain a certain set of safety and training standards.

If the school board is still worried about control, they can establish further measures such as requiring the school board to approve routes, new employees, and field trips; leaving the day-to-day functions to the contractors (Self, 1995). This is also the area where the school district can request the right of first refusal for their current district transportation employees (Finkel, 1990). Once control parameters are established it is important to place them into an RFP so that bidders know what the expectations of the district are prior to bidding. Furthermore, school districts need not worry about losing control because contractors are business people whose livelihood relies on customer (district)

satisfaction (Finkel, 1990). In fact, Ty Blout, assistant superintendent of Nevada Joint Union High School District in Grass Valley, CA points out that contracting actually gives the district more control over operations if the contract is established properly (Finkel, 1996). Often, what is not stated might be the most important. As Timoutheus Weeks points out, by contracting out you're able to elevate resources dedicated to transportation and focus on the districts core business of education (Finkel, 1996).

In order to establish a good contract with a good contractor, it is important to speak with other local districts that are currently contracting services or have contracted out in the past (Golden, 1993). By doing so, the district that is getting ready to establish requirements can ask other communities, "what would you change" and apply those answers to their contract (Finkel, 1998). According Jack Fitzgerald, director of operations for Waterloo (IA) Community Schools, another important thing districts can do is invite contractors to an informal question-and-answer session prior to bidding (Finkel, 1998). Fitzgerald believes that this has saved his district both time and money, neither of which the district has a lot of. Once school officials talk to vendors and other school districts they will be able to establish a client reference lists (Lyons, 1995). The district can also use these question-and-answer sessions with other districts and contractors to examine both performance records and financial stability. One recommendation for school officials is to require that contractors demonstrate that they have: "(a) solid finances, (b) 5 or more years of successful business history, (c) enough staff and equipment to handle anticipated needs, (d) trained

and qualified field personnel, (e) quick emergency response, and (f) a computerized communications and dispatching system" (Golden, 1993).

Insurance and liabilities are another important detail that must be hammered out when establishing an RFP and contract. Paul J. Miola, Senior Vice-President of Risk Management at Gallagher in Hammonton agrees, contracts need to spell out the district's insurance, hold-harmless, and indemnification requirements very clearly (Zolkos, 2003). Milola also recommends, "the other thing they need to build into the contract is that the contractor is going to comply with all local, state, and federal requirements concerning transportation of students" (Zolkos, 2003). Anne Mulholland, Senior Vice-President at Aon Risk Services in Cincinnati even recommends that school districts push the responsibility of performing background checks onto the contractors to alleviate the school districts from the costs and administrative burden of doing so themselves (Zolkos, 2003). However, this still does not completely alleviate the district of the liability. Therefore, Mike Fox, Risk Analyst for Miami-Dade County Public Schools in Florida recommends performing drivers' license checks, fingerprinting, and background checks. Fox also believes it's important for the contractor to name the school district as an additional insured, and that the school district is held harmless, indemnified, and defended against any loss, damages, and expenses (Zolkos, 2003). Furthermore, it is important for the district to ensure that buses comply with state statues, drivers pass written test, and that the district monitors that all of this is occurring (Zolkos,

2003). If this does not occur, the district may be putting themselves in danger if an accident occurs.

The next thing that should occur is a cost analysis of contracting. Costing based on cost-per-mile or cost-per-student are generally the most preferred and commonly used methods of costing (Hutchinson & Pratt, 1999; Hutchinson & Pratt, 2007; Cassell, 2000; Damask, 2000; and McGuire & van Cott, 1984). However, districts should not rely solely on cost estimates given by contractors. Districts need to determine the administrative overhead of managing the contract. The previous arguments on determining hidden costs are also essential for determining their own costs of providing in-house transportation. Once all hidden costs are revealed, the district can then decide whether the proposed contracts (by the vendors) are more cost effective than in-house operated transportation. Furthermore, districts should use the information gained from other school districts to determine the future costs of contracting. Sometimes vendors will use low-ball bid tactics and the lack of competition to gain contractors and increase costs in the future (Mathis & Lorna, 2008; and Sutton, 1992).

The final step to contracting is establishing a contract with a vendor; obviously this step is ignored if a cost effectiveness study shows that contracting is likely to cost more. This is the portion of contracting where everything comes together. At this point the district must identify their span of control, how monitoring will occur, how operations will be staffed and so on. School districts should use the aforementioned performance techniques to establish a good

contract since this will essentially be their only method of service delivery. The contract should establish how the district will be charged (flat-rate vs. per-student vs. per-mile) and how long the contract will lasts. Contracts should usually lasts four to five years to offer stability to both the school district and the contractor. The contract should also contain an out clause for the district in case services provided become unbearable. Finally, the district may want to sell their fleet of buses to the contractor in order to gain capital. Often contractors will agree to this because they do not always have, or want to invest in a new fleet. This provides additional money to the local school district and costs savings to the vendor. Lastly, the contract has to be something both the contractor and school district can live with for the life of the contract.

# III. METHODOLOGY

## Hypothesis

This quantitative research project has been established to test, which pupil transportation services, contracted or in-house, provide the most cost effective method of service delivery and what other externalities might attribute to costs differences. Empirical analysis based on costs-per-student and costs-per-mile are the most common method of evaluating pupil transportation services (Hutchinson & Pratt, 1999; McGuire & van Cott, 1984; Damask 2000; Cassell, 2000; and Hutchinson & Pratt, 2007). Therefore, this project has been set-up to test the following experimental hypothesis:

- ***Null Hypothesis #1***: Contracted (either partial or full) pupil transportation services do not cost less, on a per student basis, than in-house pupil transportation services in the population.
- ***Experimental Hypothesis #1***: Contracted pupil transportation services cost less, on a per student basis, than in-house pupil transportation services in the population.
- ***Null Hypothesis #2***: Contracted (either partial or full) pupil transportation services do not cost less, on a per mile basis, than in-house pupil transportation services in the population.
- ***Experimental Hypothesis #2***: Contracted pupil transportation services cost less, on a per mile basis, than in-house pupil transportation services in the population.

## Data Collection

The method of data collection used for this study was secondary. The financial data used in this research study was obtained from the Michigan Department of Education's 2006-2007 Transportation Expenditure Report (SE-4094). This report provides a standardized report of each school's transportation expenditures and serves as an excellent tool for comparison. A list of schools that contracted all or part of their pupil transportation services was obtained from the Michigan Department of Education: Pupil Transportation section. The list provided gives the names of school districts and the contractor's providing services, a copy of this list is provided in Appendix A.

## Participating School Districts

This project has been limited to 102 local school districts, from 8 intermediate school districts (ISD), within the State of Michigan. Intermediate school districts are established and defined under The Revised School Code (Act 451 of 1976) in Michigan. Intermediate school districts are typically limited to school districts that reside in the county; however, rural counties do combine resources and establish joint-county intermediate school districts.

**Table 1: Demographics of Intermediate School Districts**

| Intermediate School District | Participating Schools | Percent |
|---|---|---|
| Clare-Gladwin RESD | 5 | 4.9 |
| Eaton ISD | 5 | 4.9 |
| Genesee ISD | 21 | 20.6 |
| Kent ISD | 19 | 18.6 |
| Lenawee ISD | 12 | 11.8 |
| Livingston ISD | 5 | 4.9 |
| Montcalm Area ISD | 7 | 6.9 |
| Oakland Schools | 28 | 27.5 |
| ***Total*** | ***102*** | ***100.0*** |

Table 1, displays the number and distribution of local school districts that were tested within each intermediate school district. This study was limited to the eight selected school districts because at least one local school district within the intermediate school district contracted out its services. These intermediate school districts are geographically located in Southeast Michigan (Lenawee ISD, Livingston ISD, and Oakland Schools), Central/Mid- Michigan (Clare-Gladwin RESD, Eaton ISD, Genesee ISD, and Montcalm Area ISD) and West Michigan (Kent ISD). All school districts are located within the Lower Peninsula of Michigan.

Each local school districted was initially divided into two categories, contracted and in-house. However, after further review it was determined that some local school districts provided pupil transportation services, did so using a partial-contracting method. Districts that are classified as mixed are done so

because they provide pupil transportation using both in-house service delivery and contracted service delivery.

**Table 2: Frequency Table for Contracted Services**

| Service Delivery Method | Frequency | Percent |
|---|---|---|
| In-house | 67 | 65.7% |
| Contracted | 13 | 12.7% |
| Mixed (In-house & Contracted) | 22 | 21.6% |
| ***Total (n)*** | ***102*** | ***100%*** |

Table 2, shows the number and percentage of school districts that provide in-house, contracted, and mixed pupil transportation services. This also shows that while only 12.7-percent of school districts rely on contracted services alone, more than one-third of all districts rely on some form of contracted pupil transportation services.

**Table 3: Demographics by Service Delivery and Intermediate School District**

| Service Delivery Method | Clare-Gladwin RESD | Eaton ISD | Genesee ISD | Kent ISD | Lenawee ISD | Livingston ISD | Montcalm Area ISD | Oakland Schools |
|---|---|---|---|---|---|---|---|---|
| In-house | 4 | 0 | 18 | 0 | 11 | 4 | 5 | 25 |
| Contracted | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 3 |
| Mixed | 0 | 4 | 0 | 18 | 0 | 0 | 0 | 0 |
| ***Total*** | ***5*** | ***5*** | ***21*** | ***19*** | ***12*** | ***5*** | ***7*** | ***28*** |

Table 3 displays a cross-tabulated frequency table of intermediate school districts and the number of in-house, contracted, and mixed pupil transportation services. Genesee ISD and Oakland Schools have the largest number of contracted service providers, each with three. Oakland Schools also has the greatest

number, 25, of in-house provided transportation services. Kent County has the greatest number of mixed service delivery, with a total of 18 districts having mixed service delivery.

## Methods of Analysis

Hypothesis testing will be conducted using the following methods of data analysis: descriptive statistics, Analysis of Variation (ANOVA), Independent-Samples T-Test, and Pearson Product Moment Correlation (Pearson's correlation). Descriptive statistics will be run in order to determine the mean costs for total expenditures per student and total expenditures per mile to best describe the differences in monetary terms because it provides the best picture for school and transportation administrators. ANOVA tests will be run to determine if there's a significant difference between the costs, on the basis of total expenditures per student and total expenditures per mile, between in-house pupil transportation and contracted/partial-contracted pupil transportation services. Bivariate Pearson's correlation (two-tailed) tests will be run on the following variables: total expenditures, total expenditures per student, total expenditures per mile, total ridership, total miles, average cost per gallon of fuel, average ridership per regular education bus, average ridership per special education bus, total expenditures per special education student, total expenditures per regular education student, and total insurance costs per bus.

# IV. RESULTS AND FINDINGS OF ANALYSIS

## Descriptive Statistics

By following the methodologies described above, Table 4 represents the descriptive statistics for the total expenditures per student and the total expenditures per mile.

**Table 4: Descriptive Statistics for Total Expenditures Per Student and Total Expenditures Per Mile**

| | Service Type | N | Mean | Std. Dev. | Std. Error | 95% Confidence Interval for Mean | | Min | Max |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound | | |
| Total Exp. Per Student | In-House | 67 | $1,133.67 | $1,128.09 | $137.82 | $858.51 | $1,408.83 | $311.09 | $7,733.18 |
| | Contracted | 13 | $835.08 | $322.97 | $89.57 | $639.91 | $1,030.24 | $275.42 | $1,324.64 |
| | Partial-Contracted | 22 | $725.40 | $254.81 | $54.32 | $612.43 | $838.38 | $119.75 | $1,385.30 |
| | Total | 102 | $1,007.56 | $942.98 | $93.36 | $822.34 | $1,192.77 | $119.75 | $7,733.18 |
| Total Exp. Per Mile | In-House | 67 | $4.75 | $2.31 | $0.28 | $4.18 | $5.31 | $1.60 | $14.97 |
| | Contracted | 13 | $4.12 | $1.62 | $0.45 | $3.14 | $5.10 | $0.80 | $7.08 |
| | Partial-Contracted | 22 | $3.97 | $0.90 | $0.19 | $3.57 | $4.37 | $2.96 | $7.22 |
| | Total | 102 | $4.50 | $2.02 | $0.20 | $4.10 | $4.90 | $0.80 | $14.97 |

The results of Table 4 show that the average cost of contracted pupil transportation services, on a total expenditures per student basis, is 26.3-percent ($298.69/student) less than in-house pupil transportation services. Partial-contracted pupil transportation services, on a total expenditures per student basis, is 36-percent ($408.27/student) cheaper than in-house services and 13.1-percent ($109.68/student) cheaper than contracted services. On a total expenditures per student basis, in-house services cost 12.5-percent ($126.11/ student) more than the average of all samples combined; contracted cost 17.1-

percent ($172.48/student) less than the average of all samples; and partial-contracted costs 28-percent ($282.16/student) less than the average of all samples. Therefore, on average, on a total expenditures per student basis, partial-contracted transportation services result in the cheapest service delivery method, contracted services result in the second cheapest delivery method, and in-house services result in the most costly service delivery method.

The results of Table 4 also show that the average costs of contracted pupil transportation services, on a total expenditures per mile basis, is 13.3-percent ($0.63/mile) less costly than in-house pupil transportation services. The partial-contracted model for pupil transportation services, on a total expenditures per mile basis, is 16.4-percent ($0.78/mile) cheaper than in-house services and 3.6-percent ($0.15/mile) cheaper than contracted services.

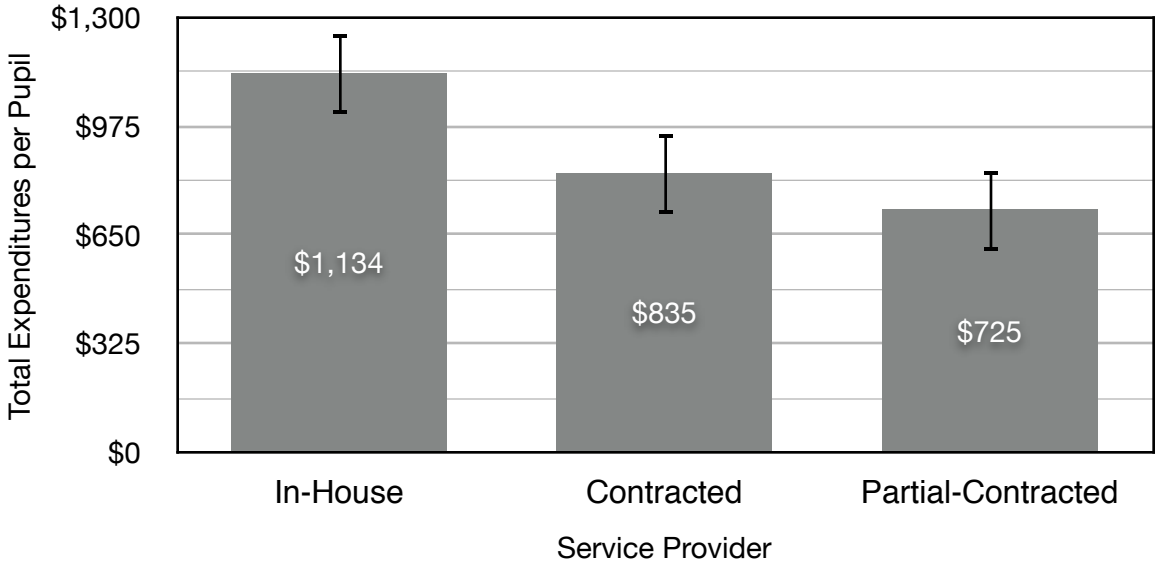


**Figure 1: Average Costs (Total Expenditures per Student)**

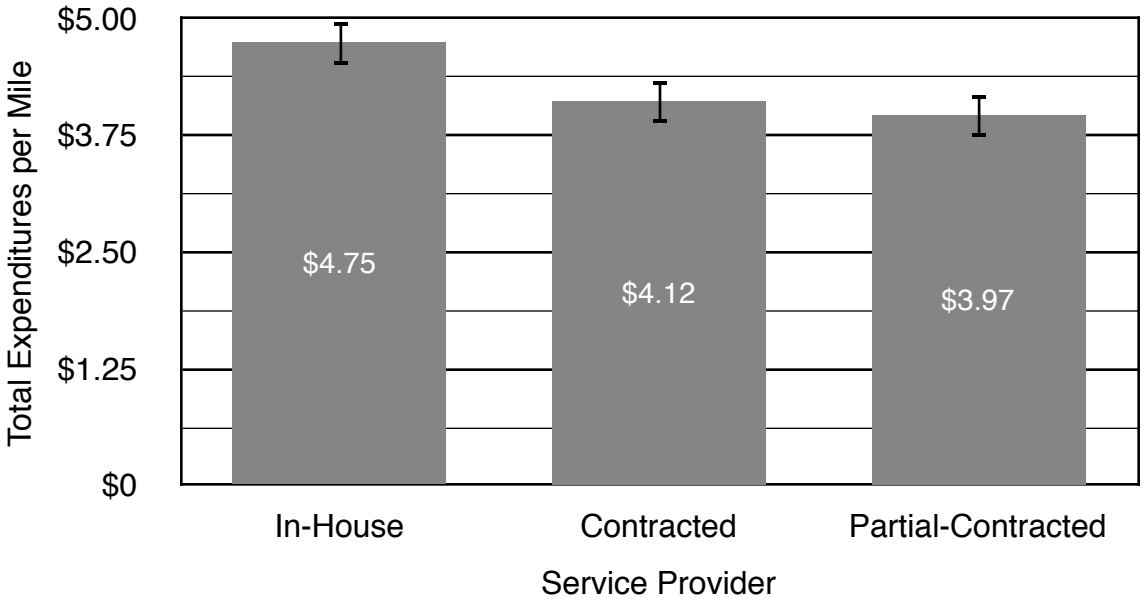


**Figure 2: Average Costs (Total Expenditures per Mile)**

Figure 1 shows the average costs of in-house, contracted, and partial-contracted pupil transportation services on a total expenditures per student ($/pupil) basis. Figure 2 shows the average costs of in-house, contracted, and partial-contracted pupil transportation services on a total expenditures per mile ($/mile) basis.

## Statistical Associations and Statistical Significance

### Analysis of Variances

Using Analysis of Variance (ANOVA), Table 5 displays a comparison of in-house transportation services against contracted (both contracted and partial-contracted) transportation services. The results of the ANOVA test shows that there is a significant difference, at the .10 level, between in-house provided pupil transportation services and contracted/partial-contracted on a total expenditures

per student basis. The results of the ANOVA test also reveal that there is a significant difference, at the .10 level, between in-house provided pupil transportation services and contracted/partial-contracted on a total expenditures per mile basis.

**Table 5: ANOVA Results: In-House vs. Contracted/Partial-Contracted**

**ANOVA**

| | | *Sum of Squares* | *df* | *Mean Square* | *F* | *Sig.* |
|---|---|---|---|---|---|---|
| Total Expenditures Per Student | Between Groups | 3105458.968 | 1 | 3105458.968 | 3.582 | 0.061 |
| | Within Groups | 86704271.256 | 100 | 867042.713 | | |
| | Total | 89809730.224 | 101 | | | |
| Total Expenditures Per Mile | Between Groups | 11.921 | 1 | 11.921 | 2.964 | 0.088 |
| | Within Groups | 402.181 | 100 | 4.022 | | |
| | Total | 414.102 | 101 | | | |

## Independent Samples T-Test

Using Independent Samples T-Test, Table 6 shows that in a comparison between in-house and contracted (contracted and partial-contracted combined) there is a significant difference at the 0.10-level (equal variances assumed) and 0.05-level (equal variances not assumed) for total expenditures per student. Additionally, using Independent Samples T-Test, Table 6 also shows that in a comparison between in-house and contracted (contracted and partial-contracted combined) there is a significant difference at the 0.10-level (equal variances

assumed) and 0.05-level (equal variances not assumed) for total expenditures per mile.

**Table 6: Independent Samples T-Test**
**(In-house vs. Contracted/Partial-Contracted)**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Total Expenditures Per Student | Equal variances assumed | 7.355 | 0.008 | 1.893 | 100 | ***0.061**** | $367.53 | $194.20 | -$17.76 | $752.82 |
| | Equal variances not assumed | | | 2.520 | 80.544 | ***0.013**** | $367.53 | $145.86 | $77.30 | $657.76 |
| Total Expenditures Per Mile | Equal variances assumed | 5.742 | 0.018 | 1.722 | 100 | ***0.088**** | $0.72 | $0.42 | -$0.11 | $1.55 |
| | Equal variances not assumed | | | 2.070 | 100.000 | ***0.041**** | $0.72 | $0.35 | $0.03 | $1.41 |

***. Correlation is significant at the 0.05 level (2-tailed).***
***. Correlation is significant at the 0.10 level (2-tailed).***
***n = 102***

## Correlations

Using bi-variant Pearson Product Moment Correlation two-tailed test, Table 7 displays the Pearson's correlations between six selected variables for pupil transportation services: (1) total expenditures, (2) total ridership, (3) total expenditures per student, (4) average ridership per regular education bus, (5) average ridership per special education bus, and (6) total miles. The following variables have significant positive correlations at the 0.01-level: total expenditures and total ridership; total expenditures and total miles; total ridership and average ridership per regular education bus; and total ridership and total miles. Total expenditures per student and average ridership per regular

education bus had a significant negative correlation at the 0.01-level. Total ridership and total expenditures per student had a significant negative correlation at the 0.05-level.

**Table 7: Correlations of Select Variables**

| | | Correlations | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Total Expend.** | **Total Ridership** | **Total Expend. Per Student** | **Avg. Ridership per Reg. Ed. Bus** | **Avg. Ridership per Sp. Ed. Bus** | **Total Miles** |
| **Total Expend.** | **Pearson Correlation** | 1 | **.783**** | 0.002 | 0.161 | 0.095 | **.917**** |
| **Total Ridership** | **Pearson Correlation** | **.783**** | 1 | **-.218*** | **.527**** | 0.044 | **.767**** |
| **Total Expend. Per Student** | **Pearson Correlation** | 0.002 | **-.218*** | 1 | **-.307**** | .272** | -0.043 |
| **Avg. Ridership per Reg. Ed. Bus** | **Pearson Correlation** | 0.161 | **.527**** | **-.307**** | 1 | **.246*** | 0.142 |
| **Avg. Ridership per Sp. Ed. Bus** | **Pearson Correlation** | 0.095 | 0.044 | .272** | .246* | 1 | 0.084 |
| **Total Miles** | **Pearson Correlation** | **.917**** | **.767**** | -0.043 | 0.142 | 0.084 | 1 |

****. Correlation is significant at the 0.01 level (2-tailed).***
****. Correlation is significant at the 0.05 level (2-tailed).***
***n = 102***

## Regression Analysis

Through the use of regression analysis, Figure 3 shows the scatter plots and line of best fit for total ridership (x) and total expenditures (y). The line of best fit has best been calculated using linear regression; the $R^2$ value for this calculation is 0.75. The formula for predicting total expenditures for in-house pupil transportation services using total ridership is:

y = total expenditures

x = total ridership

y = 787.71x + 232195

$R^2$ value = .7514

Again, through the use of regression analysis, Figure 4 shows the scatter plots and line of best fit for total miles (x) and total expenditures (y). The line of best fit has best been calculated using linear regression; the $R^2$ value for this calculation is 0.85. The formula for predicting total expenditures for in-house pupil transportation services using total miles is:

y = total expenditures

x = total miles

y = 4.1603x + 200287

$R^2$ value = 0.8467

Since the $R^2$ value for miles (x) to expenditures (y) is higher than the $R^2$ value for ridership (x) to expenditures (y) and is more towards the desired 0.90-level; mileage is the best predictor of cost for in-house pupil transportation services.

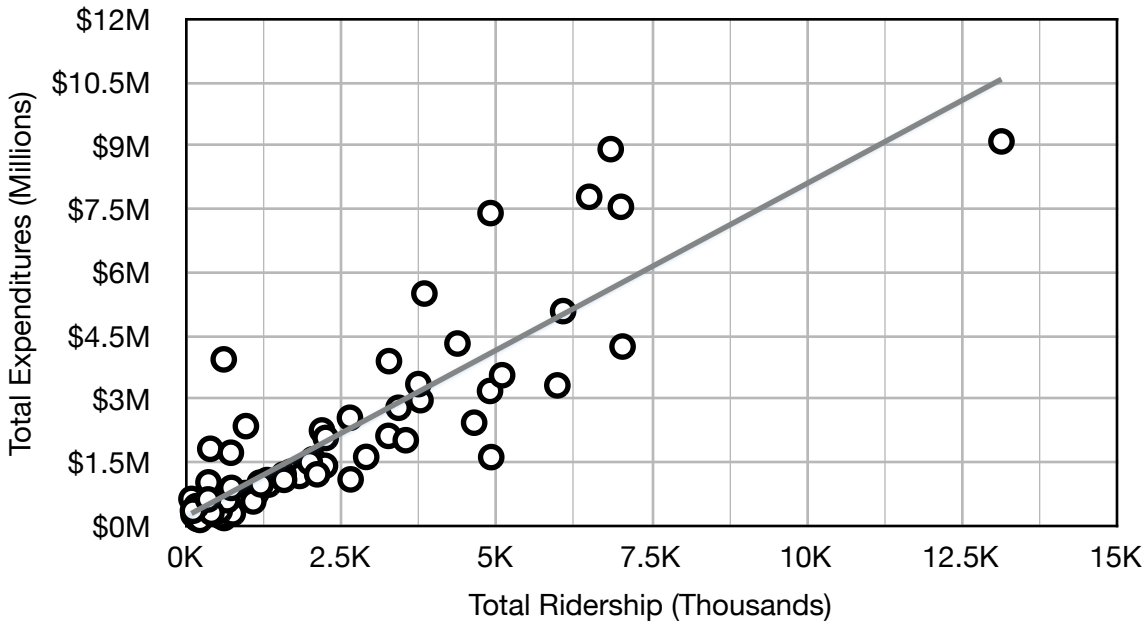


**Figure 3: Scatter Plot of Total Ridership (x) and Total Expenditures (y) for In-House Transportation Services**

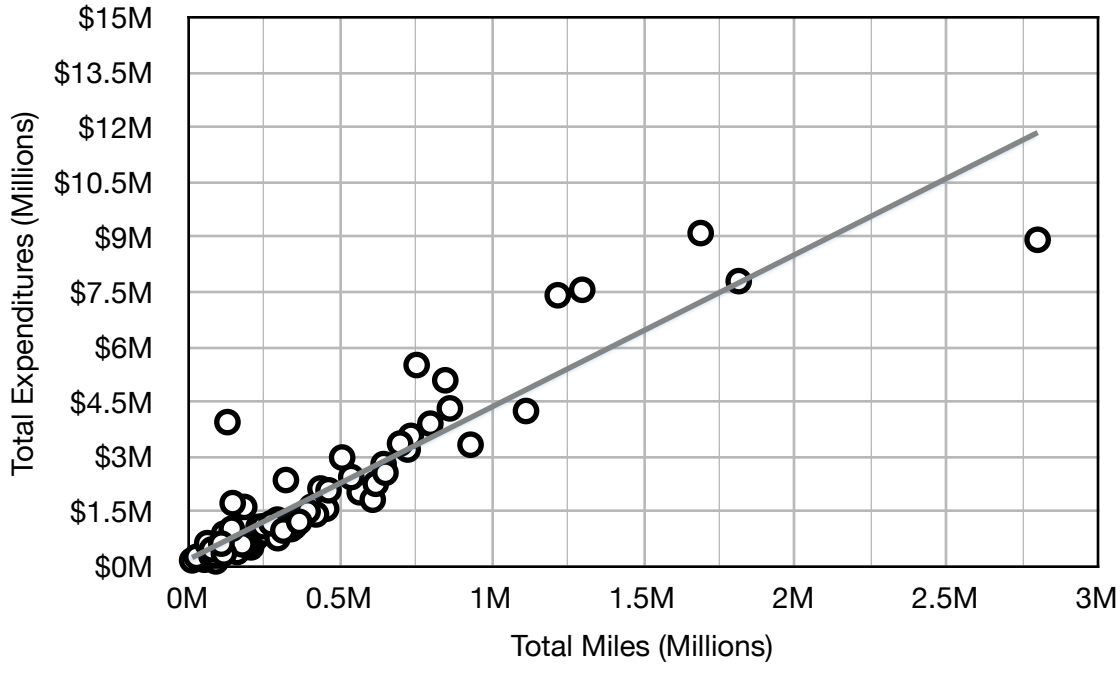


**Figure 4: Scatter Plot of Total Miles (x) and Total Expenditures (y) for In-House Transportation Services**

Through the use of regression analysis, Figure 5 shows the scatter plots and line of best fit for total ridership (x) and total expenditures (y) for partial-contracted pupil transportation services. The line of best fit has been calculated using power regression; the $R^2$ value for this calculation is 0.96 and is statistically significant at the 0.05-level. The formula for predicting total expenditures for in-house pupil transportation services using total ridership is:

y = total expenditures

x = total ridership

$y = 2079x^{0.8523}$

$R^2$ value = 0.9575

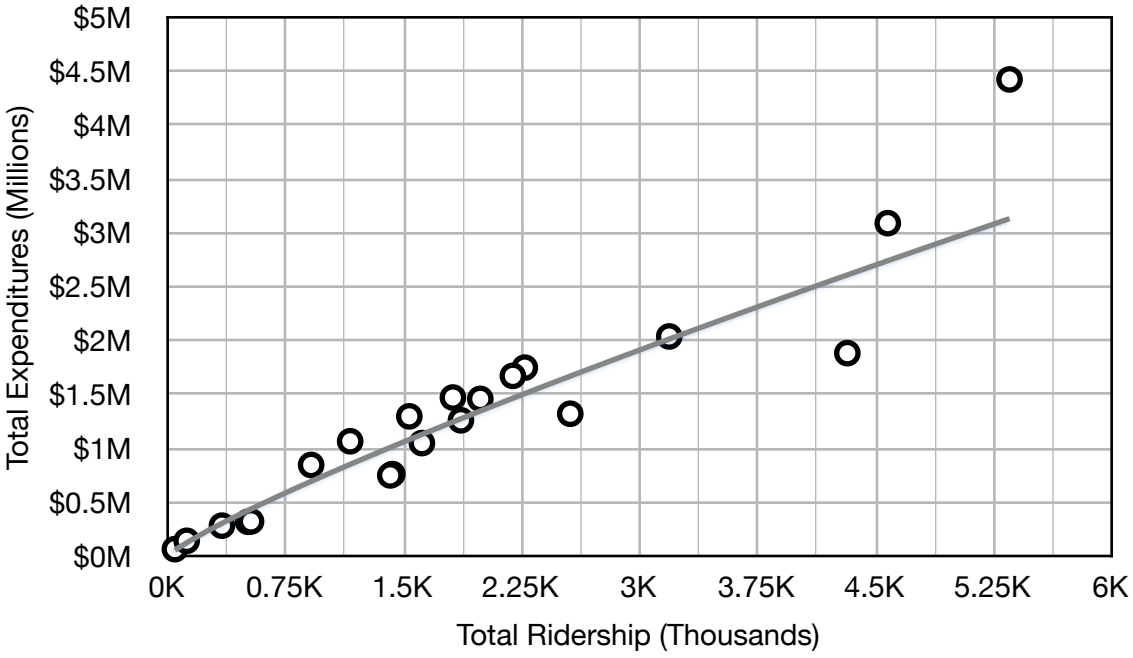


**Figure 5: Scatter Plot Total Ridership (x) and Total Expenditures (y) for Partial-Contracted Transportation Services**

Again, through the use of regression analysis, Figure 6 shows the scatter plots and line of best fit for total miles (x) and total expenditures (y) for partial-contracted pupil transportation services. The line of best fit has best been calculated using power regression; the $R^2$ value for this calculation is 0.97 and is statistically significant at the 0.05-level. The formula for predicting total expenditures for in-house pupil transportation services using total miles is:

y = total expenditures

x = total miles

$y = 12.871x^{0.9034}$

$R^2$ value = 0.9734

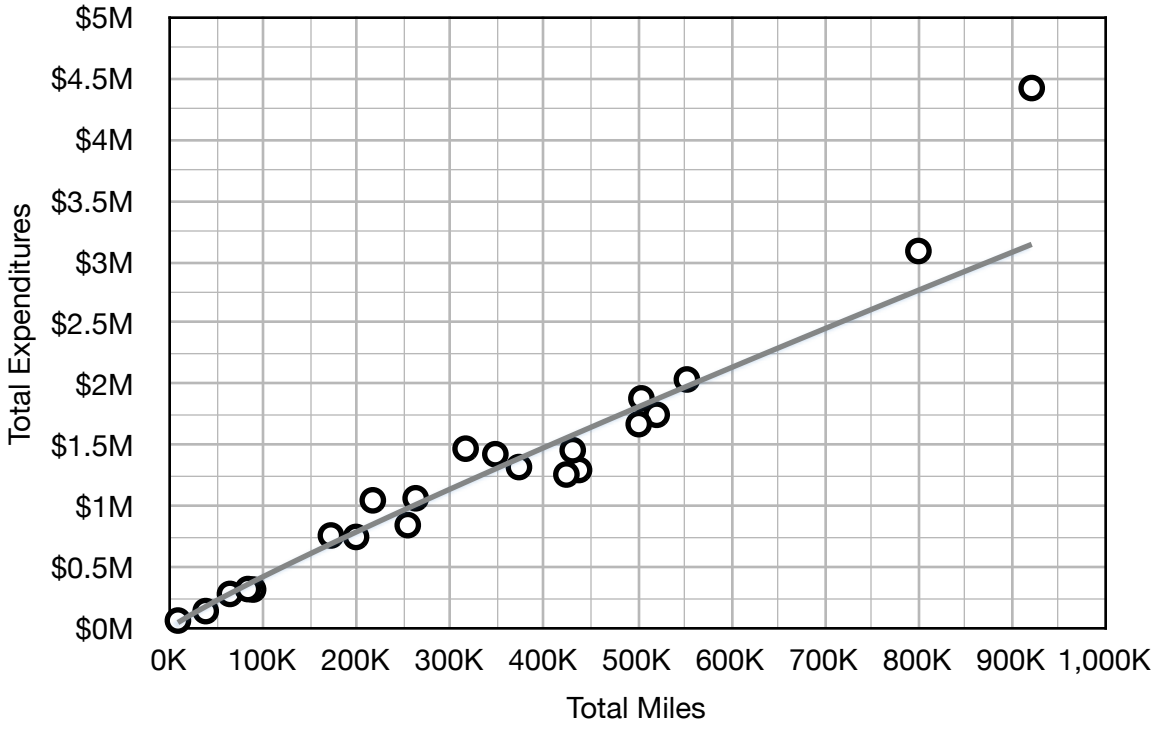


**Figure 6: Scatter Plot of Total Miles (x) to Total Expenditures (y) for Partial-Contracted Services**

Since there is not a significant difference between $R^2$ value for miles (x) to expenditures (y) and total ridership (x) to total expenditures (y); each of them serves as good indicators for prediction of total expenditures.

Through the use of regression analysis, Figure 7 shows the scatter plots and line of best fit for total ridership (x) and total expenditures (y) for all pupil transportation services. The line of best fit has best been calculated using power regression; the $R^2$ value for this calculation is 0.74 but is not statistically significant at the 0.10-level. The formula for predicting total expenditures for all pupil transportation services using total ridership is:

y = total expenditures

x = total ridership

$y = 3732x^{0.795}$

$R^2$ value = 0.735

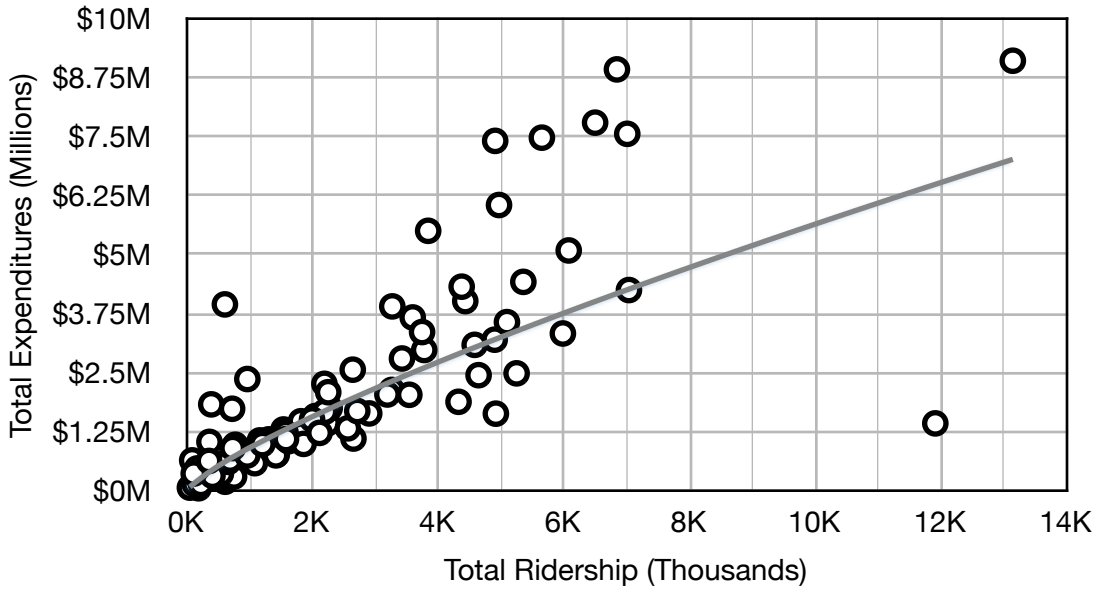


**Figure 7: Scatter Plot for Total Ridership (x) and Total Expenditures (y) for All Pupil Transportation Services**

Again, through the use of regression analysis, Figure 8 shows the scatter plots and line of best fit for total miles (x) and total expenditures (y) for all pupil transportation services. The line of best fit has best been calculated using power regression; the $R^2$ value for this calculation is 0.84 and is statistically significant at the 0.10-level.

The formula for predicting total expenditures for in-house pupil transportation services using total miles is:

y = total expenditures

x = total miles

$y = 12.871x^{0.9034}$

$R^2$ value = 0.9734

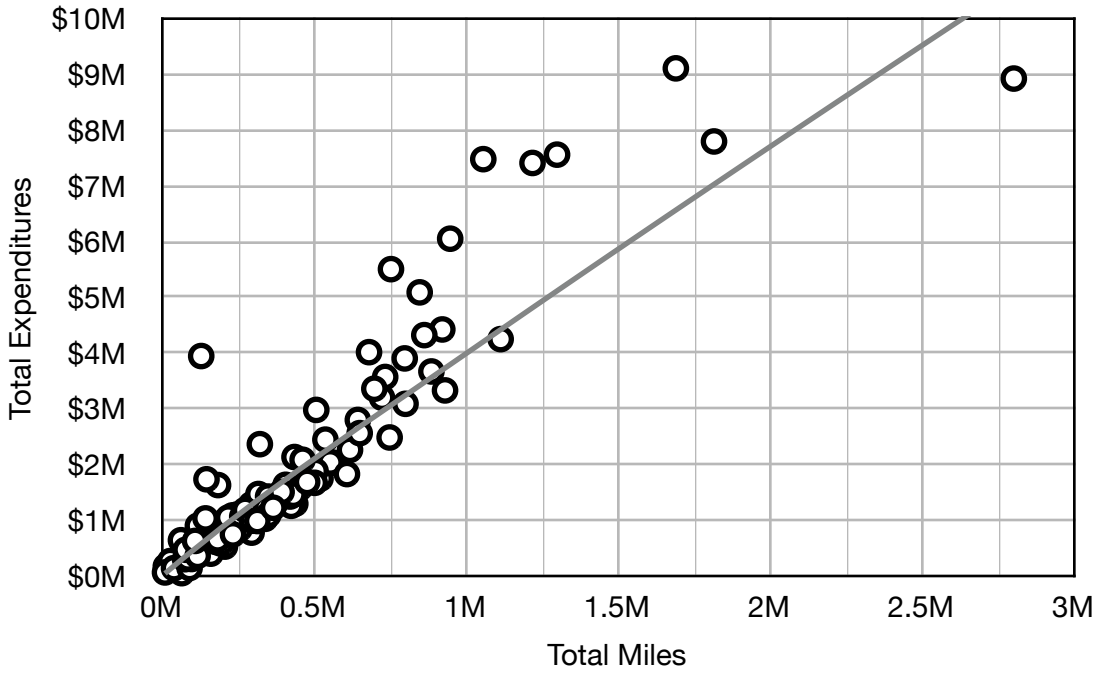


**Figure 8: Scatter Plot of Total Miles (x) to Total Expenditures (y) for All Transportation Services**

Since there is not a significant difference between $R^2$ value for miles (x) to expenditures (y) and total ridership (x) to total expenditures (y), each of them serve as good indicators for prediction of total expenditures.

Attempts were made to develop a model using linear, logarithmic, polynomial, power, and exponential modeling for contracted services; based both on total miles (x) to total expenditures (y) and total ridership (x) to total expenditures (y). However, no model could be created that represented an R2-value higher than the 0.75-level. A six-power polynomial model had the greatest success, but seriously lacked significance. As of now, no good model exists for predicting costs for contracted services.

# V. SUGGESTIONS OF ANALYSIS

## Summary

The main findings of this research project reveal that there are noticeable differences in total expenditures per student and total expenditures per mile between in-house, contracted, and partial-contracted pupil transportation services in the population. These differences range from 10 to 35-percent based on the selected groups of comparison. Furthermore, the ANOVA and Independent Sample T-Test reveal that there is a statistically significant difference in the total expenditures per student and total expenditures per mile between in-house and contracted/partial-contracted pupil transportation services. These statistical differences are significant at a minimum of the 0.10-level. Finally, the results of the Pearson's Correlation reveals that there are correlations between total expenditures and total ridership, total expenditures and total miles, total ridership and average ridership per regular education bus, total ridership and total miles, and total expenditures per student and average ridership per regular education bus at the 0.01-level; and correlations between total ridership and total expenditures per student at the 0.05-level.

## Conclusions

Based on the results of both ANOVA and Independent Samples T-Test; the "Null Hypothesis #1: Contracted (either partial and/or full) pupil transportation services do not cost less, on a per student basis, than in-house pupil transportation services in the population" is rejected false and the "Experimental

Hypothesis #1: Contracted pupil transportation services cost less, on a per student basis, than in-house pupil transportation services in the population" is accepted as true. Again, based on the results of both ANOVA and Independent Samples T-Test; the "Null Hypothesis #2: Contracted (either partial and/or full) pupil transportation services do not cost less, on a per mile basis, than in-house pupil transportation services in the population" is rejected as false and the "Experimental Hypothesis #2: Contracted pupil transportation services cost less, on a per mile basis, than in-house pupil transportation services in the population" is accepted as true. Therefore, this project supports evidence found in previous studies by Damask (2000), Hutchinson and Pratt (1999), McGuire and van Cott (1984), and Bails (1979) and does not agree with the findings of Hutchinson and Pratt (2007) and Cassell (2000). However, differences in findings are not surprising and may result from institutional, location, or structural factors as previously noted by Ott and Hartley (1991) and Vickers and Yarrow (1991). From a theoretical standpoint, more studies should be done on a region-by-region or state-by-state basis to determine if contracting and/or partial-contracting of services does indeed deliver a more cost effective means of pupil transportation, both on a per pupil and per mile basis.

The descriptive statistics paint a very obvious budgetary picture for school administrators based on a per-mile and per-student basis. As previously mentioned, on a per pupil basis, in-house transportation services costs 26.3-percent ($298.69/pupil) more than contracted, and 36-percent ($408.27) more than partial-contracted. Figure 9 shows the estimated costs and comparisons of

mean versus model for an average school district on a total expenditures per pupil basis, based on 2367 pupils.

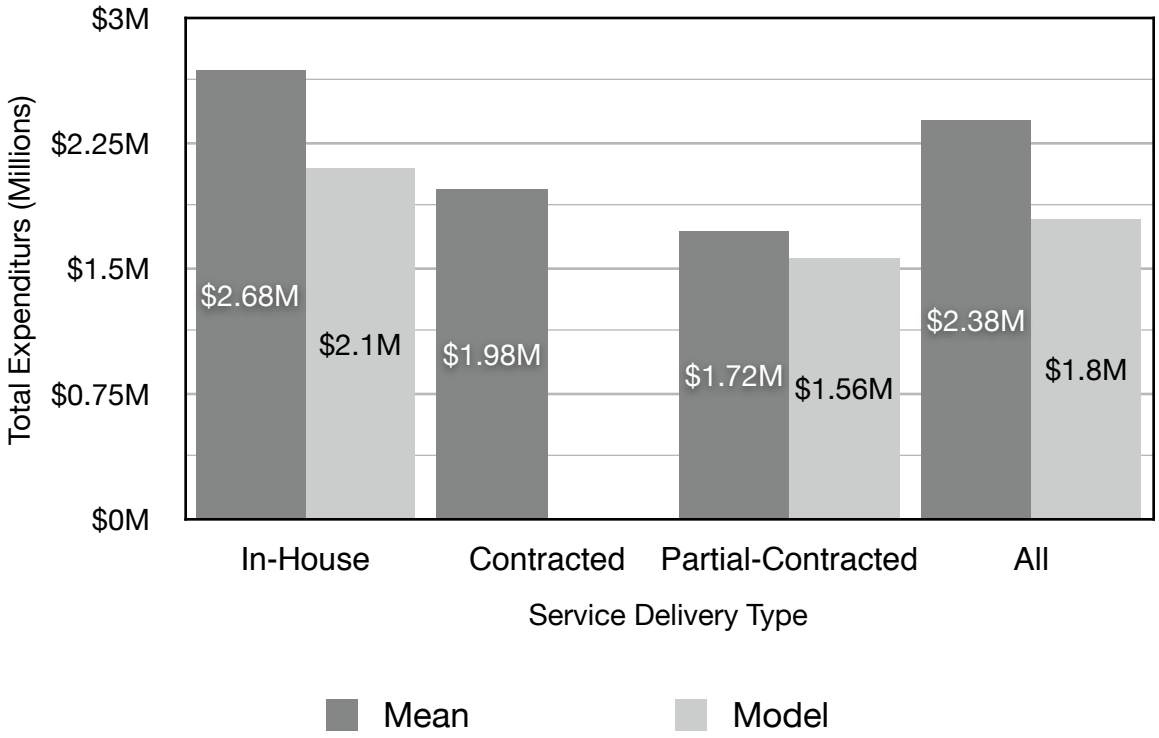


**Figure 9: Estimated Costs for Average School District Based on Ridership**

As previously noted, the average costs of contracted pupil transportation services, on a total expenditures per mile basis, is 13.3-percent ($0.63/mile) less costly than in-house pupil transportation services. Partial-contracted services for pupil transportation services, on a total expenditures per mile basis, is 16.4-percent ($0.78/mile) cheaper than in-house services and 3.6-percent ($0.15/mile) cheaper than contracted services. Figure 10 shows the estimated costs and comparisons of mean versus model for an average school district on a total expenditures per mile basis, based on 429,888 miles.

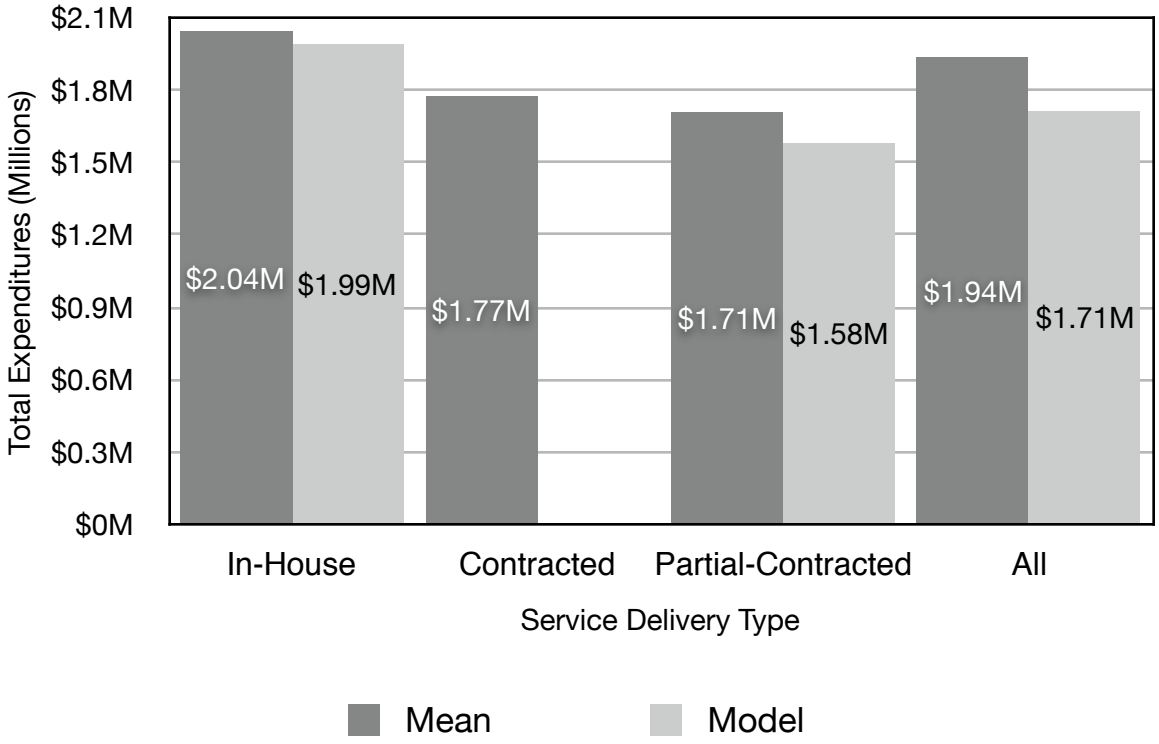


**Figure 10: Estimated Costs for Average School District Based on Mileage**

This evidence suggests that school administrators in the lower-peninsula of Michigan should seriously consider contracting out part or all of their pupil transportation services. Currently, Dean Transportation Inc., Dean Transportation Management Services, and First Student are the primary stakeholders in Michigan and provide the vast majority of contracted pupil transportation services. Therefore, those districts closest to districts already supported by these vendors will likely see the greatest cost savings.

One final area of critical meaning is the trends shown in the correlation analysis. The positive correlations from total expenditures to total miles and total ridership are expected because as mileage and ridership increase, costs are naturally going to increase as well. Also, based on economies of scale, the

negative correlation witnessed between the total expenditures per student and average ridership per regular education bus is not surprising. Since the more people that ride, the cost naturally per person tends to drop. However, what is surprising is the positive correlation between average ridership per special education bus and total ridership. This is surprising because there is an economies of scale expectation, like that witnessed with regular education buses, to occur and instead the inverse is true. This phenomenon is likely caused by the unique nature of, and special requirements for, special education transportation. This helps to explain why so many of the districts that rely on partial-contracting transportation services, rely on contracting for special education transportation.

## Recommendation and Implications

The present study reveals that contracting, whether it is full or partial, facilitates costs savings for the school districts involved. Given the current fiscal constraints faced by school boards and administrators, contracting represents a viable alternative to reducing overall expenditures. However, this may not be the case for every district involved. Therefore, every school district must perform their own cost study to determine if contracting will work for them. Furthermore, school districts can use the cost models presented in this study to run a primary analysis on what the potential cost savings might be if they were to contract.

The present study also reveals that partial-contracting is the most cost effective method of providing pupil transportation services. The cost savings

witnessed by the districts largely revolves around the privatization of special education pupil transportation services. The costs variance between special education pupil transportation services and regular education transportation services is an issue of special needs and it appears that contracting can address those needs in a more cost effective manner.

The study of the cost effectiveness of pupil transportation services in an in-house versus contracted comparison still remains an empirical question as cited by previous research (Hutchinson & Pratt, 1999 and Hutchinson & Pratt, 2007). This question can only be answered through detailed costs analysis like those found in this study and others (Hutchinson & Pratt, 2007; Cassell, 2000; Damask, 2000; Hutchinson & Pratt, 1999; McGuire & van Cott, 1984; and Bails, 1979). However, all of the research conducted as of yet represents cross-sectional studies. Therefore, in order to determine if contracting is more cost effective than in-house pupil transportation services, longitudinal studies must be conducted to evaluate if costs remain the same, increase, or decrease for contracted services.

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## APPENDIX A - CONTRACTED PUPIL TRANSPORTATION PROVIDERS

# MICHIGAN DEPARTMENT OF EDUCATION
# Grants Coordination and School Support
# Pupil Transportation

**Third Party Transportation Providers (Michigan Public Schools)**
June 12, 2008

Following is a list of third party transportation providers, as reported by the contracting agency, for Michigan public schools. The list is not considered all inclusive because there are smaller companies that provide various specialized services (possibly for individual students or small groups of students) for other school districts, but this specific information in unavailable at this time.

**Contractual Transportation Providers and School Districts Served**

## FIRST STUDENT

| | |
|---|---|
| Berrien Intermediate School District | All Transportation |
| Harrison Community Schools | All Transportation |
| Lake Fenton Community Schools | All Transportation |
| Linden Community Schools | All Transportation |
| Lakeview Public Schools | Special Education Only |
| Montabella Community Schools | All Transportation |
| Mt. Clemens Community Schools | All Transportation |
| Niles Community Schools | All Transportation |
| Pinckney Community Schools | All Transportation |
| Pontiac School District | All Transportation |
| Tecumseh Public Schools | All Transportation |
| Westwood Heights Schools | All Transportation |

## DEAN TRANSPORTATION, INC.

Grand Rapids Schools – All Transportation Services

Potterville Public Schools – Partial General Education Transportation Services

Lansing Public Schools – Partial General Education Transportation Services

Clinton County RESA – All Special Education Transportation Services for:
Bath Community Schools, DeWitt Public Schools, Fowler Public Schools, Ovid-Elsie Area Schools, Pewamo-Westphalia Community Schools, St. Johns Public Schools

Eaton ISD – All Special Education Transportation Services for:
Charlotte Public Schools, Eaton Rapids Public Schools, Grand Ledge Public Schools, Maple Valley Schools, Oneida Township S/D #3, Potterville Public Schools

Traverse Bay Area ISD – All Special Education Transportation Services for:
Alba Public Schools, Bellaire Public Schools, Benzie County Central Schools, Buckley Community Schools, Excelsior Township S/D #1, Forest Area Community Schools, Frankfort-Elberta Area Schools, Kalkaska Public Schools, Kingsley Area Schools, Mancelona Public Schools

Gratiot-Isabella RESA – All Special Education Transportation Services for:
Alma Public Schools, Ashley Community Schools, Beal City Public Schools, Breckenridge Community Schools, Fulton Schools, Ithaca Public Schools, Mt. Pleasant City Schools, Shepherd Public Schools, St. Louis Public Schools

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Ingham ISD – All Special Education Transportation Services for:
Danville Schools, East Lansing School District, Haslett Public Schools, Holt Public Schools, Lansing Public Schools, Leslie Public Schools, Mason Public Schools, Okemos Public Schools, Stockbridge Community Schools, Waverly Community Schools, Webberville Community Schools, Williamston Community Schools

Kent ISD – All Special Education Transportation Services for:
Byron Center Public Schools, Godfrey-Lee Public Schools, Godwin Heights Public Schools, Grand Rapids Public Schools, Grandville Public Schools, Kelloggsville Public Schools, Wyoming Public Schools

Ottawa Area ISD – All Special Education Transportation Services for:
Allendale Public Schools, Coopersville Public Schools, Grand Haven Area Public Schools, Hamilton Community Schools, Holland City School District, Hudsonville Public Schools, Jenison Public Schools, Saugatuck Public Schools, Spring Lake Public Schools, West Ottawa Public Schools, Zeeland Public Schools

## DEAN TRANSPORTATION MANAGEMENT SERVICES

Grand Ledge Public Schools – General Education
Kent ISD – Special Education
Caledonia Community Schools – Special Education
Cedar Spring Schools – Special Education

Comstock Park Public Schools – Special Education
East Grand Rapids Public Schools – Special Education
Forest Hills Public Schools – Special Education
Kenowa Hills Public Schools – Special Education
Kent City Community Schools – Special Education
Kentwood Public Schools – Special Education
Lowell Area Schools – Special Education
Northview Public School District – Special Education
Rockford Public Schools – Special Education
Sparta Area Schools – Special Education
Thornapple Kellogg School District – Special Education

## OTHER TRANSPORTATION PROVIDERS

Smaller transportation service contractors as provided by the Michigan State Police from their bus inspection data base. The companies name is available, but not the type of service provided.

Global Bus Service (Detroit), TVP Inc. (Inkster), Choice Charter Transportation (Detroit), Triumph Transportation (Ecorse), Trinity Transportation (Wyondotte), Safeway Transportation (Detroit), DHT (Detroit), ABC Transportation (Detroit), Servicar of Michigan (Royal Oak), Pioneer Resources (Muskegon), Schillemon Bus Service (Eagle River, Wis.), Mass Transit Authority (Flint), Johnsons Buses, Inc. (Petoskey), Truckland Transportation (Kingsford), Pellegriene, Roger (Norway), Rochon Bus Service (Norway), Larel Bus Service (Kingsford), McKnight Transportation (Wells), CLM Community Action Agency (Sault Ste. Marie), E & E Services (Eau Claire), Careful Transit ( Berrien Springs), and Superior Coaches (Hancock)