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Is Service Costing Too Much? An Examination of County Government Fleet Assets

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ABSTRACT

Local government fleet asset investments significantly impact the overall cost of service provision each fiscal year. The costs associated with short retention is subject to significant depreciation losses and increases in asset value, but expenses related to higher inventories and acquisition costs reduce liquidity. This study examines the factors that contribute to fleet asset inventory levels and original purchases. Findings among North Carolina county governments indicate more employees and governments with larger budgets lead to a higher probability of elevated inventory levels. Results also point to asset increases that do not correlate with population growth. Recalcitrance concerning replacement is limited based on life cycle and capitalization metrics, but inquiry among staff exists with new administrative and business-type activity fleet purchases. Implications include potentially reduced costs with more finance office staff oversight of assets and adjustments to existing policy thresholds.

1. INTRODUCTION

Governments are required to provide updated capital asset information annually. For local governments, the Annual Comprehensive Financial Report (ACFR) includes a summary of capital assets net of depreciation and in some cases, net of amortization. Over the years, capital assets have been redefined due to the continuing escalation of costs and capitalization policy thresholds for the government unit. Capital projects generally include buildings, land, projects under construction, and computer hardware and software. Automobiles and other motorized equipment have been considered capital projects by smaller governments for some time, but now the vast majority of local governments now define the purchase of a vehicle a capital project which requires an alternative budgeting mechanism. One reason contributing to these changes has been the escalating cost of automobiles and other equipment not to mention the continuing requests by department managers and other elected officials due to service provision; however, questions remain concerning the accumulation of these assets in consideration of the initial costs as well as maintenance. In the case of certain specialized equipment such as crawlers and dual-axle dump trucks for landfill operations, repair costs and parts can add a significant amount to the overall cost of operations. The purpose of this study is to examine the factors that contribute to overall fleet asset amounts in county governments in North Carolina for the fiscal year (FY) of 2022-2023. County governments that serve slightly smaller populations were more likely to have more assets invested in automobiles while investments in vehicles and other motorized equipment were linked to less experienced finance officers with less staff. Relationships were also found between finance personnel and vehicle additions notwithstanding replacements.

Motivation for the study is the continuance of increased financial reporting transparency among state and local governments (GASB 34 1999; GASB 2019; GASB 2021). A preliminary analysis revealed alternate ways of reporting capital assets, especially automobiles within county audit Management Discussion & Analyses (MD&A). While some reporting was extremely specific with vehicles purchases and leases, others would consolidate equipment types. However, more specified information could be found within the financial statements. Acquisition information could also be vague at times. In some cases, there was information concerning vehicle asset purchasing that went back several years along with the method of purchase inclusive of fund usage while others had no information. Other discretionary disclosures including county government vehicles by department and changes that have taken place over a period of specific years could be more uniform among audits.

This study adds to the literature in many ways. First, the research finds that at least within this study, every county now defines the purchase of automobiles and motorized equipment as capital asset acquisitions therefore increasing the importance of these assets in the budget formulation process. Second, the number and amount of assets reported can have a tremendous impact on the net position of governments, especially in the case of borrowing practices. This becomes even more important for governments that are attempting to issue debt service, secure an initial bond rating, or obtain a higher bond rating. Third, study findings illustrate a continual increase in these assets despite a distinctive service rationale. Fourth, there were several relationships found associated with finance officer personnel demonstrating the importance of accounting skills with all aspects of reporting including costs itemization and depreciation, suggesting a gatekeeper role among some of these positions (Goodman, 2008). Finally, local government audit information was the primary source for the study which makes it distinctive compared to previous studies (Sacco and Bushee´ 2013; Marsh, et al., 2005).

The study is organized as follows. The next section will consist of a literature review and initial hypotheses development. Next, the research design will be introduced with a primary model inclusive of the factors that are expected to influence the amount of current vehicle asset investments and additional vehicle assets. Ordered logistic regression models will follow that provide further comprehensive analyses along with robust model testing. Finally, there will be a summary of all findings with a discussion of the overall impact of the study.

2. LITERATURE REVIEW AND HYPOTHESES

The extant research concerning overall fleet management is abundant in some areas, but there are limitations. Depending on the type of equipment, costs, demand, and quantity, there are studies that provide models of optimal replacement time (Chen, 1998; Hopp et al., 1993; Tang and Tang, 1993). However, the use of some type of vehicle replacement policy (VRP) is a common practice among local governments. These policies normally have replacements based on years, miles, or both depending on the jurisdiction (Alamance County, NC, 2003; Philadelphia, Pennsylvania, 2019). Some local governments even allocate a point system that provides a comparison of continued maintenance costs versus replacement (City of Brentwood, Missouri, 2013). Correlation among polices is not prevalent as some jurisdictions will replace at a miles or year thresholds compared to others (Modlin, 2016). For the most part, local governments incorporate some form of life cycle costing method that provides salvage value for retiring vehicles. One study found that the resale value for salvage county government vehicles averaging just over 25% (Modlin, 2016). This is comparable to the normal salvage value of a 70% loss of original value for the first six years of use (South Florida Water Management District, 2012). Considering the rate of increased costs associated with fleet replenishment and the rate of return on vehicles no longer in service, further examination into salvage values could change the optimal replacement time for traditional service vehicles as well as other capital projects.

Vehicle acquisition can be a routine process with governments purchasing and/or leasing the required assets. In atypical cases, there are governments with a vehicle replacement policy that requires the examination of alternatives to purchasing such as leasing, service replacement of underutilized vehicles, or even the use of an employee-owned vehicle for occupational purposes with expense reimbursement (City of Knoxville, Iowa, 2018). Modlin (2018A) found that most county governments in North and South Carolina do not have these policies. Purchase options generally include direct purchases with an invoice or the use of cash through the general fund, a specified vehicle replacement fund, or some type of debt issuance with is usually an installment purchase for a very limited period of time (Ammon, 2003; Modlin, 2018A). The first two options are the most popular with the third option having extensive exclusivity for construction projects. Governments primarily choose to engage in either cash payments for vehicles or some form of short-term borrowing (Modlin, 2016). As a result of GASB 54 (2009), the additional fund balance designations have provided an alternative to the VRF for vehicle replenishment. Law enforcement and other departments that have a frequent need for vehicles can now have either a *committed, restricted, or assigned* portion of fund balance designated for purchases, leases, etc. depending on governing board policy directive. In cases with portions of designated fund balances for specific departments, it could be an indication of departmental influence within the overall budget process.

The literature thus far does not examine inventory levels of governments nor the factors that are driving the asset totals. Current research and policy provide information concerning fleet use, replacement, and purchasing practices. Current policies also provide very limited information concerning the responsible actors within the process. Fleet managers normally have responsibility for fleet management and administration to some degree, but the accuracy of asset quantity is critical in the evaluation of overall government position. Three hypotheses have been developed that attempt to both advance the literature and address the void in the research concerning the impact of government officials. There are no expectations concerning hypotheses direction.

HYPOTHESIS 1: The amount of fleet assets are associated with type and experience of key personnel.

Each fiscal year department heads have numerous budget requuests inclusive of traditional salary increases as well as funding for capital projects. For commission-manager form of governments, the finance officer initially examines the requests and in some cases, can make the final decision at this point; otherwise, the responsibility is that of the county manager. For other elected official requests, the governing body will make the final decision if there are significant differences with the manager's recommendation. The finance officer is usually the only official within the entire budget and audit process that can determine all

costs associated with service delivery and potential audit impact. This person is also the primary official responsible for specialized cost-benefit analysis (Modlin, 2016). One study found a very high level of agreement between the manager and finance officer budget recommendations (Modlin, 2018B). The importance of the position is also substantiated due to the state law requirement (N.C.G.S. 159-24, 2019) and findings have suggested that finance officers with additional experience (FINEXP) submit audit reports with fewer reporting errors (Modlin 2012; Modlin 2017; Rich and Zhang 2016). Previous research also suggests finance officers are very influential in determining administrative fleet needs with more experienced finance officers acquiring fewer vehicles (Modlin 2018A). Department managers often will request positions that will arguably enhance service delivery; however, these positions increase the full-time equivalency (FTE) and in some cases, require accompanying capital assets such as automobiles or even heavy-duty machinery. Law enforcement and emergency services (EMS) are primary examples, but more administrative areas such as code enforcement, animal control, and human services can have these same requirements. Approval is more likely when service provision has to increase due to an increase in service population (POP).

Additional finance personnel as well as departmental intermediaries also have a tremendous role in budget implementation, execution, and evaluation (Sokolow and Honadle, 1984). From an accounting standpoint, higher numbers of staff accountants (ACCT) can provide tremendous assistance with the proper recording of transactions to ensure proper implementation of generally accepted accounting principle (GAAP) requirements. The positions are also extremely effective for fund development and management with a previous finding suggesting an increased reliance on staff with accounting expertise for special revenue fund development (Modlin, 2024A). In cases involving more complex fleet transactions such as specific fund balance designations for purchases, asset depreciation calculations, and subsequent transfers, the position has increased importance. Geiger and Ittner (1996) found that government services financed by fees utilized higher levels of cost analysis compared to services funded by appropriations. Accounts payable personnel (APTECH) have the responsibility of eliminating payables in a timely manner in order to sustain current and accurate cash accounts as well as fund balances. For fleet asset purposes, the position is involved in many transactions from fund maintenance to invoice recordkeeping. The position has importance for internal control purposes as well since the responsibilities exclude receivables.

HYPOTHESIS 2: The amount of fleet assets is related to government accounting practices.

Fund development and accounting execution are necessary for all aspects of fleet acquisition and service. Asset capitalization thresholds (CAP) need to be established in order for the asset to receive capital designation. Previous studies have determined that not all local governments considered automobiles a capital asset (Modlin, 2016). However, this has significantly changed over the past decade with vehicles in each county receiving capital asset status. During this same process, the life cycle (VEHLIFE) of the asset has to be determined. In most cases, it is approximately five years, but can exceed ten years in counties that choose replacement on an intermittent basis. In conjunction with the expected life of the asset, a depreciation (DEPREC) method has to be adopted. In most cases, the straight-line depreciation method is utilized which traditionally consists of a subtraction of the salvage value of the asset from the acquisition cost and dividing by the number of service years. In many cases, salvage values are relatively standardized (Hang et al., 2016). Of course, traditional automobiles depreciate rather quickly with salvage values that can easily drop below 25% after several years of service depending on miles and type of use. In previous years, some law enforcement agencies have made the argument that depreciation among some sport utility vehicles was not as regressive therefore justifying the cost. However, when the acquisition costs were included, the option was less cost effective compared to the traditional patrol sedan (Vincentric, 2010).

Fleet assets require routine maintenance on a recurring basis. Many of these costs are considered indirect with only a modest link to actual service provision. The internal service fund (ISF) is way to track the indirect costs associated with any type of vehicle. Previous studies have found that the ISF has been used as a tool for cost effectiveness for decades although larger governments are most likely to employ this more complex form of accounting (Coe and O'Sullivan, 1993; Modlin, 2011). Previous research suggests that the ISF provides a method of cost comparisons among like units (Gianakis, 1995). In the case of law enforcement, or the sheriff's office in this case, costly automobiles can be identified and retired early if necessary. County sheriff departments (DEPTLAW) overwhelmingly have the largest level of object expenditures compared to other departments along with the most vehicles and equipment (Modlin, 2024B). The ISF is quite useful for counties with a fleet that exceeds 100 vehicles overall and have a county operated garage. Fund balance levels within ISFs have actually increased over the last decade due to escalating service costs to the fund (Modlin, 2023). Extra revenue among funds (ASSETS) at the end of the fiscal year is not uncommon, but a significant portion are earmarked for specific services and unallocated amounts can be appropriated for the next FY. Acquisition costs account for elevated levels of total expenditures (BUDGET) and are partly driven by department manager assertions of changes in service area (AREA). Law enforcement and EMS are the most likely advocates along with elected official desires for service provision despite standard procedural doctrine (March and Olsen, 1986). When these types of increases occur even with population decreases and less service demand, additional evidence emerges for bureaucratic expansion models (Downs, 1967; Niskanen, 1971; Wildavsky, 1989).

3. RESEARCH DESIGN

The units of analysis for the study are county governments in North Carolina. All 100 counties operate under the commission-manager form of government with a heavy state oversight process providing structure over finance practices including many aspects of the audit presentation. Professionally administered governments, such as the council-manager form of government, usually perform more effectively on many levels of financial and accounting reporting with higher levels of transparency (Giroux and McLelland 2003; Ingram and DeJong 1987; Modlin, 2011). The significant amount of uniformity among subjects enables a more parallel comparison among subjects. Information regarding the amount counties were spending on automobiles was obtained from county audits for FY 2023. At this point, a significant portion of intergovernmental funding related to the pandemic has lessened resulting in more traditional reporting. Audit information for the dependent variables was obtained from multiple sources within ACFR including the *Management Discussion & Analysis* as well as the *Notes to the Financial Statements*. Audit presentation was fairly common among the subjects enabling more precise data identification efforts. In some cases, specific asset location could be onerous.

The purpose of the study is to examine the connections between county government personnel and accounting practices and the level of fleet funding. A significant portion for the personnel variables was obtained through the annual salary study conducted by the UNC School of Government. Positions used in the study include the number of accountants employed by the county (ACCT), the number of accounts payable technicians (APTECH), and the experience of the finance officer (FINEXP). Some data for finance officer experience was retrieved from specific county governments. All other variables were available through ACFRs with the exception of population and service area (AREA) which were available via the U.S. Census Bureau and the U.S. Census Bureau Geography Division respectively.

The primary model consists of variables that are expected to influence fleet asset amounts that have been acquired or consist of present inventory with additions. Most of the variables are exploratory and have no previous use with this type of study while some have been used for different types of analyses. A primary model has been developed below to test fleet asset specifics against the predictors with *FLEET ASSET* as a proxy for the specified dependent variables.

$$FLEET\ ASSET = \beta_0 + \beta_1 FINEXP + \beta_2 ACCT + \beta_3 APTECH + \beta_4 EMP + \beta_5 CAP + \beta_6 VEHLIFE + \beta_7 DEPREC + \beta_8 ISF + \beta_9 BUDGET + \beta_{10} ASSETS + \beta_{11} DEPTLAW + \beta_{12} ASSETS + \beta_{13} POP + \beta_{14} AREA$$

Measurements for the variables can be found in the appendix. The dependent variables in the study consist of the total number of fleet assets managed by the county (ADFLEET), the number of vehicles used for business-type activities (BUSFLEET), and additional vehicles purchased excluding replacements (ADDITION). All dependent variables are ordered enabling an analysis into the alternate levels of purchasing and inventory levels. The predictors in the study encompass employee composition and accounting practices which are usually not included with many policy studies and provide a substantive advancement of the literature. Direct relationships will be examined through the pairwise correlations and will provide an initial test of the hypotheses. Ordered logistic regression models will then be used to test the predictors against the dependent variables. All of the dependent variables are on three-point scales that enable the inclusion of all county data. There are no initial expectations concerning predictor directions with the study.

Numerous transactions are involved with fleet assets including acquisition, accounting including depreciation, fund adjustments, and disposal. Finance office employees have the background training and expertise to fulfill these responsibilities. Finance officer experience (FINEXP) will be used as a predictor due to the tremendous amount of responsibility associated with the position. Very experienced finance officers have the ability to determine the outcomes of all transactions and the impact on audit reporting. The remaining variables, (ACCT) and (APTECH), are exploratory and are expected to have some impact on fleet asset management practices. An increased number of accounts payable technicians can make acquisitions easier due to an increased number of FTEs among that position so the cost-benefit analysis associated with purchases could be somewhat compromised. This position would also more than likely have bank payment responsibilities and without proper oversight such as a significant deficiency in internal controls, there could be additional unnecessary purchases. Both positions are coded according to the number of FTEs up to five. Other personnel related variables that will be tested is the number of full-time county employees (FTE) and the number of citizens that are served by the county government (POP).

The study will also examine accounting and finance activities that have relationships with fleet transactions and management activities. Previous studies have demonstrated there is usually a cash balance requirement (BALANCE) needed prior to purchases (Modlin, 2016); therefore, this variable will be examined in addition to the number of total assets (ASSETS) in all accounts along with total budget size (BUDGET). The ease of measuring indirect costs is one of the advantages with the internal service fund (ISF) and governments that have the personnel with the expertise of execution and the cost results associated with the practice are expected to influence management. In addition to the ISF, capitalization (CAP) practices and the level of depreciation (DEPREC) are also expected to influence the overall amount of assets. On the surface, there is some expectation that with lower capitalization thresholds, rotation could be more frequent, especially among larger counties. Depreciation, especially fleets with higher-than-

average levels of depreciation, can have two outcomes. The first would be higher levels of replacement to coincide with the depreciation while the other could be more intermittent levels of replacement with higher unit numbers designated as surplus. Similar outcomes are also possible for vehicle life cycle (VEHLIFE) therefore it will be tested as well. Law enforcement agencies are normally the primary fleet users and thus an isolation of public safety functional classification spending (DEPTLAW) versus primary spending practices is used as a predictor.

4. SUMMARY STATISTICS AND PRELIMINARY RESULTS

Panel A in Table 1 provides descriptive statistics for the entire sample. Counties on average had an on-hand inventory fleet asset amount of approximately $5M; whereas, assets related to business-type activities were less than $500K. New purchases or additions to the inventory averaged slightly more than $700K. Quarterly centile values illustrate the advantages of larger governments. For the personnel statistics, larger governments tend to employ more staff and accounts payable personnel compared to smaller governments. Approximately 40 finance officers had less than five years of experience with nine presiding over finance offices that are responsible for $200M+ budgets. The accounting factors also favored larger governments. Larger governments were the primary users of the ISF and fleet asset values less depreciation were higher with fleet values exceeding 70% with nearly every unit among the largest budget group. Although life cycles are fairly high for the entire sample, smaller governments are slightly more extensive within this area. Asset amounts and end-of-year bank balances were also higher for larger governments. For the entire sample, bank balances were approximately $37M, but most governments had less than $50M at the end of the fiscal year. Seven counties had more than $100M as the total bank balance. Bank service providers for most North Carolina county governments are normally located inside the respective county, but the highest rate of return on investments has taken place with governments that choose a primary bank outside of their county office location (Modlin and Stewart, 2012). Higher cash balance levels point to efforts to engage in one of the key objectives of a sound cash management policy (Larson, 2004**)**. Capitalization was fairly consistent with the vast majority of counties using $5K as a benchmark.

TABLE 1: Descriptive Statistics

Panel A: Full Sample (N=100)

Variable	Mean	Median	Standard Deviation	Q1	Q3
ADFLEET (Ordered)	1.51	1	0.72	1	3
BUSFLEET (Ordered)	1.44	1	1.14	.5	3
ADDITION (Ordered)	2.20	3	0.93	1	3
FINEXP	2.41	2	1.52	1	3.5
ACCT	0.92	1	1.23	0	1
APTECH	1.75	1	1.54	1	2
EMP	2.81	3	1.49	1.5	4
CAP	2.11	2	0.45	2	2
VEHLIFE	2.29	2	0.74	2	3
DEPREC	1.93	2	0.74	1	2
ISF	0.32	0	0.47	0	1
BUDGET	2.53	2	1.45	1	4
ASSETS	2.63	2	1.57	1	4
DEPTLAW	0.70	1	0.46	0	1
BALANCE	1.64	1	1.14	1	2
POP	2.14	2	1.44	1	3
AREA	0.41	0	0.49	0	1

Panel B: Acquisition Distribution

		$5M+ > 1 (N = 38)			**$5M < = 0 (N = 62)**		
Variable	**Mean**	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**	**Significance**
FINEXP	2.29	2	1.49	2.48	2	1.55	
ACCT	1.18	1	1.56	0.75	1	0.97	*
APTECH	2.18	2	1.77	1.48	1	1.33	**

EMP	3.78	4	1.34	2.20	2	1.24	***
CAP	2.16	2	0.44	2.08	2	0.45	
VEHLIFE	2.32	2	0.70	2.27	2	0.77	
DEPREC	1.89	2	0.76	1.95	2	0.73	
ISF	0.53	1	0.51	0.31	0	0.46	**
BUDGET	3.37	3.5	1.40	2.02	2	1.23	***
ASSETS	3.42	3.5	1.54	2.15	2	1.40	***
DEPTLAW	0.58	1	0.50	0.78	1	0.42	**
BALANCE	2.00	1.5	1.32	1.42	1	0.97	**
POP	2.92	3	1.53	1.66	1	1.14	***
AREA	0.45	0	0.50	0.39	0	0.49	

***** represents significance at the .001 level; **at the .05 level; *at the .10 level.**

Panel B isolates the acquisitions based on an investment amount of $5M. This enables as analysis of capability in addition to testing for relationships within the predictors. The findings demonstrate the financial capabilities of larger governments in acquiring fleet assets. Three personnel-related variables had significant relationships with all three suggesting that governments with additional accountants, accounts payable personnel, and higher FTE levels were more likely to purchase $5M or more in fleet assets in a given fiscal year. The EMP finding (3.78) suggests counties with approximately 700 employees or more acquired at least $5M in vehicles. Several significant relationships were also present among the accounting practices. Counties that purchased higher numbers of vehicles also used the ISF more than counties that purchased less vehicles, had larger budgets, had more fund assets, and more cash at the end of the year. Interestingly enough, DEPTLAW had significance as well, but the mean values suggest more overall increased spending in another area compared to public safety. This is also a characteristic of larger counties. In North Carolina, many of the larger counties by population and budget size spend more money per capita on education than other service areas (Modlin, 2024B). Spending priorities are reflective of overall mission statements.

County fleet investments (net of depreciation) for fiscal year ending 2023 are listed in Table 2. Service capabilities are quite apparent in larger counties, especially those with total expenditures exceeding $200M. Counties of this size can easily maintain a fleet of 200 vehicles or more considering fund balance levels and designated funding for fleet replacement, a stand-along vehicle replacement fund, and the availability of direct cash payment. In North Carolina, counties are required to maintain a fund balance level of 8% of general fund expenditures; however, the Local Government Commission (LGC) prefers fund balance maintenance to be at the level of peer counties as defined by population groups. The table also points out the limitations of smaller counties and explains why some of these counties choose higher life cycles prior to replacement. For Fiscal Year 2023, the least spent was approximately $277K on fleet acquisitions while Wake County, the largest county in population with one of the largest budgets, spent more than $19M.

Business-type activities generally consist of solid waste and sometimes county-maintained water services that operate as enterprise funds. Employee salary and benefits are county nonexchange expenditures while remaining operations are funded by service fees. Fleet expenditures for these activities are not common. Approximately 20% of counties did not make any expenditures in this area for FY 2023 with only two spending more than $10M. All counties, especially counties that operate landfills, have to be aware of costs within these areas since the expenses can likely include heavy equipment such as bulldozers, crawlers, tandem axle dump trucks, and excavators. Any of this equipment, depending on the size, number of miles or hours, condition, etc. can easily approach or exceed $200K.

Table 2: Vehicle Spending by Category Type and County Budget Size (Net of Depreciation)

Category	Less than $50M	$50M-$100M	$100M-$150M	$150M-$200M	More than $200M
Government Activities	**$1,497,437**	**$4,367,550**	**$5,489,929**	**$7,297,676**	**$11,908,988**
Business-Type Activities	**$349,239**	**$1,168,738**	**$1,380,022**	**$2,157,277**	**$3,074,121**
TOTAL	**$1,846,676**	**$5,536,288**	**$6,869,951**	**$9,454,953**	**$14,983,109**

Table 3 provides information concerning fleet asset inventory turnover levels. Table 2 examined investments which included replacements as well as fleet additions so additional clarity was needed to determine government capacity. Counties appear to maintain some quantity of surplus vehicles with more volume for larger units. The ratios appear to be rather high; however, the

number of actual units associated with the assets are unknown and for the smaller counties, there may not be as many disposals as a collective. The overall fleet asset account suggests counties in the $100M+ range can actually maintain higher numbers of fleet assets due to the ability to fund the service requirements and the necessary maintenance. It is entirely possible that with the rising costs associated with acquisition, retirement asset numbers could easily begin to decrease due to increased service years and revolving movement of high mileage vehicles to service departments that require less travel.

Table 3: Vehicle Increases and Decreases by County Budget Size

Category	Less than $50M	$50M-$100M	$100M-$150M	$150M-$200M	More than $200M
Additions	$366,231	$1,042,156	$2,169,148	$1,886,518	$3,224,544
Retirements	$115,089	$323,737	$480,564	$841,705	$1,661,386
TOTAL (NET)	$251,142	$718,419	$1,688,584	$1,044,813	$1,563,158

Direct relationships among the variables are examined in Table 4 with the pairwise correlation analysis. Relationships among the dependent variables verify information from the previous two tables with significant and positive relationships between ADDITION and the other dependent variables. This finding suggests that additional surplus vehicles are purchased alongside replacement vehicles. Both hypotheses are supported with the analysis as well. Several personnel variables have significant relationships with the dependent variables. All are positive with the exception of the FINEXP relationship with BUSFL. With the direct relationship, less experienced finance officers were related to additional business-activity fleet purchases. Hypotheses two was also supported with the findings. CAP had a significant and positive relationship with BUSFL suggesting these assets are required for a longer service life prior to replacement. ISF, BUDGET, ASSETS, BALANCE, and POP all had positive and significant relationships with the dependent variables. DEPTLAW had a negative relationship with ADFLEET and ADDITION suggesting increased level of fleet purchases if the primary functional classification spending area is not law enforcement. In these cases, it is more than likely public education. AREA was significant with the ADDITION variable possibly suggesting the importance of additional service distribution. Many of these variables also have significance with many of the personnel variables contrasting the differences between the larger and smaller governments and coupled with many of the variables associated with hypothesis two, the capability levels become more apparent.

Table 4: Pairwise Correlations (N=100)

Variable	ADFLT	BUSFL	ADD	FINEX	ACCT	APTECH	EMP	CAP	VEHLIF
ADFLEET	1.000								
BUSFLEET	0.2292**	1.000							
ADDITION	0.5557***	0.2111**	1.000						
FINEXP	-0.1099	-0.2094**	0.0057	1.000					
ACCT	0.3765***	0.2689**	0.2419**	-0.2128**	1.000				
APTECH	0.4364***	0.0575**	0.4364***	-0.0721	0.4828***	1.000			
EMP	0.7534***	0.3117**	0.7120***	-0.1923**	0.4526***	0.5034***	1.000		
CAP	0.1067	0.1617*	0.0921	-0.0372	-0.0205	-0.0770	0.1987	1.000	
VEHLIFE	-0.0718	0.0148	-0.1138	0.0277	0.0805	0.0022	-0.1141**	-0.0058	1.000
DEPREC	0.0677	-0.1185	-0.0088	-0.0101	-0.0392	0.0199	0.0793	0.1452	-0.1644*
ISF	0.1754*	0.1779*	0.3803***	-0.0269	0.1686*	0.2241**	0.3656***	-0.0134	-0.1196
BUDGET	0.7942***	0.3213**	0.6744***	-0.1401	0.5131***	0.6243***	0.8972***	0.1426	-0.0784
ASSETS	0.7320***	0.3168**	0.6430***	-0.1297	0.4984***	0.5782***	0.8835***	0.1732*	-0.0369
DEPTLAW	-0.3575**	-0.1308	-0.3059**	0.1625	-0.2909**	-0.4059***	-0.4081***	-0.1324	0.2570**
BALANCE	0.4482***	0.1850*	0.3721***	-0.1813	0.2155*	0.2586**	0.4942***	0.0388	0.0052
POP	0.7241***	0.2459**	0.5677***	-0.2572	0.5526	0.6374***	0.8917***	0.1331	-0.1237
AREA	0.0310	0.1606	0.2587**	-0.1047*	0.1368	0.0564	0.3266**	0.1138	-0.1621*

Table 4 Continued

Variable	DEPRE	ISF	BUDGET	ASSET	DEPTLW	BALAN	POP	AREA	
DEPREC	1.000								
ISF	0.1036	1.000							
BUDGET	0.0816	0.3451***	1.000						
ASSETS	0.0727	0.3722**	0.9171***	1.000					
DEPTLAW	0.0266	-0.2371**	-0.4544***	-0.4472***	1.000				
BALANCE	0.0176	0.2173**	0.4146***	0.5209***	-0.3227**	1.000			
POP	0.0567	0.2948**	0.8940***	0.8679***	-0.5011***	0.4686***	1.000		
AREA	0.0240	0.2922**	0.2711**	0.3138**	-0.1642*	0.0852	0.2741**	1.000	

Notes: Table 4 represents pairwise correlations of the variables used in the analysis. ** represents correlations at the .05 level; *at the .10 level.

4.1 Multivariate Results

Three ordered logistic regression models are utilized to assess the probability of some type of asset increase based on the predictors. Findings within the first model primarily point to increased administrative fleet inventory levels, but not necessarily as a result of service demand. There were positive and significant findings for EMP and BUDGET; however, inverse relationships were present with POP (= -1.0503; Z = -1.63) and AREA (-1.8762; Z = -2.66). The ISF predictor also had an inverse relationship suggesting there is an effort to marginalize these costs and ensure the best assets are retained. Personnel factors have more impact with the BUSFLEET variables. Finance officers with less experience, additional accountants within the finance office, but less payable technicians have significance with an increase in the level of on-hand vehicles for business-type activities. The significance of the increased number of accountants in this model suggests more scrutiny over the financing of specialty equipment items. This is somewhat reiterated with the negative finding for DEPREC (-.4833; Z = -1.77). All of the predictors associated with finance personnel as well as the number of employees have significance with the ADDITION model. A higher probability of additional purchases notwithstanding replacements exists with finance officers with more experience and accounts payable personnel, but not with additional accountants ACCT (-.7157; Z = -2.04). With the findings associated with this model, there appears to be no direct service justification for the new purchases and more than likely, there was some other alternative for the addition. The model also suggests that these transactions are routine additions versus addition based on a quantitative analysis. Two models were significant at the .001 level with the other at the .05 level and after being tested against a constant-only model, indications are that as a set, the predictors are reliable for determining the varying levels of fleet asset levels and additions among county governments.

Table 5: Determinants of Fleet Asset Administration by Types of Asset Specification

Panel	ADFLEET		BUSFLEET		ADDITION	
FINEXP	.0531	(0.22)	-.2398	(-1.76)*	.2954	(1.70)*
ACCT	-.0391	(-0.16)	.3885	(1.75)*	-.7157	(-2.04)**
APTECH	-.2377	(-0.85)	-.3141	(-1.68)*	.6080	(1.89)**
EMP	1.8998	(2.81)**	.0365	(0.10)	1.6484	(2.57)**
CAP	-.5516	(-0.67)	.6623	(1.51)	-.6624	(-1.12)
VEHLIFE	-.2898	(-0.56)	-.0109	(-0.04)	-.5133	(-1.29)
DEPREC	.0522	(0.10)	-.4833	(-1.77)*	-.3835	(-1.10)
ISF	-1.4007	(-1.86)*	.4940	(1.12)	.5477	(0.90)
BUDGET	2.1082	(3.19)**	.7627	(1.71)*	1.1117	(1.45)
ASSETS	.0229	(0.05)	.0316	(0.08)	.0207	(0.03)
DEPTLAW	-.2103	(-0.25)	.1487	(0.29)	-.7435	(-1.07)
BALANCE	.4191	(1.46)	.1060	(0.50)	.2813	(0.66)
POP	-1.0503	(-1.63)*	-.4880	(-1.23)	-1.0496	(-1.53)
AREA	-1.8762	(-2.66)**	.1200	(0.29)	-.1470	(-0.24)
Threshold 1	6.7454		-.1462		-3.2049	
Threshold 2	11.4129		1.5268		.7532	
Threshold 3			2.4131		2.7021	
N	100		100		100	

Log. Lik.	-36.6924		-120.9342		-63.9440	
LR Chi-Squared (14)	108.25***		28.24**		94.32***	
McFadden's Pseudo R-Squared	0.5960		0.1045		0.4245	

Notes: Cell entries are unstandardized parameter estimates; ***p <.001; **p < .05; *p < .10 (Two-tailed test). Z Scores in parentheses. The table presents estimates of ordered logistic regression specifications. For the dependent variables, ADFLEET = 3 if vehicle assets are more $20M; BUSVEH = 3 if assets are more than $1M; ADDITION = 3 if new vehicle purchases are more than $1M.

Two replacement predictors were used to test for the robustness of the results (Table 6). Functional classification area was changed from public safety to education (DEPTED). For fiscal year 2023, approximately 27 counties reported a higher level of education expenditures compared to other functional classification areas. The accounts payable position was replaced with the business officer (BUSINESS). Any number of departments can have this position. The position primarily has responsibilities related to human resource and finance activities within the assigned department and although managed by the department director, it functions as an intermediary for human resources and finance departments. Business officers can be located in the sheriff's office, social services, public health, etc. and it is within the discretion of the department concerning position existence.

The models appear to be fairly consistent with the changes. The ADFLEET model had a very similar outcome with no change in variable significance or direction. Two new findings are now present in the BUSFLEET model. CAP is now positive and significant suggesting a higher probability of increased business-type fleet inventory levels if the capitalization threshold increases. An inverse relationship also emerged with the POP variable. The ADDITION model had two similar findings with a significant and positive relationship with the size of the county budget and additional fleet purchases. Previously, BUDGET was significant with the BUSFLEET model. Neither of the replacement variables had significance with the models.

Table 6: Alternative Determinants of Fleet Asset Administration by Types of Asset Specification

Panel	ADFLEET		BUSFLEET		ADDITION	
FINEXP	.0291	(0.11)	-.2872	(-2.12)**	.3475	(1.98)**
ACCT	-.0551	(-0.22)	.3603	(1.60)*	-.4798	(-1.50)
BUSINESS	-.3379	(-0.55)	-.2386	(-0.57)	.7923	(1.36)
EMP	2.0805	(3.15)**	.1831	(0.51)	1.4479	(2.33)**
CAP	-.4079	(-0.52)	.7348	(1.67)*	-.6504	(-1.14)
VEHLIFE	-.2338	(-0.44)	-.0389	(-0.14)	-.4724	(-1.24)
DEPREC	.1348	(0.26)	-.4928	(-1.79)*	-.3468	(-0.97)
ISF	-1.3469	(-1.82)*	.3741	(0.87)	.8104	(1.34)
BUDGET	2.0491	(3.12)**	.6029	(1.36)	1.3590	(1.87)*
ASSETS	-.0856	(-0.18)	.0633	(0.17)	-.2150	(-0.36)
DEPTED	.4028	(0.46)	-.2358	(-0.43)	.9755	(1.23)
BALANCE	.4423	(1.56)	.0759	(0.36)	.4375	(0.92)
POP	-1.2600	(-2.05)**	-.7089	(-1.86)*	-.6872	(-1.00)
AREA	-1.7453	(-2.46)**	.2058	(0.49)	-.3619	(-0.58)
Threshold 1	7.5792		-.3116		-2.1709	
Threshold 2	12.1978		1.3534		1.8277	
Threshold 3			2.1994		3.7105	
N	100		100		100	
Log. Lik.	-36.8164		-122.2238		-65.0638	
LR Chi-Squared (14)	108.00***		25.66**		92.08***	
McFadden's Pseudo R-Squared	0.5946		.0950		0.4144	

Notes: Cell entries are unstandardized parameter estimates; ***p <.001; **p < .05; *p < .10 (Two-tailed test). Z Scores in parentheses. The table presents estimates of ordered logistic regression specifications. For the dependent variables, ADFLEET = 3 if vehicle assets are more $20M; BUSVEH = 3 if assets are more than $1M; ADDITION = 3 if new vehicle purchases are more than $1M.

The overall analysis revealed widespread support for the hypotheses. Evidence of support for the first hypothesis can be found in Panel B of Table 1, the pairwise correlation analysis, and in at least two of the regression models. As the level of fleet inventory increased, especially with fleet or equipment designated for business-type activities, staff had a more significant role. Findings were somewhat limited with the ADFLEET regression model for all specific personnel. The data in general illustrates a more involved staff when there is some type of change among these assets such as new purchases or a replacement of more expensive equipment. Support for the second hypothesis exists as well, but not as widespread among all analysis areas. The univariate analysis had abundant support for many of the variables; however, the budget variable had the most support among the logistic regression models. The use of the internal service fund was significant with one model as was the depreciation variable (DEPREC). County population and area were significant with the ADFLEET model, but not the other models. The relationships were negative indicating that there is a higher probability of increasing administrative fleet inventory levels although the populations are not increasing. However, with the pairwise correlations, these relationships were significant and positive.

5. CONCLUSIONS AND LIMITATIONS OF THE STUDY

This study has examined factors that contribute to the overall amount of fleet assets purchased and managed by county governments in North Carolina. Findings indicate that higher levels of administrative fleet asset inventory levels are associated with larger budgets with higher levels of employees, but not service areas. Findings also point to a higher likelihood of business-type fleet inventory if there is more scrutiny over depreciation along with an established capitalization threshold. Again, with the significance of the population variable, these inventory levels are not service based. Findings associated with a higher probability of additional vehicle purchases included more employees and larger budget sizes suggesting efforts to ensure employees have adequate vehicles for service use.

The models have to be examined as a unit in order to determine the fleet asset process. For routine fleet management, replacements, and purchases, employees receive most of the requested amount with little inquiry. The ADDITION model suggests less experienced finance officers allow staff to assess and execute the necessary transactions for the process and for larger governments, this process can be expedited with the additional accounting staff. The ISF finding supports this assumption since this is a tool for tracking indirect costs. However, due to the costs and amount of depreciation associated with heavy equipment purchases such as cleated bulldozers for landfill operations which are a normal part of business-type activities, there are higher levels of involvement by staff to assess need and determine financing options.

Findings among the models did provide some support for previous research. Counties with larger budgets had a higher capacity for an increased inventory level and additional purchases (Modlin, 2016). More analysis for fleet associated with machinery that were part of some type of business-type activity was also supported (Geiger and Ittner, 1996). The study also pointed to a need to explore the implementation of the ISF to control asset levels by closely examining fleet costs (Gianakis, 1995). The necessity of accounting skills and expertise were also a finding consistent with previous research (Modlin 2012; Modlin 2017; Rich and Zhang 2016). Indirectly, the continuance of fleet acquisitions despite a population equivalency provides support for bureaucratic expansion arguments (Downs, 1967; Niskanen, 1971; Wildavsky, 1989).

The study has several limitations. The primary limitation is the lack of data specifying the types of assets under analysis nor the actual condition of the assets. Depreciation accuracy could improve with this type of data. Second, the analysis does not include assets used by component units that are supplied by the county. Third, the depreciation information is very general and without specific asset types and conditions, accuracy related to the true value of assets including salvage costs are difficult to determine. Fourth, the county governments in North Carolina are under an extensive state oversight process concerning financial activities; therefore, county government spending is restricted. Finally, for counties with staggered life cycles for assets, there was no accompanying information for miles or hours thresholds depending on the type of equipment.

Government actors are at the center of the initial decision-making process as well as financial reporting accuracy. Areas that warrant further research include the role of the county manager as well as other finance staff. Another area of research could be the focus of depreciation timing and how this affects total assets. Alternate ways of financing and the overall impact on governmental funds could provide insight on purchasing impact. A further benefit of these research endeavors could also potentially yield additional findings associated with the responsibilities required by specific personnel and provide information that may necessitate additional training.

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Appendix

Variable	Definition
ADFLEET (DV-Ordered)	**Total Amount of Vehicle Assets that are County Managed; 3 = More than $20M Source: ACFR**
BUSFLEET (DV-Ordered)	**Total Amount of Vehicle Assets per County that are used for Business Activities; 3 = More than $1M Source: ACFR**
ADDITION (DV)	**Number of Vehicle Assets Purchased During the Fiscal Year; 3 = More than $1M Source: ACFR**
FINEXP	**Finance Officer Experience; 5 = More than 20 Years Source: UNC School of Government County Salary Study, ACFR**
ACCT	**Number of Staff Accountants; 5 = Five or More Source: UNC School of Government County Salary Study**
APTECH	**Number of Accounts Payable Technicians on Staff; 5 = Five or More Source: UNC School of Government County Salary Study**
EMP	**Number of County Employees by FTE; 5 = More than 1,000 Source: ACFR**
CAP	**Threshold for Capital Asset; 3 = More than 5K Source ACFR**
VEHLIFE	**Useful Life of Vehicle Asset; 3 = More than 5 Years**
DEPREC	**Percent Value of Fleet Less Depreciation; 3 = More than 80%**
ISF	**Use of Internal Service Fund by County; 1 = Yes Source: ACFR**
BUDGET	**Total Budget Size by Revenue; 5 = More than $200M Source: ACFR**
ASSETS	**Amount of assets within all governmental funds; 5 = More than $200M Source ACFR**
DEPTLAW	**Functional Classified Area with Highest Level of County Expenditures; 1 = Law Source: ACFR**
BALANCE	**Bank Balance(s) at the end of the fiscal year; 5 = More than $100M Source ACFR**
POP	**Number of County Citizens; 5 = More than 200K Source US Census Bureau**
AREA	**Number of County Square Miles; 1 = More than 500 Source: US Census Bureau Geography Division (2010)**