SEARCHING FOR EFFICIENCIES THROUGH THE CONSOLIDATION OF NON-INSTRUCTIONAL SERVICES IN MICHIGAN K-12 PUBLIC SCHOOLS

by

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A dissertation proposal submitted to the faculty of the University of Michigan – Flint in partial fulfilment of the requirements for the degree of

Doctor of Education

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2020, September

DEDICATION

I dedicate this dissertation to my wife, Christina Cartwright, the lady who has always been there for me and who has sacrificed so much over the years in support of our family. After dragging her off backpacking for a month in 2017, she probably thought there was nothing else I could do that would be any crazier. Instead, she was enthusiastically supportive when I suggested starting this multi-year doctorate journey, despite being in the twilight of my career and trying to get our two children through college. Christina has been my partner, co-conspirator, champion, and best friend. There is no way I could have achieved any of my life goals, let alone finish this doctorate program, without her steadfast support. Christina, you are my rock, and I would be lost without you.

ACKNOWLEDGEMENT

First and foremost, I want to recognize my family elders who installed in me the love and respect for public education. To my parents, Dianne Cartwright and Larry Cartwright, who have been lifelong learners and teachers, I thank you for passing on your passion and dedication for public education to me. To my Aunt Roni Telfer and Uncle Dick Telfer, both devoted and enthusiastic educators, your many accomplishments in secondary and higher education have both impressed and motivated me. The high bar I strive for every day is the one set by the four of you through your examples and dedication.

To my family, Christina, Ryan, and Shannon, who have become used to the never-ending crazy ideas that I seem to come up with, thank you for your indulgence throughout this journey. Despite all the time I spent away from home, the many nights and weekends of doing homework, and the moaning and groaning they often heard coming out of the home office, my family laughingly and lovingly supported me every step of the way. This includes my sister, Laura Diekevers, who has known for a long time the extent of my crazy, yet she still supports me. For your relentless, selfless, and unending positive support, thank you with all my heart.

Next, I would like to thank my co-workers at the Public Schools of Petoskey for their support and friendship. Even after 19 years of working together, it remained fun because of each of you. For your smiles, quiet excellence, and unrelenting encouragement, please accept my appreciation. Renee Artibee, Ron Griffin, Beth Kavanugh, Diana Konkus, Lori Lewis, Tara Moore, Michelle Nichols, Liz Nortley, Bruce Smith, Michelle Sysko, and Denny YoungDyke, you have been the unheralded heroes of this outstanding school district and it has been an honor and a privilege to work with you.

Third, I would like to thank my mentors and coaches, including Jane Bailey, Dr. John Jeffrey, Jim Pitcher, Dr. Diane Scheerhorn, Dr. John Scholten, and Dr. Lynn Slanec. I have been blessed by the unending support and counseling of these outstanding educational professionals. I have worked hard every day to ensure that I met the high standards each of you set through your words and actions. Thank you for challenging, coaching, advising, and supporting me throughout our various adventures together. I would have left this profession a long time ago had it not been for your support.

Finally, to my advisory team of Dr. Tyrone Bynoe, Dr. Woojong Kim, Dr. Toko Oshio, and Dr. Thomas DeLuca. I have appreciated your efforts and support throughout this challenging journey. You never allowed me to settle for anything less than my best, and you continually challenged me to improve myself and this study. You have brought patience, candor, and laser-like focus on ensuring I met your exacting standards. I especially want to recognize Dr. Bynoe for his unending faith and tireless coaching during this entire doctoral process. Throughout the many challenges, setbacks, and life events that transpired during this journey, he never let me doubt myself or my ability to finish this journey. Thank you.

ABSTRACT

One important source of creating school efficiencies has been the consolidation of non-instructional support services with another educational entity. In Michigan, as state financial resources have dwindled, so has fiscal support of schools. This has forced districts to examine alternative ways to educate students and provide services. In K-12 districts, the search for financial efficiencies often begins with examining the costs of district-level support services, including administration, business office, and custodial services. Staffing creates the largest expense for educational institutions, yet there has been limited investigation into the size and cost of staffing for the non-instructional services subject to possible service consolidation. Using data available from Michigan databases, the study analyzed relationships between staffing levels and common district characteristics of enrollment, foundation allowance, per pupil expenditures by function, per pupil wages by function, and per pupil benefits by function. The study used a combination of descriptive statistics, correlational analysis, cross-sectional regression analysis, and fixed effects regression analysis to determine which model variables had influence on staffing, along with whether staffing levels could be estimated. This study also examined the impact consolidation of support services had on these same variables and the models' estimation ability. The study found that several of the model variables had influence on staffing in both consolidated service and non-consolidated service arrangements. The models' estimation abilities appeared successful in non-consolidated service arrangements, but the results were less dependable when only examining districts with consolidated service arrangements.

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CHAPTER ONE

INTRODUCTION

This predictive correlational research study sought to identify, measure, and describe the impact non-instructional support service consolidation had on staffing and staffing costs of Michigan K-12 school districts. The researcher used an estimation model for determining effective staffing levels and costs based upon common district characteristics such as enrollment and funding. Therefore, this chapter includes the following sections: Problem Statement, Research Questions, Purpose of the Study, Significance of the Study, Rationales, Limitations and Delimitations, and Key Definitions.

Problem Statement

The financial pressures on Michigan to fund school districts adequately have been significant for decades. Fiscal efficiency and academic excellence have been the focus of education policy, with wholesale district consolidation often seen as a way to achieve these goals. Local communities, however, realize that the loss of schools due to mergers can have an immense negative impact on a community (Lyson, 2002). As a result, policy makers have been hesitant to force mergers in the face of fierce local resistance, instead leaving those decisions up to individual districts (Arsen, 2011). Meanwhile, as state financial resources dwindled, so has fiscal support of schools, forcing districts to examine alternative ways to educate students and provide services (Baker & Duncombe, 2004; Brasington, 2003; DeLuca, 2013; DeLuca, 2014; Duncombe & Yinger, 2007; Eggers, Snell, Wavra & Moore, 2005; Menzel, 2016; McGoey, 2008; Rooney & Augenblick, 2009).

In K-12 districts, the search for financial efficiencies often began with examining the costs of district-level support services, including administration, business office, and custodial services. Three important sources of creating school efficiencies have been the merging of entire school districts, the privatizing of specific school support services, and the consolidation of non-instructional support services. The researcher saw an opportunity to expand the current body of literature by examining the impact non-instructional support service consolidation had on district staffing and related staffing costs. Staffing creates the largest expense for educational institutions, yet there had been limited investigation into the size and cost of staffing for the non-instructional services subject to possible consolidation.

Research Questions

The researcher pursued answers regarding staffing levels and costs within specific support services using a variety of techniques designed to answer the following questions:

1) ***When examining Full Time Equivalents (FTE) by functional area at the district level of non-instructional support services, are the variables of Foundation Allowance, Enrollment, Per Pupil (PP) Expenditures by function, Per Pupil (PP) Wages by function, and Per Pupil (PP) Benefits by function statistically different in consolidated service arrangements as opposed to non-consolidated service arrangements?***

2) ***Is FTE by functional area at the district level of non-instructional support services associated with the model of independent variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, PP Benefits by function, consolidated school districts, and non-consolidated school districts?***

3) ***Does consolidation play a significant role in the model's ability to predict FTE by functional area over time at the district level for non-instructional support services?***

4) ***Does a model regarding school consolidation of non-instructional support services predict FTE by functional area over time at the district level?***

5) ***Does a model regarding the lack of school consolidation of non-instructional support services predict FTE by functional area over time at the district level?***

Purpose of the Study

Over the past two decades, inadequate funding of K-12 schools in Michigan created challenges for district leaders who were looking for ways to stretch the resources they were allocated. This study investigated effective practices in K-12 education when it came to the consolidation and staffing of non-instructional support services. The researcher envisioned a statistical model that identified and estimated effective staffing levels for support services, along with their associated costs, based upon common district characteristics such as enrollment and per pupil funding. When faced with budget shortfalls, educational leaders might find such a tool invaluable, as they communicated their findings and decisions regarding staffing. Having a estimation staffing model available would allow leaders to identify potential cost savings due to being overstaffed within their non-instructional support services, identify if they are paying too much for those services even if adequately staffed, or provide research-based evidence about the appropriateness of their existing staffing levels and costs.

In a time of significant financial pressure on Michigan school, school officials must consider alternative ways to deliver non-instructional support services. Local districts may find the fiscal rewards they seek, while avoiding the pitfalls that come with district mergers and privatizing services, by pursuing service-level consolidation with Intermediate School Districts (ISD) or other educational entities (Arsen, 2011; Eggers, Snell, Wavra, & Moore, 2005). The purpose of this study was to identify, measure, and describe the impact non-instructional support service consolidation had on the size and cost of district staffing in those areas.

Significance of the Study

As school officials deal with their budget challenges, they must give serious thought to alternative ways of delivering support services. One measure often considered by legislators and civic leaders has been the merging of multiple school districts into a single, larger district. Advocates believed this would provide economies of scale, thereby reducing the cost of education (Brasington, 2003; Duncombe & Yinger, 2007). It was common for district merger initiatives to encounter community resistance due to the emotional impact of closing schools (Coulson, 2007; Lyson, 2002). The number of mergers in Michigan over the past three decades has significantly declined, suggesting that most economies of scale have already been achieved (Ballard, 2010; Brasington, 2003; Coulson, 2007).

The use of private contractors providing non-instructional services has been prevalent in Michigan in the areas of transportation, maintenance, and business services (Lafaive & Hohman, 2015). The predicted fiscal windfalls have been mostly unmet, though districts have been able to identify other compelling benefits that provided positive outcomes. The existing body of evidence failed to create a persuasive case for rapid investment in the privatizing of support services (Angelo, 1999; Brenner, 1999; DeLuca, 2013; Maher, 2015; O'Toole & Meier, 2004).

The consolidation of non-instructional support services as a means for cost savings remained largely unexplored. The studies by DeLuca (2013), Metcalf (2009), and Augenblick, Palaich and Associates (2018) provided the most recent information, though each approached the topic from a different angle. DeLuca (2013) conducted a mixed methods study that supplied the most relevant research, as it focused on the per pupil (PP) expenditure impacts between districts that consolidated services and those that did not. While this study explored the effects service consolidation had on costs, it did not investigate the impact on staffing levels. At the time of the study, no state data existed separating districts that had service consolidation arrangements in place from those that had not, forcing DeLuca (2013) to rely on survey results to make this determination. Metcalf (2009) used a case study examining the effects of consolidation on a single support service, focusing on the qualitative effects on the district this change created. Augenblick, Palaich and Associates (2018) used a mixed methods approach designed to estimate the costs of providing overall educational services in Michigan. This study addressed the support services cost structure but did so at a summarized level based largely upon professional judgement. Proponents suggested the concept of the consolidation of non-instructional support services provided significant savings, while avoiding the pitfalls associated with full district mergers or privatization of support services, and these three latest studies did not refute that (Hilvert & Swindell, 2013; Maher, 2015; Menzel, 2016).

As districts struggled with fiscal challenges, the researcher noticed a need for identified effective practices to assist decision makers forced to adjust budgets due to fiscal constraints. One of the first areas school officials looked to when cutting budgets was in non-instructional support service staffing. These positions were the furthest away from the classroom and arguably had the least negative impact on academic achievement. Constituents can sometimes challenge district administrators, especially during the bargaining of labor contracts, to justify the staffing levels and costs of non-instructional support services. Lacking an estimation model that allowed analysis of staffing levels through a lens composed of common district characteristics, school administrators have found themselves at a disadvantage when trying to justify whether their non-instructional support service staffing levels and costs were appropriate.

The literature review revealed a possible gap in research regarding the size and cost of district staffing for the non-instructional services subject to possible consolidation. The state had disaggregated district data, which included fields differentiating employees from contractors, thereby allowing identification of those districts that had support service consolidation arrangements in place. The state introduced this critical data field subsequent to DeLuca’s 2013 study, thereby allowing the researcher to identify districts with service consolidation arrangements without the need of a survey. As a result, the researcher was able to conduct a quantitative analysis designed to answer questions regarding effective staffing levels for districts that had consolidated non-instructional support services versus those that had not. This study explored whether there were efficient levels of staffing in these areas, followed by a determination of whether there existed reasonable relationships between staffing size and key variables such as district size, district funding, and district expenditures.

When such relationships were established, the researcher attempted to provide an estimation staffing model based upon the key variables, further differentiated between districts that had consolidated services and those that had not. The researcher intended to offer a blueprint for educational leaders that identified efficient practices regarding the staffing levels and related costs of instructional support services that might be helpful when working through the challenges of trimming budgets and staff. This study offered district administrators research-based guidance, prior to implementing changes, on whether consolidation of non-instructional services might provide lower costs, higher staffing levels, both lower costs and higher staffing levels, or neither.

Limitations and Delimitations

The main limitations of this study included database accuracy, timeframe, *n*-size of service consolidation districts, non-financial factors of service consolidation, and focus. The study's data set was derived from state databases made up of information that was required reporting for individual districts. The state audited many of these databases for reasonableness, with discrepancies and concerns communicated to individual districts with opportunities for corrections. The state conducted desk audits remotely from Lansing, Michigan, rather than onsite audits conducted at individual district locations. This reduced the ability of auditors to examine baseline documents, verify reported information, or conduct similar testing often associated with rigorous audits. As a result, auditors had to rely on reasonableness testing, which can identify only the grossest of errors. The individual district clerical staff entering the data were often provided with little training or oversight. The researcher did not identify any monetary or similar incentives for districts to knowingly manipulate the data elements of interest. Therefore, the greatest likelihood of database accuracy issues rested with data errors due to clerical oversight.

The second limitation was that the study covered the period 2012 through 2017, where the fiscal conditions may or may not have been representative of the norm. Additionally, the research may not have captured the long-term impact of service support consolidations that occurred prior to this study's timeframe. The inability to identify when service consolidation occurred prior to 2012 may have influenced the longitudinal aspects of this study.

A third limitation was a problem encountered with the *n*-sizes of districts with consolidated service arrangements. The lack of a sufficient number of these arrangements resulted in the elimination of three non-instructional support service areas from the study. Even in the functional areas tested, their small *n*-sizes made reaching broad conclusions more difficult.

A fourth limitation was that of scope, as the researcher's study did not examine any of the non-financial implications of service consolidation arrangements. In this study, the researcher examined the cost implications of non-instructional support service consolidations based upon the change in expenditures only. The assumption in this study was that service consolidation provided some degree of economies of scale. By definition, economies of scale occurred when entities realized cost savings and all other factors remained the same, or when cost remained the same but service quality improved. There were non-financial implications with service consolidations, such as savings in management time and improved service levels, which were beyond the scope of this study and therefore not measured. The researcher anticipated that if a service consolidation arrangement resulted in unacceptable declines in service quality, then the district would reverse the arrangement. The examination of these factors presented an opportunity for a separate qualitative or mixed method research project, as the measurement of these factors was beyond the scope of this study.

The final limitation was that the focus of this study was from a school administrator's viewpoint, looking at ways to achieve financial savings with little or no loss in service level. However, taxpayers and legislatures often viewed schools from a different point of view, frequently focusing on the return on tax dollars as measured by graduation rates, test scores, or other non-financial factors. The impact of non-financial factors was beyond the scope of this study and might provide an opportunity for further research.

Delimitations in this study included geography, functional focus, and consolidation type. This study concentrated on the results of service consolidation and staffing in Michigan; therefore, readers should undertake any projection of results to other states with caution. The examination for efficiencies was limited to non-instructional support services that Local Education Agencies (LEAs) normally accounted for within their General Fund. The researcher did not examine instructional services in this study, nor non-instructional support services that districts normally accounted for outside the General Fund, such as Food Service Fund activities, Enterprise Fund activities, or Capital Project Fund (Construction) activities. There were multiple methods of school consolidation, including whole district mergers and privatizing of services, which the researcher also excluded from the study to maintain a focus on the research questions.

Finally, the researcher assumed consolidation of support services would remain an option for LEAs in the future. Over the past decade, both Governors Jennifer Granholm and Rick Snyder introduced plans requiring examination of school service consolidation. Given the high number of service consolidations in existence, the ramifications of eliminating this option were likely significant. These factors strongly suggested service consolidation was one financial tool that would remain viable into the near future (Eagan, 2010; Wallbank & Miller, 2008).

Key Definitions

In order to provide consistency through this report and to assist the reader, the researcher identified and provided the following definitions.

Annexation. One school district attaches to another district, after which the attaching district ceased to exist (Citizens Research Council, 1990).

Annexation and property transfer. Only a portion of a school district was attached to one district and the remaining portion was transferred to one or more districts (Citizens Research Council, 1990).

Consolidation of services. Contractual arrangements between two or more educational entities that agreed to cooperate by sharing similar services, or when one entity provided specific services to another, independent entity (Maher, 2015). For this study, the researcher used *consolidation of services* or *service consolidation* to describe when one or more LEAs obtain specific services from other LEAs or ISDs (DeLuca, 2013).

Cost. The total value of all resources required for the goods or services had they been used in their most valuable alternative use (DeLuca, 2013). This includes district outlays or the value of resources necessary to provide a specified level of educational outcomes (Duncombe, Ruggiero, and Yinger, 1995).

Diseconomies of scale. Occurred when there were increases in the average per pupil cost as enrollment grew while maintaining the same level of quality, or where the level of quality for the same or reduced average per pupil cost decreased (Duncombe et al., 1995).

Dissolution. A term describing school districts that lost their legal identity and life, dissolving by attaching themselves to other school districts (Citizens Research Council, 1990).

Economies of scale. As a term related to the nature of production processes within manufacturing organizations, *economies of scale* were a reduction in the per-unit cost of output when all inputs, including fixed and variable costs, were increased by the same proportion (Dollery & Fleming, 2006; Rasmussen, 2011). When applying this concept to educational outcomes, *economies of scale* were most often defined as a reduction in the average per pupil cost as student enrollment increased while maintaining the same quality of academic achievement (Duncombe & Yinger, 2007).

It was important to point out that some authors used the phrases "*economies of size*" interchangeably with "*economies of scale*" (Andrews, Duncombe, & Yinger, 2002; Duncombe, Miner & Ruggiero, 1995; Duncombe & Yinger, 2007; Fox, 1981). Duncombe and Yinger (2007, p. 343) indicated that when examining educational entities, "several different 'units' could be defined, including number of students, the quality of services (as measured, say, by student performance), or the scope of educational services". For most practical purposes in this study, the distinction between *economies of size* and *economies of scale* was not important and therefore the researcher used *economies of scale* when addressing these concepts.

Economies of size. A reduction in the total cost per unit of output resulting from the growth in output (Dollery & Fleming, 2006; Rasmussen, 2011). This differed from *economies of size*, which allowed input proportions to change, whereas *economies of scale* required input proportions to remain the same (Dollery & Fleming, 2006). For this research study, entity size was measured by student enrollment (Fox, 1981). For most practical purposes, the distinction between *economies of size* and *economies of scale* again was not important; thus, the researcher used *economies of scale* when addressing these concepts during the study.

Expenditure. The amount of money spent to acquire a good or service (DeLuca, 2013).

Foundation Allowance. The targeted amount of funding which all LEAs received from the state on a per pupil basis (Metcalf, 2009).

Function. This study examined most expenditures at the function level, making this a critical term in the study. The term *function* referred to a category of financial expenditure records submitted to the state. More importantly, it described the activity for which a service or material was acquired (DeLuca, 2013; Michigan Department of Education, 2016). Another way to look at *function* was it described the job, occupation, or service that was being examined. For example, Function 270: Transportation Services was where every district captured 100% of the staffing and expenditure data related to providing transportation services.

Functional area. Related to the term 'function', a *functional area* described the job, occupation, or service that was being examined. For example, functional area 270: Transportation Services was where every district captured 100% of the staffing and expenditure data related to providing transportation services.

Intermediate school districts (ISD). These were educational service agencies that provided support to all LEAs within a geographic area. The geographic area frequently approximated the county (Metcalf, 2009).

Local education agency (LEA). A name for local school districts recognized by the state, each with its own elected board and superintendent (The Revised School Code, 2014).

Merger. Sometimes referred to as *district consolidation*, this occurs when two or more school districts legally dissolve and reform into one larger, organized school district (Citizens Research Council, 1990).

Per pupil expenditures (PP Expenditures). A key metric in this study, *per pupil expenditures* equaled total support services expenditures divided by enrollment (Michigan Department of Education, 2016).

Support service. An activity performed in support of the educational mission of the district, largely by non-certified staff. For this study, support services were identified by their *function* as defined by the Michigan Department of Education (2016) in Bulletin 1022 and were comprised of the following:

1. Support Services - Instructional Staff (Function 220);
2. Support Services - General Administration (Function 230);
3. Support Services - School Administration (Function 240);
4. Support Services Business (Function 250);
5. Operations and Maintenance Services (Function 260);
6. Transportation Services (Function 270);
7. Central Support Services (Function 280) (Michigan Department of Education, 2016).

Chapter Summary

This chapter introduced a study designed to identify, measure, and describe the impact non-instructional support service consolidations had on the size and cost of district staffing within Michigan K-12 school districts. The chapter included the purpose of this study, along with its importance, critical limitations, delimitations, key definitions, and assumptions.

CHAPTER TWO

LITERATURE REVIEW

In order to discuss ways to find fiscal savings in K-12 school districts, it was important to review the common means of achieving efficiencies that historically occurred. The first section of the literature review described the methods, findings, and conclusions reached by others in their exploration of attempts to achieve efficiencies in non-instructional services within K-12 school districts. The exploration included the three major ways districts have historically pursued these efficiencies, followed by a comparison of actual results to expectations. The second section contained a critical review of the research methods used in key studies, along with research strategies, data gathering methods, and evaluation of results in the arena of K-12 non-instructional support service efficiencies.

Synthesis of Literature Regarding Support Service Efficiencies in K-12 Schools

Sustained financial pressures have forced local governments to examine critically their operations to ensure they made the most efficient use of their resources. When working with scale economies, researchers most often cite overhead as a place to find efficiencies. In K-12 districts, this often began with examining the costs of district-level support services, including administration, business office, technology, food service, maintenance, and custodial. Three important sources of pursuing school efficiencies have been the merging of entire school districts, the privatizing of specific school support services, and the consolidation of non-instructional support services (Andrews et al., 2002; Coulson, 2007; DeLuca, 2013; Duncombe & Yinger, 2010; Duncombe & Yinger, 2007; Eggers, Snell, Wavra, & Moore, 2005; Fox, 1981; Maher, 2015; Menzel, 2016; Metcalf, 2009; Rooney & Augenblick, 2009; Shakrani, 2010; Zimmer, DeBoer, & Hirth, 2009).

Production Theory

The financial and production focus of governmental entities such as schools has been much different from that of industry. Schools are not production facilities that focus on maximizing profits. Instead, constituents have expected schools to utilize their resources in a manner that maximizes the services they provided. In fact, the generation of profits by governmental entities may suggest they were failing to provide the level of services expected by the taxpayers who were paying the bill and, therefore, were negligent in achieving their overarching mission. Yet the same taxpayers who provided the resources were well acquainted in for-profit business practices and often viewed government through that lens. It was not a surprise to find leaders and constituents applying basic production theory, initially developed with an eye towards manufacturing, to government operations including schools.

Manufacturing scale economies theory. Most business leaders understood their purpose for their enterprise was to maximize profit. To achieve this end, firms must increase their revenue, decrease cost, or a combination of both. In manufacturing, a focus on costs was appropriate since raw materials tended to be a major component of per-unit costs. If manufacturers could drive these unit costs lower through efficiencies, then they could maximize their profits without increasing production or pricing. Economies of scale occurred when the manufacturer could reduce the average cost per unit of output without changing output quality, or when the average cost per unit of output remained the same with increased output quality (DeLuca, 2013; Dollery & Fleming, 2006; Rasmussen, 2011). If the changes implemented by the firm created increasing average cost per unit, or if the output quality deteriorated, business leaders identified this as diseconomies of scale (Dollery & Fleming, 2006; Rasmussen, 2011).

Empirical observations often showed that smaller companies were not as productive, with larger companies producing at lower per-unit costs. There were varied sources of efficiencies, which included price-side advantages, technical advantages, and fixed cost advantages (Rasmussen, 2011). Price-side advantages could come in many forms, including discounts for volume purchases of materials and pressure on suppliers due to a stronger market position based upon the size of the buyer. Larger firms could achieve technical advantages when they developed larger facilities, bigger machines, and assets that favored large-scale production. Finally, larger firms were able to spread their fixed costs over the higher production output that their size advantage gave them, and in that manner drive down overall per-unit costs (Rasmussen, 2011).

In a perfect economic model, companies would continually strive to increase their operations resulting in driving down their per-unit costs. In practice, constraints eventually limit the per-unit cost benefits of expansion. The limits can occur due to monetary or budgetary constraints, increasing scarcity of resources, or similar circumstances (Rasmussen, 2011). As a result, as a company produced greater quantities, average cost per unit tended to decrease initially until they met a point of equilibrium, at which point the average cost per unit began to increase. An economy of scale process created a characteristic “U-Shaped” curve, as shown in Figure 2.1 (Dollery & Fleming, 2006; Rasmussen, 2011).

As shown in Figure 2.1, economies of scale occurred between point A and point B as the average cost per unit declined to the lowest position on the curve, assuming quality factors remained unchanged. At point B the firm was producing its product in the most efficient manner possible (Rasmussen, 2011). Following the curve after point B, the average cost per unit began to increase as it moved towards point C, indicating diseconomies of scale were occurring. The researcher noted that discussions regarding the concept of scale economies focused on the production or cost side of the profit equation. Output elements such as sales increases, pricing to customers, market demand, and product customization were not elements in scale economies since the concept anticipated all other factors increased in a proportional basis to the output (Dollery & Fleming, 2006; Rasmussen, 2011).

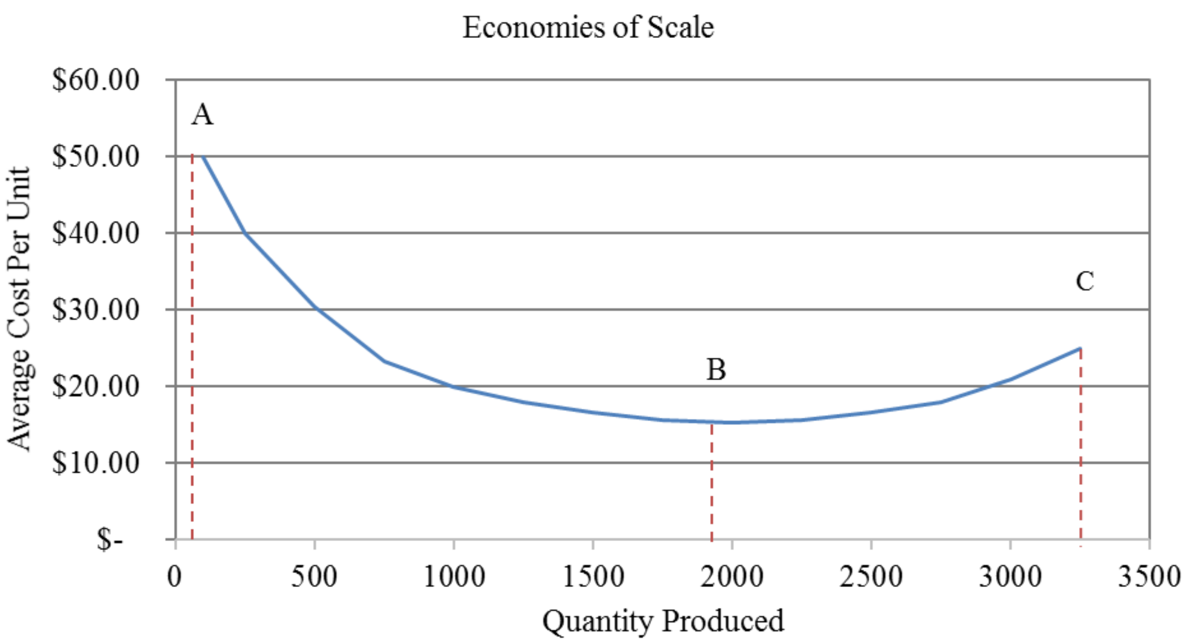

Figure 2.1. Sample Average Cost per Unit for Quantities Produced

K-12 scale economies theory. A significant amount of research has been conducted in attempts to validate the effectiveness of applying production scale economy theories to school consolidations (Andrews et al., 2002; Ballard, 2010; Coulson, 2007; DeLuca, 2013; Duncombe, Miner, & Ruggiero, 1995; Duncombe & Yinger, 2010; Duncombe & Yinger, 2007; Eggers, Snell, Wavra, & Moore, 2005; Fox, 1981; Metcalf, 2009; Rooney & Augenblick, 2009; Shakrani, 2010; Walbert & Fowler, 1987; Zimmer, DeBoer & Hirth, 2009). The intent was to determine whether districts could achieve cost efficiencies by reforming in a manner such that the enrollment size took advantage of scale economies. The idea was to spread district fixed costs over a greater number of students, thereby reducing the average cost per student while maintaining student achievement quality (Andrews et al., 2002; Duncombe & Yinger, 2010; Fox, 1981). If the production theory of economies of scale applied to schools, then one would predict a "U-shaped" curve of the per-student cost function similar to Figure 2.1. If true, this suggested there were efficient district enrollment sizes, but that there also existed district sizes that may be too large to educate students in an efficient manner. It was under this umbrella of economic production theory where economists suggested district consolidation or deconsolidation may make sense, since correctly sized districts should make efficient use of the resources available.

K-12 scale economies and district mergers. Since the mid-1800s, the basic tenets of a free and public education have been in place: 1) establishment of boards of education at state and local levels; 2) taxation at the township, city, and county level to support public education; 3) outlawing tuition for public schools; and 4) compulsory attendance (Rooney & Augenblick, 2009). Local school districts, by nature, have always been creatures of the state and as such, states enjoy the ability to create or abolish districts. To some degree, the number of school districts each state permitted reflected the amount of local control the states were willing to allow (Mitchell, Crowson & Shipps, 2011). Examination of states like Hawaii and Florida, where districts made up only 5.3% and 4.1% of the local governments respectively, suggested a desire for more centralized control (Cochran, 1921; Hooker & Mueller, 1970; Rooney & Augenblick, 2009; Strange, 1987). Policy makers compared that to New Jersey and Vermont, where those states viewed school districts as an integral part of the local community and as a result, they made up 42.9% and 39.8% of the state governments respectively (Rooney & Augenblick, 2009). One of the biggest challenges for policy makers looking to force school mergers has been the local sense of identity these independent creatures of government convey to their communities.

School mergers in the U.S. began in the early 19th century, as policy makers began looking for ways to professionalize the education industry. Local school districts were often one-room schoolhouses, with few students spread across multiple grades and the teachers of varying skills and credentials. In industrial centers, school districts were often a subset of the city and city officials that exerted control over the district. Many saw this as detrimental, since the districts were then subject to oversight by political appointees versus professional educators, and subsequently subject to the corruption often associated with city politics. There was significant public backlash at municipalities during this time as voters became displeased with the graft and corruption in their city governments. The policy and political push towards cities with a professional elite and scientific management also occurred with other local forms of government, including schools (Berry & West, 2010; Rooney & Augenblick, 2009; Strang, 1987). As a result, school mergers began in the city centers, with multiple schools placed together in one large district overseen by a professional and independent school superintendent.

Merger policy next spread to the rural areas where legislators saw the small, rural one-room schoolhouses as being inefficient and unprofessional. Since 1930, the number of school districts nationwide has dropped by approximately 90%, from over 130,000 districts in 1930 to 13,584 by 2016 (Duncombe & Yinger, 2007; Nitta, Holley, & Wrobel, 2010; Sell, Leistritz & Thompson, 1996; U.S. Department of Education, 2017). Policy makers used emerging ideas on corporate management for school merger theory and justification. Lawmakers often looked at the principles of the scientific method of corporate governance as preferable to the then-current arrangement of most rural districts (Berry & West, 2010; Green, 2013). Some of the major premises for school mergers began with creating efficiencies through economies of scale, which was an industrial concept of management. Using this concept, policy makers believed larger districts needed far fewer facilities and allowed for the concentration of teachers, administrators, and students, resulting in more centralized and efficient support services (Berry & West, 2010;

Green, 2013; Rooney & Augenblick, 2009). Allowing smaller districts to merge into a larger one would ensure the resources provided by the policy makers had the largest impact to the greatest number of students.

A second premise of policy makers was that district mergers allowed specialization of instruction and oversight (Berry & West, 2010; Nitta et al., 2010). Some experts believed that districts could find scale economies through the centralization of supervision services, whereby a small number of core administrators could effectively oversee many teachers (Green, 2013). Merged districts also allowed specialization of instruction, as larger districts allowed teachers to focus on one grade or topic and become subject-matter experts in that field. Education experts expected this specialization would provide better instruction; consequently, the schools would enjoy better student outcomes (Berry & West, 2010; Nitta et al., 2010).

Moving from the post-WWII era and into the 1960s, states began the slow process of exerting their control over the widely spread and largely unorganized local districts. As the cost of education began to increase and the pressure on state budgets grew, concerns over fiscal equity across widely separated parts of each state became an issue (Metcalf, 2009). In the South, the racial segregation issue added to this mix, with resulting pressure to merge schools in a way that brought both fiscal and racial equity (Berry & West, 2010). States were also interested in professionalizing the industry, with a push to broaden their power over teacher certification, school accreditation, and curriculum standards development (Berry & West, 2010; Nitta et al., 2010). In Michigan, the 1960s saw policy dictating that districts without a continuum of service from kindergarten through 12th grade were required to put together a merger plan that would provide such a continuum, and place that plan before the local voters (Citizens Research Council, 1990; Metcalf, 2009).

States identified district mergers as the most efficient way to increase their control and obtain their objectives (Citizens Research Council, 1990; Rooney & Augenblick, 2009). This push towards forced mergers clashed with local communities, who resisted such efforts fiercely. Especially in rural America, residents often viewed the local school district as the central hub of the community, providing social cohesion and community identity in a way other forms of government could not provide. The local district was so instrumental to these communities that removing them threatened not only the community's identity, but also the economic vitality of the area (Berry & West, 2010; Nitta et al., 2010). As a result, resistance was fierce, and the pace of mergers slowed significantly in the 1970s. State policy makers next turned to a carrot and stick approach, providing financial incentives for districts that voluntarily merged, and sanctions for districts that failed to meet certain criteria and subsequently failed to merge (Citizens Research Council, 1990; Metcalf, 2009; Rooney & Augenblick, 2009). Today, policy makers have largely met their goal of professionalization of the industry, as shown by the implementation of state-led licensing requirements and the resulting majority of district leaders in the U.S. with professional educational backgrounds (Grissom, Mitani & Blissett, 2017; Overbeck, 1997). The two major policy initiatives behind school merger efforts today remain fiscal efficiency through economies of scale and increasing student achievement through enlarged course offerings and instructor specialization.

School District Organization in Michigan

This research project concentrated on school districts in Michigan; therefore, it was important to understand the basic structure of the state's K-12 education system. The local school district, often referred to as the Local Education Agency (LEA), was the basic educational unit in Michigan. The state originally created these districts as subsets of the townships, with oversight provided by each township board. Over time, legislative actions created multiple district governance models that moved oversight away from the townships towards locally elected school boards (Citizens Research Council, 1990; Fuller, 1928).

School district organization: Legal context. By the turn of the 19th century, the state adopted a classification system that divided districts by student enrollment size. In 1976, a major revision occurred with the passage of Public Act (PA) 451 of 1976. This Act classified districts into five categories, with the two Special Acts districts, Petoskey and Ann Arbor, making a sixth category due to not falling into any of the other categories. The classifications were:

1. Primary: district can not operate a grade above eighth grade.
2. Fourth Class: district has between 75 and 2,399 pupils.
3. Third Class: district has between 2,400 and 29,999 pupils.
4. Second Class: district has between 30,000 and 119,999 pupils.
5. First Class: district has 120,000 students or greater.
6. Special Act: two districts remained: Ann Arbor and Petoskey (Citizens Research Council, 1990; The Revised School Code, 2014)

These classifications automatically changed as district enrollment changed. There were no voting or administrative requirements for a district to move upward in classification, and no requirement that once a district obtained a higher classification that it moved downward despite enrollment declines (Citizens Research Council, 1990; The Revised School Code, 2014).

The current system occurred due to PA 289 of 1996, which replaced the 1976 system with four new classifications of school districts: General Power School Districts, School Districts of the First Class, Intermediate School Districts (ISD), and Public School Academies (PSA). Under this legislation, the state recognized districts of the fourth class, third class, second class, and the two remaining Special Acts districts as General Power school districts. Detroit Public Schools remained the single School District of the First Class, while ISDs and PSAs retained their traditional designations (Michigan Department of Education, 2018; The Revised School Code, 2014).

One unit that fell under the broad heading of "school district" was the Intermediate School District (ISD). ISDs exist through statute, providing regulatory functions for the state, service functions to local school districts, and leadership within their boundaries (Blomquist, 1975). Today's ISDs have aimed their efforts at offering specialized services and support to the local school districts in the areas of special education, career and technical education, technology support, and professional development (Rollandini, 2009). ISDs trace their origins to PA 55 of 1867, which called for the creation of County School Boards. The intent behind the county school boards was to assist the State Superintendent in monitoring whether local districts were adhering to the School Code. PA 217 of 1949 upgraded the educational and experience requirements for the County Superintendent of Schools, while removing the supervision of instruction from township officials. PA 269 of 1955 began to interchange the words "county" and "intermediate" when describing these districts, as it further delineated the powers of the ISD. Many legislators felt a far smaller number of ISDs could be equally effective and more efficient, so PA 269 included consolidation procedures for ISDs (Blomquist, 1975).

At the beginning of 1955 and the passage of PA 269, each of the 83 counties in Michigan had its own ISD. Moving forward to 1963, 83 ISDs remained despite state pressure to reduce the number of ISDs, which included legislation allowing for ISD consolidation. Feeling compelled to intervene, the legislature passed PA 190 of 1962, which authorized ISDs to operate across county lines and put in place minimum requirements for population and student enrollment.

ISDs that could not meet these requirements merged with adjacent ISDs and by 1965, only 58 ISDs remained (Blomquist, 1975; Michigan Legislative Council, 2017). The last ISD consolidation occurred in 2012, when the dissolution of Oceana ISD brought the number of ISDs down to its current level of 56 (P. Boone, personal communication, September 28, 2016).

With the passage of PA 362 of 1993, Michigan began allowing the formation of Public School Academies (PSA), also known as charter schools. This legislation made Michigan the ninth state in the union to authorize charter schools (Goenner, 2011). PSAs operated under different rules than traditional districts in the areas of funding, evaluation, and adherence to testing and other academic requirements (Carrauthers, 2016; Goenner, 2011). PSAs were required to have an oversight institution, such as a traditional public-school district, ISD, community college, or public university. The legislation authorized the formation of new PSAs only within the geographical boundaries of the authorizing entity. With ISDs, community colleges, and LEAs, this meant most students attending the PSA were already students of the entity and the state funding tied to the students stayed within the local districts. Very few of the students came from outside the entity boundaries, thereby bringing the funding attached to transferring students to the detriment of adjacent districts. However, public universities had statewide boundaries, which made them the only sponsor type that could place new PSAs anywhere within the state (Goenner, 2011; The Revised School Code, 2014). This created fiscal challenges for LEAs who found a public university PSA placed within their boundaries, due to the allocation of state funding from the local district to the university-sponsored PSA when these students transferred to the PSA.

PA 289 of 1996 further expanded the role of charter schools in the state’s educational environment, and firmly recognized them as individual school districts. The state extended the concept with the passage of PA 179 of 2003, which created another form of charter school known as "Urban High Schools" (The Revised School Code, 2014). This was followed by the creation of charter districts called "Schools of Excellence" under PA 205 of 2009 (The Revised School Code, 2014). In 2016, driven by the impending fiscal demise of the state's largest school district, PA 192 authorized the creation of hybrid districts, called "Community Districts". Community Districts retained the same powers as a General Powers district, covered the same geographical boundaries as the district it was replacing, but were subject to financial oversight by a state-appointed commission (The Revised School Code, 2014).

School district reorganization: Legal context. The Michigan Compiled Laws (MCL) provided multiple ways for districts to reorganize. The first form was "district consolidation", where two districts merged to create a distinct new district. Ten or more voters in each district could initiate this form of merger via a petition, or either board of education could initiate the process by approving their own petition. Regardless of how the petition originated, the petitioning party had to forward it to the local ISD for evaluation. The ISD was then required to forward the request to the State Board of Education for its approval or rejection. Assuming approval by the state, next the ISD had to prepare petitions calling for the election. For the ISD to call the election, 50% or more of the voters from the primary district had to sign the approved petition, along with 5% or more of the voters from all other affected districts. Assuming each district hit the minimum signature thresholds, the ISD called for the election. Final approval happened when the majority of voters in each affected district voted affirmatively for the merger. An example of a successful merger between two districts was that of Ypsilanti and Willow Run in 2013 (Menzel, 2016). If the electorate in any affected district failed to pass the proposal, the state considered the entire reorganization effort rejected (Citizens Research Council, 1990; The

Revised School Code, 2014). The 2014 proposed merger of Ann Arbor Public Schools with Whitmore Lake Public Schools was approved by the Whitmore Lake voters, but rejected by the Ann Arbor constituents, resulting in the entire merger being disallowed (Knake, 2014). Appendix C provided a complete list of successful mergers since 1980, while Table 2.1 showed this same information since 1987.

The second form of reorganization, and the most commonly used, has been “annexation”. This involved one district attaching itself to another and becoming an integral part of the absorbing district. The dissolving district’s majority voters and the annexing district’s board had to approve the annexation, with subsequent approval from the state Board of Education (Citizens Research Council, 1990; The Revised School Code, 2014). As shown in Table 2.1 and Appendix C, this was the most common method for district reorganization since 1980.

The third form of reorganization has been “annexation and property transfer”. This involved one primary district annexing the majority of the dissolving district, while other adjacent districts absorbed the remaining portions of the annexed district’s territory. Annexation and property transfer required the approval of voters of the dissolving district and the boards of the receiving districts (Citizens Research Council, 1990; The Revised School Code, 2014).

The fourth form of district reorganization has been “property transfer”, whereby a district could transfer part of its territory to another district through simple board action, unless the territory ceded exceeded 10% of the sending district’s size, in which case voter approval was required (The Revised School Code, 2014). This method did not require either district to cease its existence upon completion of the transaction. While “property transfer” was a form of district reorganization, districts most often used it to address property line disputes, assist in zoning, or address boundary issues that occurred between districts (Citizens Research Council, 1990).

Table 2.1

Reorganization of Michigan Districts – 1987 through 2017

Year	LEAs	Type	Eliminated District	Receiving District(s)
86-87	564	Consolidated	Mathiasa & Rock River SDs	Superior Central SD
86-87	564	Annex	Fredonia Twp SD	Marshall PS
87-88	563	Annex	Sheridan Twp SD #5	Bad Axe PS
88-89	562	Annex	Covington Twp SD	L'anse PS
90-91	561	Annex	Berlin Twp SD #5	Ionia PS
91-92	559	Annex	Cross Village Twp SD	Harbor Springs PS
91-92	559	Annex	Orleans Twp SD	Ionia PS
93-94	557	Annex	Ionia Twp SD #5	Ionia PS
93-94	557	Annex	Falmouth Twp SD	McBain
95-96	555	Annex	Pineview Twp SD	Big Rapids PS
95-96	555	Annex	Ferry Twp SD	Shelby PS
00-01	554	Dissolved	Bloomfield Twp SD #1	Harbor Beach, Port Hope, Bloomfield #7, Siegel #3
02-03	553	Dissolved	Roxand Loucks CS	Charlotte PS & Grand Ledge PS
04-05	552	Consolidated	Wakefield & Marenisco	Wakefield-Marenisco PS
08-09	551	Annex	White Pine Twp SD	Ontonagon PS
11-12	549	Annex	Bloomfield Twp #7 Rapson	Sigel Twp SD #3
11-12	549	Consolidated	Deerfield & Britton-Macon	Britton Deerfield SD
13-14	545	Annex	Freesoil PS	Mason County Eastern PS
13-14	545	Dissolved	Buena Vista PS	Saginaw, Bridgeport-Spaulding & Frankenmuth
13-14	545	Dissolved	Inkster PS	Romulus, Taylor, Wayne-Westland, & Westwood
13-14	545	Consolidated	Willow Run & Ypsilanti	Ypsilanti CS
14-15	541	Annex	Palo CS	Carson City-Crystal Schools
14-15	541	Annex	Redford Union PS	South Redford PS
14-15	541	Dissolved	Galien Twp SD	Buchanan CS
14-15	541	PSA	Highland Park PS	Highland Park Academy
15-16	540	Annex	Port Hope SD	North Huron SD
16-17	538	Annex	Albion PS	Marshall PS
16-17	538	Annex	Sigel Twp SD #6	Harbor Beach CS

CS = Community Schools, SD = School District, PS = Public Schools, Twp = Township, ("How school districts", 2012; Peapples, 1986; P. Boone, personal communication, September 28, 2016)

The fifth form of district reorganization has been “dissolution”. Dissolution occurred through the disbanding board’s formal action, via a petition of 5% of the district voters, or when the ISD deemed there were not enough residents to serve on the district’s school board. Under a dissolution, the ISD allocated the parts of the dissolving district across the adjacent districts and submitted the plan to the voters for approval. Once voters approved the plan, the state deemed the district disbanded and gave its students, territory, and assets to adjacent districts per an ISD-devised plan (The Revised School Code, 2014). Table 2.1 and Appendix C showed that this method, when used, occurred in tiny districts with little or no student population.

School district reorganization: Historical context. Michigan’s initial laws governing public education occurred in 1827 and 1829, when Michigan was still a territory. This legislation initiated the practice of organizing school districts under the oversight of the townships and required the services of a schoolmaster for any township with 50 or more families. Post-statehood public education legislation for Michigan began in 1837, with the appointment of the Superintendent of Public Instruction and directing each local district to have an elected three-member board (Citizens Research Council, 1990). By 1840, Michigan had over 1,500 districts and 48,000 students as shown in Table 2.2 (Michigan Legislative Council, 2017). PA 50 of 1843 limited school district size to nine township sections, approximately nine square miles, and authorized a township that also contained a village or a city to consolidate districts. The legislation referred to these as “Union Districts”, with Detroit becoming the first in 1843.

Table 2.2

Summary of District Numbers, Staffing Levels, and Student Enrollment

Year	ISDs	LEAs	PSAs	Districts	Teachers	Enrollment
1836		55		55	98	2,377
1840		1,560		1,560	1,870	48,817
1850		3,097		3,097	4,087	132,234
1860		4,087		4,087	7,921	246,802
1870		5,108		5,108	11,014	384,554
1880		6,352		6,352	13,949	506,221
1890		7,168		7,168	15,990	654,502
1900		7,163		7,163	15,924	721,698
1910		7,333		7,333	17,987	771,471
1920		7,273		7,273	24,302	978,412
1930		6,822		6,822	34,552	1,365,007
1940		6,386		6,386	32,447	1,385,576
1950	83	4,918		5,001	37,157	1,489,351
1960	83	2,149		2,232	60,394	2,199,545
1970	58	638		696	88,959	2,164,386
1980	57	575		632	87,487	1,910,385
1990	57	562		619	77,737	1,637,592
2000	57	555	171	783	77,720	1,714,815
2010	57	551	240	848	69,996	1,605,951
2016	56	540	303	899	58,233	1,507,743
2017	56	538	301	897	Not reported	1,485,893

(Citizens Research Council, 1990; Michigan Depart of Education, 2018)

By 1850, there were only eight union districts in the state. PA 50 of 1843 was not very strong when it came to the formation of new districts, forcing many communities to petition the legislature for the passage of special acts in order to create the local districts that made sense in individual situations (Citizens Research Council, 1990; Fuller, 1928). The first special act districts occurred in 1848 with the creation of Mackinac Island School District and St. Clair School District. Over the next several years, the state authorized a total of 157 special act districts (Citizens Research Council, 1990; Fuller, 1928). By 1996, all the special act district legislation had been repealed except for Ann Arbor Public Schools and the Public Schools of Petoskey, with those two districts later becoming General Powers districts in the classification restructuring that happened in 1996 (Citizens Research Council, 1990; The Revised School Code, 2014).

In Michigan, school district consolidation began in 1843, when the state boasted 1,020 districts serving 28,764 students. The period after 1850 through the turn of the century saw a 447% increase in student membership, from 132,000 students in 1851 to 721,698 students in 1900. Localities met this student growth by creating 131% more school districts, moving from 3,097 districts in 1850 to 7,163 districts by 1900 (Citizens Research Council, 1990; Michigan Legislative Council, 2017). Legislators made some efforts in 1859 to address both the increase in students and the number of districts. PA 161 of 1859 authorized the establishment of new high school districts for any district that contained more than 200 pupils between 4 and 18 years of age. This same legislation allowed for some consolidation by outlining a program whereupon the approval of the voters of each district, two or more districts could merge and form one high school district. This legislation did little to offset the rise in the number of districts across the state. This explosion of districts was due to parental convenience and raised state-level concerns about fiscal efficiencies. State Superintendent Oramel Hosford noted in his 1870 Annual Report,

> The desire to be near the school-house leads to these divisions. The result is, a very feeble district, able to build a small school-house and employ an inferior teacher, at a cost for each pupil of twice, and often more than twice, the cost for a pupil the best schools in the cities and large towns. There is a limit to the division of territory into districts, beyond which it is not profitable to go, although it is convenient. Conveniences are often purchased at too great an expense (Michigan Department of Public Instruction, 1870, p. 32).

PA 119 of 1873 set in place the procedures still largely used today for the reorganization of multiple districts: that of relying upon a majority vote of the residents of both districts. Major cleanup of school legislation followed with the passage of PA 164 of 1881, which established the townships as the base for district formation. This legislation set nine square miles as the largest size allowed for any township-based district and required a vote of the electorate for further district consolidation or expansion. Included were provisions for graded school districts with 100 or more students to expand beyond nine sections upon voter approval.

This legislation authorized districts larger than nine sections if they contained 100 or greater students, were organized as a graded school district, and were approved by the voters.

PA 176 of 1891 authorized residents in Michigan's Upper Peninsula to petition the township board to merge all schools into one district, resulting in all the districts in the Upper Peninsula becoming township schools by the end of the decade. By 1900, Table 2.2 shows that Michigan was servicing its 721,698 students by operating 7,163 districts, of which 6,452 were non-graded, primary school districts (Citizens Research Council, 1990; Michigan Department of Public Instruction, 1901). The turn of the century found another State Superintendent of Instruction, Dr. Delos Fall, lamenting the considerable number of small districts and their inefficiency of providing educational services. The 1901 Superintendent's annual report stated that one-sixth of the districts reported 15 students or less at an annual cost of $41.60 per pupil, compared to large city school districts who were educating students for $19.40 per pupil. Superintendent Fall investigated what other states were doing to combat this same problem and reported his findings in 1901 (Michigan Department of Public Instruction, 1901).

Most of the State Superintendents of Public Instruction continued to report on the need and rationale for district consolidation in their annual reports of 1901, 1902, 1903, 1906, 1909, 1911 and 1917 (Michigan Department of Public Instruction, 1901; Michigan Department of Public Instruction, 1902; Michigan Department of Public Instruction, 1903; Michigan Department of Public Instruction, 1906; Michigan Department of Public Instruction, 1909; Michigan Department of Public Instruction, 1911; Michigan Department of Public Instruction, 1917). As a next step, the legislature passed PA 117 of 1909, which extended statewide the same authorization for township districts that the Upper Peninsula had received in 1891, causing the rise in districts to slow. However, despite the state-level consolidation efforts, Table 2.2 showed the number of school districts exploded to 7,333 school districts servicing 771,000 students by 1910 (Citizens Research Council, 1990; Michigan Legislative Council, 2017).

Legislative response next occurred with PA 166 of 1917, which started the classification system for school districts that Michigan maintained until the mid-1990s. This system created the establishment of third and fourth-class districts based on student enrollment size. PA 141 of 1917 allowed for the implementation of school districts within cities with populations between

100,000 and 250,000 residents. Two years later, PA 65 of 1919 allowed the formation of separate districts within cities with a population greater than 250,000. This mix of graded, primary, township, rural, agricultural, and other types of school districts continued until 1927, with each district type having their own rules regarding organization and consolidation. PA 319 of 1927 established that all districts must be one of the following classifications: primary, fourth class, third class, second class, or first-class school districts (Citizens Research Council, 1990).

In 1943, legislators and educators remained concerned with the large number of districts, 6,239 in total, serving Michigan's 1.4 million students. The legislature commissioned the Michigan Public Education Study Group (MPESG) to examine the state of education in Michigan. As part of the study, the commission provided a comprehensive statewide district reorganization plan focused on finding fiscal efficiencies and equalization of educational opportunities. To achieve these goals, the MPESG plan called for mergers of smaller districts and the establishment of minimum district sizes. Reorganizations would occur using a process that included county-supervised plan development, extensive public hearings, and approval through a popular vote. Through this statewide reorganization, the commission also hoped to provide a continuum of educational services from kindergarten through 12th grade. The panel pointed out that of the 6,274 school districts in Michigan in 1942, 4,694 of the districts provided only primary education instead of a K-12 continuum (Citizens Research Council, 1990; Michigan Public Education Study Commission, 1944). While this report provided comprehensive recommendations, the legislature took no action. Twenty years later, however, the report would become the template for another state school district reorganization plan.

Legislative efforts in the 1940's had minimal impact, resulting in more vigorous actions occurring in the 1950's and 1960's that yielded more tangible results (Citizens Research Council, 1990; Menzel, 2016; Metcalf, 2009; Michigan Legislative Council, 2017). Immediately following World War II, 453 primary districts merged into 46 rural agricultural school districts. Some of the districts reported by the state during the late 1950s and early 1950s had no students yet remained as reportable entities. This was due to technicalities in the state school funding formula that provided financial incentives for districts to remain as non-operating districts. Legislative action stopped this practice with passage of PA 269 of 1955, which included a provision requiring annexation or mergers for districts that had not operated for two or more years. The result was a reduction of 996 districts between 1956 and 1958 (Michigan Legislative Council, 2017; Citizens Research Council, 1990). Following a nation-wide trend, further Michigan legislative initiatives reduced the number of districts by more than 50% to 2,149 districts by 1960, as one-room schoolhouses were slowly absorbed into larger districts (Citizens Research Council, 1990; Metcalf, 2009; Michigan Legislative Council, 2017).

The last major consolidation push in Michigan was PA 289 of 1964, known as The School District Reorganization Act, and was based upon the 1943 MPESG study. This legislation required each of the sixty ISDs to submit a reorganization plan that eliminated districts not providing a continuum of K-12 education. This act was responsible for reducing the number of districts by almost 50% to 712 districts at the end of 1968 (Michigan Legislative Council, 2017). This legislation required each ISD to compile a plan that met state standards, with a state committee available to step in for any ISD's plan that the committee deemed acceptable. Ten plans were ultimately prepared at the state level on behalf of the ISDs.

Following plan acceptance by the state, the ISDs had two methods of adopting the plans. The first was to hold one ISD-wide vote of the electorate, seeking their approval of the overall plan. Eight ISDs went this route, with voters ultimately approving seven of the plans. The second adoption method was to have each district in the ISD hold separate district-level votes on the plan. In this method, successful mergers between districts required the electorate of both districts to approve the plan. This second method made it possible for a single district to block its merger with another without endangering the entire ISD consolidation plan. Forty-five ISDs went with this second method, with local voters completely accepting the consolidation plans of 12 ISDs. Of the remaining ISD plans, voters of every local district rejected the plans of seven ISDs, and twenty-six ISD plans obtaining partial approval (Citizens Research Council, 1990).

For a legislature looking to find significant district consolidations, PA 289 was a resounding success. By July 1, 1968, there remained 147 primary districts and 529 K-12 districts in the state, a reduction of over 50% (Citizens Research Council, 1990, Michigan Legislative Council, 2017). Michigan's loss of 55% of its districts between 1950 and 1960, with another 69% loss between 1960 and 1970, mirrored a national trend that saw declines of 52% and 56% in the same periods respectively (National Center for Educational Statistics, 1995). Once again, Table 2.2 showed the history of the number of districts, staff members, and students in Michigan every decade since 1836, while Appendix C showed annual state reported data on these items.

With their focus on district consolidation, the legislature left little room for district expansion. One exception occurred with PA 275 of 1976, which allowed for limited deconsolidation under special circumstances. This piece of legislation contained a sunset clause, thereby opening a window of less than 15 months for districts wishing to dissolve an unhappy merger. Such was the case with the Twin Valley School District, a late 1960's merger between Boyne City and East Jordan school districts. The two communities found themselves at odds after their consolidation and voted to split, becoming the only districts impacted in the 15-month window created by PA 275 (Citizens Research Council, 1990).

While efforts to pass school district consolidation legislation was largely non-existent in the 1970's, concerted legislative pressure picked up in the 1980's and extended through the date of this study. These efforts have borne some fruit, with Table 2.1 and Appendix C showing the successful reorganizations that occurred between 1980 and 2017. Unfortunately, data regarding the number of district reorganization attempts that failed during this period was murky, as the state did not track this information. To get an approximation of the success rate of reorganization attempts, one can look at the 22 plans placed in front of voters between 1982 and 1989. One reorganization involved dissolution of a primary district by board vote, while the other 21 efforts involved a vote of the people. Of the 21 votes by the electorate, almost 50% failed due to lack of support (Citizens Research Council, 1990; "How school districts have reorganized", 2012; Menzel, 2016). One of the consolidation efforts between Morrice and Perry school district was defeated on two separate occasions between 1982 and 1989. Morrice and Perry would try once again in 2008, with voters rejecting the merger a third time (Citizens Research Council, 1990; "How school districts have reorganized", 2012; Mack, 2012).

Between 1984 and 1999, Michigan saw its number of traditional districts drop to 555 LEAs through a combination of district consolidation, annexation, dissolution, and conversion to charter schools. To jump start district reorganization efforts, the state passed PA 239 in 1984, offering financial incentives for district consolidation. Under this plan, merged districts received $375 per pupil the first year after consolidation, $250 in the second year, and $125 in the third year. In 1985, Wayne-Westland School District in Wayne County annexed Cherry Hill School District, resulting in the combined district capturing $875,000 of the payments noted in Table 2.3, $583,000 in 1985-86, and $292,000 in 1986-87. This annexation was notable due to the large number of students it affected (Citizens Research Council, 1990).

Table 2.3

State Aid Consolidation Incentive Payments

Year	Amount	Adjusted for Inflation [a]
1983-84	$951,353	$2,226,166
1984-85	$1,336,625	$3,020,773
1985-86	$1,328,000	$2,961,440
1986-87	$674,875	$1,444,233
1987-88	$100,000	$205,000
1988-89	$231,625	$451,669
1989-90	$27,625	$50,830

[a] December 2017 comparisons to December of each year based upon inflation adjusted dollars (Citizens Research Council, 1990; U.S. Bureau of Labor Statistics, 2009)

In 1987, the only true consolidation of adjacent districts occurred when Mathias Township Schools and Rock River Limestone merged into Superior Central School District. Between 1983 and 1990, the incentives noted in Table 2.3 affected these two districts, plus eight other districts who reorganized via annexation. While the funds were significant from each district's viewpoint, the combined number of students impacted was small in comparison to the state's overall student population and the financial impact on the state was minimal (Citizens Research Council, 1990; "How school districts have reorganized", 2012; Metcalf, 2009). This suggested incentive payments might persuade districts already considering consolidation, but incentives were insufficient to generate such talks on the merits of the money alone. By 1990, Michigan serviced its 1.6 million students through 562 LEAs and 57 ISDs (Citizens Research Council, 1990; Metcalf, 2009; Michigan Legislative Council, 2017).

The period between 2000 and 2011 was relatively quiet, as the state began to feel the impact of PSAs while also ending reorganization incentives. 2004 saw the consolidation of Marenisco and Wakefield districts to form Wakefield/Marenisco District, while Britton-Macon and Deerfield districts merged into Britton Deerfield School District in 2009. Two other districts dissolved during this period, with two more being annexed. All these reorganizations occurred among small rural districts, with combined student populations of under 1,000 students (Citizens Research Council, 1990; "How school districts", 2012; Metcalf, 2009; P. Boone, personal communication, September 28, 2016). This suggested these efforts at consolidation were due to economic factors and anticipated economies of scale (Duncombe & Yinger, 2007).

School district reorganization: Fiscal distress. In 2012, the state began exercising its power to oversee, and in some cases dissolve, districts whose fiscal situations were so dire as to threaten district bankruptcies. District bankruptcies, while concerning on their own, also brought the greater danger of potential downgrades to the state's bond rating. PA 4 of 2011, known as the "emergency manager law", created a framework for the state to impose unilaterally its oversight of struggling school districts via a state-appointed manager, known as an Emergency Manager (EM). The legislation allowed the state to appoint an EM whenever a district failed to comply with its deficit elimination plan, the state deemed the district was in fiscal distress, and there was no likelihood of the district emerging from deficit within a two-year period. The powers of the EM were broad, including the ability to modify or terminate existing contracts, suspend collective bargaining agreements, transfer or sell assets, close school buildings, and dispose of district property (The Revised School Code, 2014; Menzel, 2016).

In mid-2012, the state assigned EMs to the Muskegon Heights Public Schools and to the City of Highland Park School District. In both cases, the EM submitted a reorganization plan that converted every school in each of the districts into charter schools. The EMs recognized that the existing school funding formula required LEAs to obtain a portion of the per pupil foundation allowance through a property tax levy. Charter schools were exempt from this property tax levy requirement, instead receiving 100% of their per pupil allowance directly from the state's School Aid Fund. By converting these schools into charter schools, the EMs were able to use the existing district-level tax levies to pay off the debt each district had accumulated, while relying on the state's School Aid Fund to provide the full per pupil foundation allowance for operations at each school. This essentially shifted a portion of each of these two districts' financial burden onto the School Aid Fund, thereby affecting the amount of resources available to all other districts in the state (Citizens Research Council, 2013; Menzel, 2016).

What occurs in 2013 was unparalleled in Michigan school reorganization history. First, the Michigan legislature expanded the emergency manager legislation, making it easier to appoint EMs and expanding their power. This was followed by an unprecedented district consolidation between two large, suburban districts, affecting over 4,000 students. Finally, the year ended with the forced dissolution of two school districts without a vote of the electorate.

The district consolidation event traces its roots to 2011 and the passage of the original EM legislation. In 2011, Willow Run Schools and Ypsilanti Public Schools were two large suburban districts facing severe struggles that caught the state's attention. Both districts faced declining enrollment, persistent low student achievement scores, and budgetary shortfalls. Ypsilanti's 2011 budget projected a deficit of $8 million, equal to approximately $2,105 per pupil, while Willow Run was facing a $3 million shortfall, equal to approximately $1,786 per pupil. Both districts had submitted deficit elimination plans to the state yet were unsuccessful in meeting their goals over the previous years. The state had several of each districts' buildings listed in the bottom 5% for academic achievement (Citizens Research Council, 2013; Menzel, 2016). With the passage of the EM law, those combined pressures caused the administrative teams of the two districts to kick off a two-year process designed to explore their options.

The 2012 state takeover of Muskegon Heights and Highland Park school districts created further impetus to the discussions within the Willow Run and Ypsilanti communities (Menzel, 2016). The threat of state takeover, combined with $10 million in state-provided school consolidation incentives, was enough for these two districts to complete the previously unpalatable option of district consolidation, becoming one district named Ypsilanti Community Schools in June 2013. This merger was atypical in that the districts were large suburban districts and the consolidation affected approximately 4,800 students, a much higher number than any previous consolidation (Citizens Research Council, 2013; Menzel, 2016). While fiscal distress was an underlying factor, seeking efficiency through economies of scale was not the main reason for the consolidation efforts of these districts. It was the specter of a forced takeover and dissolution of the districts that created the urgency necessary to push for district consolidation.

Frustrated with the lack of urgency exhibited by a handful of districts in similar straits to Willow Run and Ypsilanti, the state passed legislation in 2012 designed to ramp up concern, while setting the stage to intercede in the most egregious situations. The legislature began by expanding the existing EM law with the passage of PA 436 of 2012. The EM law was already unpopular, so this expansion caught the attention of many districts, especially those already struggling. For struggling districts, the new EM legislation further stoked concerns about which districts were next on the takeover block. Using a clause in the Urban Cooperation Act of 1967, the state increased the pressure on districts whose students were chronically underperforming creating the Education Achievement Authority (EAA) and giving it the power to take over individual schools. The EAA immediately seized control of 15 schools in the Detroit Public Schools (Citizens Research Council, 2013; Menzel, 2016). However, two severely struggling mid-Michigan districts failed to heed the warning signs, with severe consequences.

By early spring 2013, the fiscal situations facing Buena Vista School District and the School District of the City of Inkster had become so dire that the state passed school dissolution legislation and immediately used it to shut down both districts. PA 96 of 2013 allowed the state to bypass the deliberative processes included in existing laws, instead handing the dissolution decision to the State Superintendent and State Treasurer. In June 2013, the State Superintendent and State Treasurer ordered Buena Vista and Inkster dissolved after determining neither district was financially viable (Smith, 2013). The underlying factors leading to the viability conclusion were declining enrollments, deficit budgets, high staff turnover, and fiscal mismanagement by the district. Without State intervention, Buena Vista projected a deficit for 2013 of $3.6 million or $8,372 per pupil, while Inkster projected their shortfall at $16 million or $6,981 per pupil (Citizens Research Council, 2013; Cleary, 2013; Smith, 2013).

The state's intervention required passage of additional special legislation that earmarked $9 million of new state funding to pay for dissolution and related costs. Under the dissolution plan, the state's $9 million, plus existing tax levies, was sufficient to replace the $19 million combined deficit of the two districts (Cleary, 2013; Smith, 2013). The state tasked the ISD with dividing each district's geographical territory, property, buildings, students and student records, and remaining funds among the surrounding districts. The ISD plan assigned the Buena Vista assets and students to the Saginaw City School District, Bridgeport-Spaulding School District, and Frankenmuth School District. The same ISD plan assigned Inkster School's students and assets to Romulus School District, Taylor School District, Wayne-Westland School District, and

Westwood School District (Cleary, 2013; Citizens Research Council, 2013).

While district consolidation slowed after 2013, efforts to merge districts did not stop, nor were they always successful. Table 2.1 showed that between 2013 and 2017, the most prevalent reorganization method was annexation, with five districts voluntarily using this method, while one district dissolved, and one other voluntarily converted into a PSA (Ackley, 2016; Cook, 2014; P. Boone, personal communication, September 28, 2016; Taylor-Jerome, 2014; Wilkinson, 2015). Between 1982 and 1989, almost 50% of the reorganization efforts failed due to lack of voter support, with some districts asking multiple times. This reluctance by local communities to embrace the loss of their "home" district continued into present times. In November 2014, Whitmore Lake Public Schools voters agreed to a proposed merger with Ann Arbor Public Schools with a 72% approval rating. Ann Arbor voters were not as interested, with voters rejecting the measure over concerns about increased taxes (Knake, 2014). Whitmore Lake turned to Dexter Public Schools, who quietly rebuffed them due to a lack of state financial incentives and a large disparity between the fiscal conditions of the districts (Knake, 2015). Meanwhile, the introduction of PSAs began to affect the landscape, with several districts voluntarily converting into this new form (Citizens Research Council, 2013; Menzel, 2016).

School district reorganization: PSA growth. The discussion so far has focused on the rise and decline of LEA's from 1836 to 2016, as LEAs have been the traditional public-school districts that people are most familiar. Beginning in 1993, Michigan became the ninth state in the union to recognize PSAs, or charter schools, as public-school districts. Some of the main rationales behind the support of PSAs included small class, school, and district sizes. The legislative emphasis on small district size appeared to be in direct contradiction of past legislative efforts to consolidate small districts to achieve efficiencies. Table 2.2 and Table 2.4

show the rise in the overall number of districts since 1993, along with the increase in small districts due to PSAs. One stark difference between PSAs and traditional public schools was that profit-motivated management companies often operated the former, as compared to traditional public schools, which tended to be service oriented (Arsen, 2011; Ballard, 2010; Goenner, 2011).

Table 2.4

Number of Districts by Pupil Enrollment – 1968 through 2017

	FY1969		FY1980		FY1990		FY2000		FY 2010		FY 2017	
District Size	LEA	%	LEA	%	LEA	%	LEA	%	LEA	%	LEA	%
10,000 +	33	5.1	28	4.9	22	3.9	26	3.6	23	2.9	16	1.9
5,000–9,999	59	9.1	53	9.2	44	7.8	46	6.4	49	6.3	49	5.9
4,000–4,999	30	4.6	30	5.2	27	4.8	30	4.2	17	2.2	21	2.5
3,000–3,999	47	7.3	59	10.3	42	7.5	51	7.1	53	6.8	42	5.1
2,000–2,999	86	13.3	87	15.1	94	16.7	87	12.1	75	9.6	85	10.2
1,000–1,999	160	24.7	154	26.8	161	28.7	162	22.4	172	22.0	148	17.8
500-999	76	11.7	81	14.1	89	15.8	93	12.9	156	19.9	201	24.2
Below 500	157	24.2	83	14.4	83	14.8	225	31.3	238	30.3	268	32.4
Total	648		575		562		720		783		830	

(Michigan Department of Education, 1969; Michigan Department of Education, 2001; Michigan Department of Education, 2011; Michigan Department of Education,2018; Michigan Legislative Council, 1980; Michigan Legislative Council, 1990)

From 1990 through 1993, reduced student enrollment continued to drive a handful of LEA annexations, reducing the number of districts to 558, the lowest point since Michigan became a state in 1840. The initial legislation allowing PSAs passed in 1993, with the first PSA formed that same year. Of particular interest were the university-sponsored PSAs, since the legislation allowed placement of these PSAs in any geographical location. This concerned LEAs, since location of a new PSA within district boundaries threatened their pupil count and related funding, as the PSA began siphoning off students. While the original 1993 legislation placed no caps on the number of PSAs that universities could authorize, subsequent legislation in 1996 set the maximum number at 85. In 1998, the pace of PSA startups began to accelerate due to court challenges to the legislation being found in favor of the state, the cap limitation was expanded to 150, and due to the strong political support of the Governor and the in-power Republican Party (Arsen & Ni, 2011; Goenner, 2011). By 2000, the combined 726 LEAs and PSA districts exceeded the 712 districts that remained following the 1968 consolidation reforms (Arsen, 2011; Ballard, 2010; Michigan Department of Education, 2018; Michigan Legislative Council, 2017).

Driven by state-level politics and the lifting of the caps in 2013, the number of PSAs continued to climb through 2016, with 303 PSAs authorized in 2016 covering approximately 9% of the state's student population. During this timeframe, the number of LEAs slightly decreased, as noted in Table 2.2, with some LEAs converting themselves into PSAs as noted in Table 2.1 and Appendix C. These conversions occurred as poorly performing and mismanaged LEAs sought refuge from state emergency manager takeovers (Carrauthers, 2016; Michigan Depart of Education, 2018; Michigan Legislative Council, 2017).

An analysis of the numbers and sizes of Michigan districts provided some insight into the changes that occurred between 1968, at the height of district consolidation, and later in 2017 at the height of the opening of PSAs. Table 2.4 showed the decline in LEAs between 1968 and 1993, as small districts consolidated into larger ones in order to provide a continuum of K-12 instructional services. Over this period, approximately 60% of all districts fell below 2,000 students, with a marked decline in the number of districts with less than 500 students. Between 1993 and 2016, the number of districts with less than 500 students increased by 223%. Figure 2.2 provided a graphical example of the changes in the number of districts based upon their pupil enrollment. By 2016, 74% of the districts in Michigan had 2,000 or fewer students.

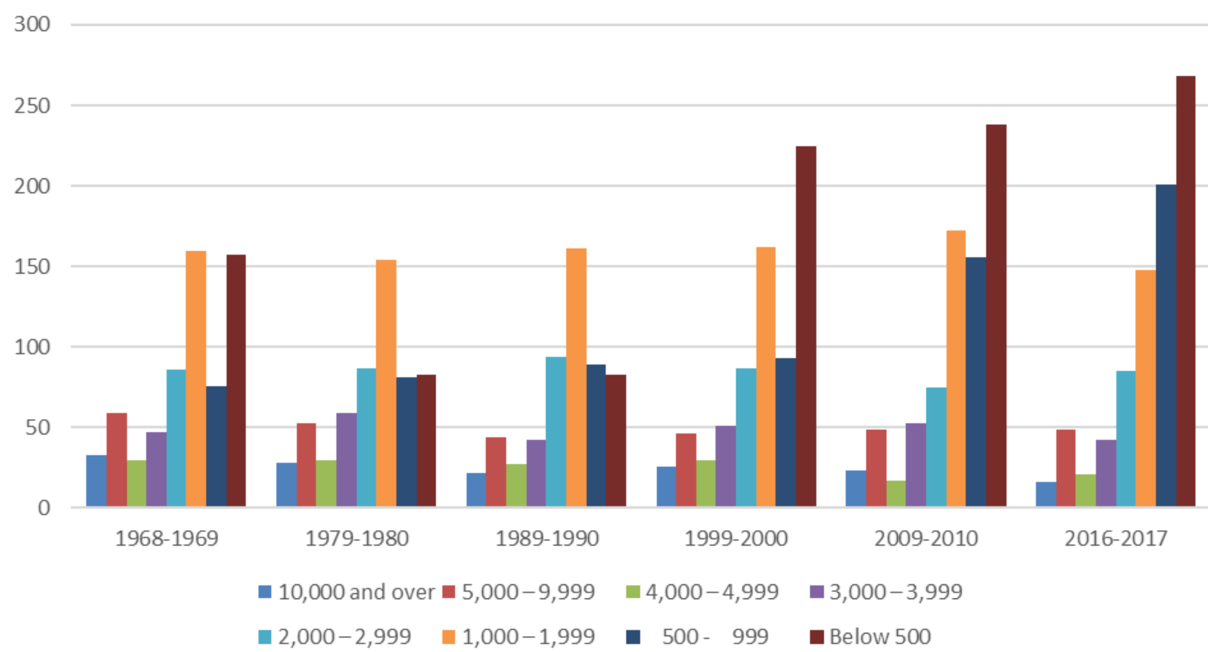

Figure 2.2. Districts by Pupil Enrollment – 1968 through 2017

District reorganizations: Policy context. One of the major policy objectives of school consolidation was to achieve cost savings through scale economies, while maintaining the same quality level of education. The argument behind scale economies began with the concept that schools could lower their per pupil fixed costs if they were able to educate larger numbers of students within existing facilities. Larger school districts concentrate students and instructors, allowing for fewer facility needs and spreading fixed costs across larger numbers of students (DeLuca, 2013; Duncombe & Yinger, 2010). Districts could find efficiencies by closing smaller schools and then moving the students in a manner that filled the remaining facilities to capacity.

One example of the anticipated efficiencies was the ability of purchasing agents to negotiate better contracts for supplies and consumables due to volume (Duncombe & Yinger, 2007).

Separate literature reviews in 1981, and thirty years later in 2002, determined that too many theoretical and data problems existed to conclude how scale economies impacted school consolidations (Andrews et al., 2002; Fox, 1981). Fox (1981) felt that size economy theorists failed to investigate issues such as increased bussing costs resulting from the bigger consolidated districts, the effects of student population density, and the need to address the cost of new building construction and old building disposition. Fox (1981) noted the research often focused on the supply side, ignoring the expenditure changes caused by increased or decreased demand. Fox (1981) argued for a theoretical framework addressing both the supply and demand sides of the education size economies equation, along with the development of appropriate data sets necessary for quality analysis. Andrews et al. (2002) found some advancement in methodologies but remained concerned over the same theoretical and data problems Fox noted in 1981.

Since that time, other investigations suggested potential savings in administrative and instructional costs when examining districts of less than 500 students against districts with between 2,000 and 4,000 students. Once a district approached the range of 3,000 to 6,000 students, diseconomies of scale were noted (Andrews et al., 2002; Coulson, 2007; Duncombe & Yinger, 2010; Zimmer, DeBoer, & Hirth, 2009). In Michigan, substantial consolidation had already occurred, with a significant slowdown following the last major wave in the 1960's. This suggested that most economies of scale were already achieved and that further consolidations might not yield the dramatic savings expected (Ballard, 2010; Brasington, 2003).

The second major rationale for district consolidation was increasing student achievement. There are two major competing beliefs amongst recent policy makers regarding how to best influence and measure student achievement. The first group believed in an education quality policy that focused on the inputs into the system. The emphasis was on better facilities, more qualified faculty and administration, and a greater variety of curricular and extra-curricular opportunities (Berry & West, 2010; DeLuca, 2013; Rooney & Augenblick, 2009). This argument suggested that students from smaller schools might not enjoy the same access to topics, class materials, or academic opportunities that students in larger districts enjoyed. For instance, a small district might only be able to justify the cost of offering one foreign language, due to the small number of students interested in the topic (Berry & West, 2010). Contrast this with larger schools, who due to their larger student population had enough demand for foreign languages that the costs of offering multiple courses were justified (Berry & West, 2010; Green, 2013).

Another major academic input was high quality instructional staff. Smaller, rural districts found it difficult to entice and retain high quality teachers, especially if the teacher sought was in a highly specialized field. Teachers with specialized skills recognized that smaller schools would demand the teachers not only teach in their specialized area, but also provide instruction in more basic and non-specialized classes (Green, 2013; Rooney & Augenblick, 2009). Larger districts provided a broader base of support from peers, intra-district collaboration, and more professional development options. Overall, staff experience improved working conditions and professional development opportunities in larger districts (Nitta et al., 2010). Finally, teachers in larger districts tended to enjoy higher benefits and pay due to district incentives to attract teachers into less-desirable positions, or because of the influence that a larger teacher base provided at the bargaining table (Rooney & Augenblick, 2009; Self, 2001).

The second major group of policy makers believed consolidation policy should focus on student achievement based on outputs, rather than inputs. The policy concept was that larger districts provided the input through more opportunities than smaller districts and as a result, the output of student achievement should increase (Berry & West, 2010; Rooney & Augenblick, 2009; Sell et al., 1996). On measures such as state assessments, ACT, SAT, and Advanced Placement tests, proponents expected higher results or faster increases from larger, consolidated districts versus smaller, unconsolidated districts. The current body of literature, however, was inconclusive on whether this premise was correct.

A study of 501 Pennsylvania school districts, conducted by Standard & Poor's School Evaluation Services (2007), was unable to find a relationship between district size and reading or math scores. Johnson (2004) conducted a study in Nebraska noting that smaller school districts typically outperformed larger districts. Other studies were unable to reach conclusions linking district size and academic performance; instead, finding that the academic scores of students from larger districts appeared relatively equal to smaller districts (Bickel & Howley, 2000; Roeder, 2002; Yan, 2006). There were several studies, and many policy pundits, who advocated for small class size in smaller districts as being better for the academic achievements of students (Ferguson, 1991; Walberg & Fowler, 1987). However, when it came to the impact of district consolidation on academic performance, there was no conclusive evidence that district consolidation affected scores (Rooney & Augenblick, 2009).

The most recent climate involving school consolidation policy continued to focus first on fiscal savings through economies of scale, followed by a push for student academic excellence. The current literature and research suggested there was an inverse relationship between fiscal economies and academic excellence. Several studies that controlled for educational costs and socio-economic factors suggested that smaller schools might be more efficient at garnering the best academic outcomes for the dollars invested (Berry & West, 2010; Effiom, 2014; Rooney &

Augenblick, 2009; Walberg & Fowler, 1987). In today's environment of high-tech innovation, larger districts may find the academic economies anticipated offset by the depth, breadth, and size of offerings available to students via technology (Green, 2013).

Many of today's policy makers were examining student achievement based upon educational attainment, as measured by the overall number of years of schooling, rather than on high school test scores (Berry & West, 2010). This group was a subset of those who believed in outputs as the proper measure for student achievement. The argument for using this measure, rather than test scores, was that increased educational attainment resulted in increased lifetime student earnings (Berry & West, 2010). They noted that between 1940 and 1969, the percentage of 17-year-old students who graduated from high school rose from 50% to 77%, and education policy should focus on pushing this even higher (U.S. Department of Education, 2002).

In a potential blow to the district consolidation argument, and welcomed by the smaller class size advocates, recent research suggested it was the size of the individual school building, rather than the size of the district, which had the most impact on educational attainment (Berry & West, 2010; Ferguson, 1991; Walberg & Fowler, 1987). This leads one to consider whether the fiscal economies of scale might be achievable at the district level, while at the same time meet educational objectives by keeping the actual school sizes smaller. Policy makers might find the academic achievements and educational attainments achieved by smaller schools were worth the missed incremental savings of mammoth school buildings, yet still find the fiscal savings from centralized non-instructional support operations of large districts sufficient. This implied further consolidation policy needed to advocate both large district size and small individual school size. This was essentially a blending of the economies of scale advocates' position, with that of the smaller school and class size advocates' argument.

Alternatives to District Reorganizations

School district consolidation can have an immense impact on the local community. Consolidation often required the closing of school buildings, with all the negative aspects for the community that accompany the loss of the schools. Communities that supported strong public schools enjoyed many positive rewards, including: 1) increased likelihood of experiencing population growth; 2) higher housing values, with new housing that includes more modern amenities; 3) higher per capita income, lower poverty; and 4) more professional, executive, self-employed workers, who enjoy shorter commutes (DeYoung, 1995; Lyson, 2002; Peshkin, 1982; Rooney & Augenblick, 2009; Sell et al., 1996). Strong community schools may not be the cause of the above factors. However, successful and affluent potential new community members listed the presence of strong schools as a major consideration when making their relocation decision. While the jobs these citizens were working at might not actually be in the district, these individuals were still investing their time, money, and services in the community if for no other reason than out of convenience (Lyson, 2002). Therefore, it was logical to consider the impact that closing schools had on those positive factors. Parents were concerned when faced with the threat of possible closures, often expressing their opposition due to apprehensions over educational opportunities for students. However, when parents saw their students moving to a larger, more centrally located school and the resulting increased opportunities it presented, their concerns are often alleviated (Barkley, Henry, & Bao, 1998; Sell et al., 1996)

School quality had a direct and significant impact on local property values, as citizens showed increased demand for residences in communities with perceived high-quality districts. As property values rose due to increased demand, fiscal resources for both the district and the local community increased through a combination of higher tax revenue and influx of businesses relocating to service the expanding population. School consolidation could have a similar, inverse impact on the community. As schools closed, citizens might relocate to be closer to open schools, resulting in a decline in property values as taxpayers fled. Lyson (2002) found that small communities that did not have local schools tended to have lower property values. Brasington (2003) measured this difference, finding that school consolidation lowered property values by an average of $3,000 per household. In a similar vein, business activity was more robust in communities that contained schools, while communities that experienced school consolidation had a higher rate of business loss and reduced retail sales (Green, 2013; Lyson, 2002; Sell et al., 1996). The current body of evidence suggested a meaningful, if unwanted, negative impact on local communities and homeowners that reached far beyond the efficiencies created by the school consolidation policy. This negative impact would almost assuredly have severe political consequences if not properly addressed during the consolidation process.

Non-instructional services contracting. One alternative to district reorganization was the privatization of services, such as transportation, food service, and similar non-core activities. For this discussion, privatization of services meant utilizing private companies to perform selected functions for the district, where the district still monitored and financed the functions. The policies and programming remained in the control of the district, but the private companies had great latitude in the means and methods of achieving their assignments. In this manner, districts could use privatization to increase their programming and advance their policies, while increasing school capacity and lowering costs (Cummings, 2013; Hefetz & Warner, 2004).

The concept of school districts utilizing private vendors to provide services was not new, nor have all such initiatives been controversial. Many districts have turned over ancillary services, such as food service and maintenance activities, to private contractors with relatively little controversy (Argon, 2001; Cummings, 2013; Rho, 2013). A 2001 survey that appeared in *American School and University* (Argon, 2001), found public schools used private vendors to provide the following ten most common services: 1) transportation, 2) vending machines, 3) HVAC maintenance, 4) computer servicing, 5) office-equipment upkeep, 6) food service, 7) printing, 8) security, 9) grounds maintenance, and 10) custodial services. Of interest, each of the services identified were for support services that district staff had traditionally provided.

In Michigan, a report by the Mackinac Center for Public Policy in 2015 indicated that 70.8% of the LEAs contracted out at least one of their food, custodial, or transportation services (Lafaive & Hohman, 2015). 13.7% of the districts reported they had contracted out all three services. The study reported this was the largest percentage of districts contracting out at least one form of service since the Mackinac Center for Public Policy began surveying in 2003. As shown in Figure 2.3, the number of Michigan districts privatizing one of these services increased from 172 districts in 2003 to 384 districts in 2015: a 123% increase (Lafaive & Hohman, 2015).

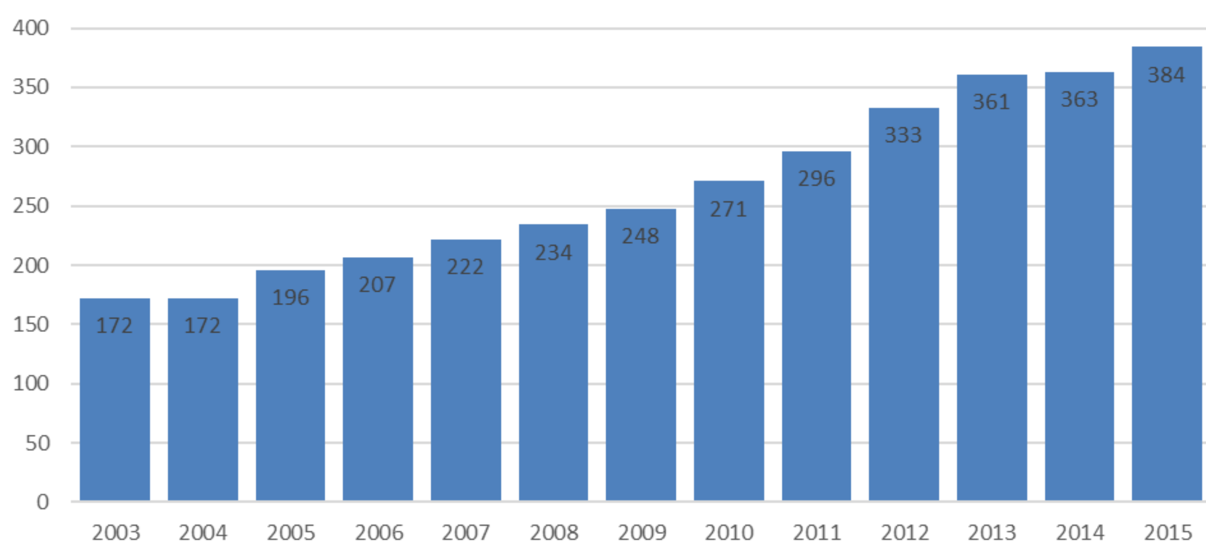

Figure 2.3. Number of Districts Privatizing Services in Michigan – 2003 through 2015

Contracting or privatizing of support services was an often-cited source of economies of scale for K-12 districts, due to the successes noted in other government privatization efforts such as the airline industry, railway systems, park concessionaries, and similar endeavors (Hentschke & Wohlstetter, 2007). Proponents of privatization pointed out school districts could achieve similar rewards, while avoiding the political ramifications of district dissolution (Belfield & Levin, 2002; O'Toole & Meier, 2004; Rho, 2013). Private companies that delivered specialized non-instructional services might offer equal or better service quality, at a lower price point, than the district could provide. Proponents suggested that districts able to shed their responsibilities on non-educational support activities, such as food service and transportation, could redirect their attention on their core mission of educating students (Belfield & Levin, 2002; O'Toole & Meier, 2004; Rho, 2013). Public perception of government being untrustworthy, bureaucratic, and overly large drove some of the sentiment towards privatization. Advocates viewed allowing private companies to compete against each other, and against the government itself, as a method of allowing market forces to drive costs (Argon, 2001; O'Toole & Meier, 2004; Rho, 2013).

School districts have a long history of contracting transportation, food service, and custodial services, while recent trends showed increased contracting of payroll, business office, and computer services. (Angelo, 1999; Argon, 2001; Brenner, 1999; DeLuca, 2013; Maher, 2015; May, 1998). While proponents argued that cost savings was a primary reason for privatization of services, other advantages included improved services and savings of management time. From the district's viewpoint, having a private vendor handle non-instructional support services could improve accountability and performance. In these arrangements, the district provided the vendor with a predetermined set of standards against which district management could measure performance. When vendors failed to meet performance goals, districts with well-written contracts could modify vendor behavior via contract provisions requiring more staffing, added time, or other similar measures, all at no added cost to the district. In egregious situations, districts could relieve vendors of their contract for non-performance and rebid the entire arrangement. This process removed district management from the daily details required to perform the service, replaced by the lessor burden of checking vendor adherence to contract specifications, and intervening only when necessary (Bryant, 2009; Cummings, 2013; Hefetz & Warner, 2004; Rho, 2013).

The impact of service privatization was not always as expected, with the positive components offset by other factors such as the influence of local unions, the politics of laying off employees, and the perception of losing local control (Angelo, 1999; Brenner, 1999; Eggers et al., 2005; Maher, 2015; May, 1998; O'Toole & Meier, 2004; Rooney & Augenblick, 2009; Thompson, 2010). Critics suggested that privatization of these services decreased service quality, accountability, service coordination, and that it offended basic democratic values (Burch, 2006; Michaels, 2013; Rho, 2013).

While contracting might appear to create fiscal savings, the resulting costs of management time and effort to oversee the contract if the relationship became contentious could offset or exceed the initial savings (Bryant, 2009). The consequences of a contractor providing poor service could have ripple effects on the entire district, especially if the poor service directly and negatively affected staff, students, and parents (Hutchinson & Pratt, 2007). Unwinding a poorly planned privatization could be especially difficult due to high up-front costs for supplies, staffing, or equipment. For example, a district that privatized its transportation service usually sold its bussing equipment, since the contractor provided its own fleet. If the contractor performed poorly and the district decided to unwind the privatization decision, the district would face a significant re-entry cost of purchasing expensive busses, locating drivers, and providing the drivers specialized training and certification (Bryant, 2009; Hutchinson & Pratt, 2007).

At least three qualitative studies reported district disappointment and underachievement of the fiscal savings goals, with positive results only reported in service improvement and savings of management time (Angelo, 1999; DeLuca, 2014; May, 1998; O'Toole & Meier, 2004, Thompson, 2010). With fiscal savings not meeting expectations, district leaders remained concerned over labor issues and the politics of laying off employees, especially in unionized environments (Angelo, 1999; Brenner, 1999; Maher, 2015; May, 1998; Thompson, 2010). The current literature contained insufficient empirical evidence or theoretical arguments to create a compelling case for moving forward with full-scale privatization of services for all districts. Each individual district should examine all aspects of privatizing these services, and the impact it might have, based on the district's unique circumstances (Angelo, 1999; Brenner, 1999; Maher, 2015; May, 1998; Thompson, 2010).

Non-instructional services consolidation. Another alternative to wholesale district consolidation was the sharing or consolidation of services. In this model, LEAs and ISDs banded together to share a wide spectrum of services in order to achieve economies of scale, while avoiding the angst of full mergers. The basic premise remained that districts had all the same services performed, but in a less costly and more efficient manner (Arsen, 2011; Delabio & Zeemering, 2013; DeLuca, 2013; Eggers et al., 2005; Hawkins, 2009; Shakrani, 2010). The district expectation was they could reduce staffing, and associated costs, by eliminating those positions. Districts then used a portion of the savings to pay for the service contract, resulting in a net overall reduction in expense with the same amount of service. Districts could also find savings through this method by eliminating redundant jobs, ensuring positions that remained were at full capacity, eliminating duplicate services, and by sharing equipment and buildings

(Holzer & Fry, 2011; Maher, 2015; Stenberg, 2011). A study sponsored by Deloitte and Reasons suggested possible savings of $9 billion countrywide if districts began using shared services (Eggers et al., 2005; Menzel, 2016). The researchers based this conclusion, however, on a simple mathematical equation that presupposed districts could turn over 25% of all education spending on non-instructional services in the U.S. to shared services (Eggers et al., 2005). The study was replete with ideas and examples of how shared services by districts might look but lacked a research-based analysis supporting whether districts could reasonably share 25% of all non-instructional services or which services this might entail. However, the report's value was in pointing out the possibility of significant savings using service consolidation (Eggers et al., 2005; Menzel, 2016).

While financial savings was the reason districts used most often as rationale for exploring service consolidation, there were other advantages to these arrangements. Many of the rationales mirrored those advanced in support of privatization. Working with other districts or ISDs could result in improved service delivery, increased service quality, and savings of managements' time (Hawkins, 2009; Hilvert & Swindell, 2013). Having another district or ISD handle non-instructional support services could improve accountability and performance, as management would be able to divert its attention away from managing the services consolidated and instead focus on student achievement. Successful service consolidation could increase demand for services, stimulate innovation, and improve working relationships between districts (Hawkins, 2009; Hilvert & Swindell, 2013; Maher, 2015). One advantage service consolidation had over privatization was the workforce was already familiar with the industry. The workers were already performing their essential services for another district; hence, they would be familiar with the job requirements, effective practices, and aberrations of the industry, versus a private contractor who would lack the same intimate industry-specific knowledge (Maher, 2015).

There were opponents to the idea of service consolidation, contending the cost savings expected were not material and hard to predict. Implementation of these agreements between districts often forgot or ignored startup costs, the need to upgrade equipment, or the necessity for more building space. The challenge for school districts and researchers was that the anticipated savings from service consolidation were often self-estimated, and expenditure evaluations afterward were not clear, consistent, or even completed (Holzer & Fry, 2011; Maher, 2015; Zettek, 2003). With a focus on wanting to appear successful and fearful of repercussions, administrators could err in their estimates on the side of long-term savings, while ignoring startup costs and other associated expenses necessary for project success (Holzer & Fry, 2011; Maher, 2015). In more rural communities, especially given the community pride often invested with the school district, turning over essential services to another district or ISD could create resistance and hostility among citizens, staff, students, and key constituents (Idzerda, 2013; Maher, 2015).

Service consolidation held several advantages over wholesale district consolidation and privatization. First, the district could be selective about what services it merged with another LEA or ISD (Maher, 2015). This allowed the district to identify those processes most advantageous to have another entity perform. Service consolidation avoided the time and effort requirements of voter approval that accompanied district consolidation (Hawkins, 2009; Holzer & Fry, 2011). Districts could make the decision to implement service consolidation quickly, requiring only administrative efforts to define the scope and procedures, with approval resting with the local school boards (Hawkins, 2009; Holzer & Fry, 2011; Maher, 2015). Districts often found stronger political support and less internal resistance with service consolidation compared to privatization (Delabio & Zeemering, 2013; Hawkins, 2009, Maher, 2015)

Regarding consolidation of services within and between school districts, most research was specific to city and county government. The body of research specifically on school district service consolidation was limited, with only three recent studies providing information on the types, financial implications, and practical considerations involved. The advantages noted above increased the use of service consolidation, as discussed by DeLuca in his 2013 work. This study suggests service consolidation efficiencies might exist in business office services, operations and maintenance, and transportation, all of which were dependent on robust staffing. The question remained on what effect service consolidation might have on staffing levels and associated costs. While the most recent studies noted overall savings, the amounts were not big enough for district leaders to justify the service consolidation without also looking at non-financial factors (DeLuca, 2013; Metcalf, 2009). As a result, further investigation may reveal potential areas where service consolidation can offer modest staffing efficiencies, while at the same time providing other non-financial benefits.

Synthesis of Literature Related to Study's Selected Methodology

Most of the literature reviewed during this study used one of two basic methodologies: Quantitative studies based on cross-sectional or longitudinal data sets and qualitative studies using interviews and case studies. There were also four mixed-method research studies, of which two had significance. Of the 39 studies and articles reviewed for this review, 36% were cross-sectional or longitudinal quantitative studies investigating effective district sizes based on student enrollment or the effects of consolidating small districts into larger districts. Three of the studies utilized regression analysis to examine the role that non-instructional support service consolidation might have had on scale economies, and none of the studies examined the staffing levels or costs associated with the services.

Quantitative studies. Most studies focused on district-level or school-level expenditure data from whole district mergers, with the emphasis on answering the research question: *What was the impact of school district student enrollment size on the average cost per student?* Most studies concluded effective district size fell between 1,000 to 2,900 students, with diseconomies of scale beginning between 3,000 to 6,000 students. However, striving for cost efficiencies through district consolidation could have unintended consequences on student achievement (McGoey, 2008; Walbert & Fowler, 1987). Several cautions were included regarding non-financial factors that districts should consider, such as community expectations, poverty, geographic size, and student transportation (Brasington, 2003; Coulson, 2007; Duncombe & Yinger, 2010; Maher, 2015; Zimmer, DeBoer, & Hirth, 2009).

Consolidations and municipalities. Brasington (2003) conducted a cross-sectional study of 298 Ohio municipalities that could potentially merge and in so doing form a consolidated school district. The focus of the study was testing whether differences in sizes between the entities influenced the eventual decision to consolidate or not consolidate. The results indicated that larger differences in sizes between two entities made the large entities more interested in school consolidation, while small entities were more likely to prefer their districts remaining separate. The study indicated the most crucial factors influencing the consolidation decision were enrollment size and property value factors, while income differences and racial composition did not have much of an effect on this decision (Brasington, 2003). This study did not examine the impact that district consolidation had on staffing levels, nor did it explore the possibility of non-instructional support service consolidation.

Maher (2015) conducted a longitudinal study of local governments in Wisconsin that pursued consolidation of various municipal services between 1987 and 2009 in order to reduce expenditures and increase capacity. While municipalities and school districts provide markedly different services, there was commonality in the concept of finding efficiencies in non-core areas by collaborating with nearby entities. The study was inconclusive on the ability of service consolidation to provide cost reductions but noted increased capacity and service enhancement as positive outcomes. The study's biggest shortcoming was the lack of data, with only seven service consolidations occurring across the more than 2,000 municipalities in the study. Most pertinent to this research study was the impact local perception and community pride had on the consolidation discussion. Municipalities considering police and fire-protection service consolidation often encountered community resistance due to the perceived loss of community identity (Maher, 2015). This was similar to districts considering consolidation that frequently encountered fierce community resistance due to the loss of community identity and school pride (Lyson, 2002; Maher, 2015; Sell et al., 1996).

Impact of consolidation on students. Walbert and Fowler (1987) conducted a cross-section correlational study examining the association between student test scores and factors such as district expenditures, district enrollment size, and socioeconomic status. The study found an inverse relationship between district enrollment size and student achievement scores. When looking at the balance between student scores and economies of scale, Walbert and Fowler's (1987) study suggested districts with enrollment between 2,601 and 3,900 exhibited student scores better than predicted. At the same time, these districts were obtaining some measure of economies of scale as measured by decreased expenditures on a per pupil basis. Interestingly, the study noted that per-student expenditures were insignificantly associated with student test scores. The study was limited in scope, examining one year's worth of data from New Jersey school districts in 1984. The study provided limited information regarding economies and diseconomies of scale for school districts and was silent on the consolidation of non-instructional support services.

McGoey (2015) conducted a cross-section correlational research study of 55 school districts in Suffolk County, New York aimed at identifying the factors that influenced inefficiency in public K-12 schools. Efficiency in this study was a measure of student performance based on the financial resources provided. McGoey (2015) identified six districts that obtained sizeable efficiencies, noting that those entities had lower average enrollment and greater PP expenditures than districts with low efficiency. The study found that the most efficient districts had an average enrollment of 1,101 students, while inefficient districts had average enrollment of over 8,000 students. The study's findings offered implications of the effect implementing strategies designed to maximize economies of scale might have on student achievement scores. McGoey (2015) did not examine the impact service consolidation had on district efficiencies or student achievement. The study included limited staffing information that focused on teacher salaries, teacher experience, and teacher-to-pupil ratios.

Support service privatization. Brenner (1999) conducted a correlational study of district privatization of non-instructional support services in Texas. The researcher was exploring district rational explaining why some districts privatized services more often than others did. The study found that districts with wealthier tax bases and larger fund balances were more likely to privatize services, as were districts located in non-urban areas. The study was limited due to examining only one period of time rather than over a series of years (Brenner, 1999). While the study investigated aspects of privatizing several non-instructional support services, it did not study the effect on per pupil costs or any staffing level changes caused by privatization.

Thompson (2010) conducted a pooled cross-section correlational study on the impact that the privatization of school transportation services had on costs. Using data from districts in Minnesota from 2000 through 2007, this study reported increased costs of over 20% when privatizing transportation services as compared to keeping the services in-house. The researcher suggested the cost increase was due to higher driver turnover and inexperience within the private contractors' staff, which resulted in higher training costs and accident rates. The study did not examine when two or more districts consolidated transportation services, instead focusing on those districts employing a private contractor versus those that did not. The study provided little information on staffing levels pre- and post- privatization and did not address staffing costs.

Consolidation and effective district size. Duncombe, Miner, and Ruggiero (1995) presented a cross-sectional study designed to create a cost model measuring the effects of school consolidation on economies of size. The study examined 610 of the 696 districts in New York, looking at data from 1990. The study identified per pupil costs savings for districts with between 1,000 and 2,500 students, with per pupil costs increasing beyond that point. Duncombe et al. (1995) noted that they observed diseconomies of scale when districts with 6,500 or more students consolidated. The researchers concluded there were per pupil economies of scale available, but the cost savings to New York was not significant. Duncombe et al. (1995) also examined the possible sources of economies of scale, including the non-instructional support services of administration, capital, transportation, and maintenance. The study noted savings in administrative costs and some support services in districts between 500 and 1,500 students, with diseconomies observed when student enrollment grew beyond 5,000 students. This prompted Duncombe et al. (1995) to suggest districts might find cost savings through the sharing or consolidating of non-instructional support services and recommended further studies in this area.

Baker and Duncombe (2004) conducted a cross-sectional analysis of districts in Kansas and Texas from 1998 through 2001 examining the effects of need-based state aid adjustments. The report suggested state school funding should make economies of scale adjustments based on both district enrollment size and pupil density. The study found support that economy of scale faded as enrollment approached 2,000 students and that there was a non-linear relationship between per pupil costs and enrollment size. The non-linear relationship supported other research that suggested there existed a range of district sizes within which consolidation successfully achieved economies of scale, but at some point, districts could become too large, resulting in diseconomies of scale. The study addressed the impact consolidations could have on non-financial factors, such as transportation time for students, and the influence larger schools could have on student performance (Baker & Duncombe, 2004). This study reviewed data from entire districts, but the study did not examine the consolidation of individual support services or the impact whole-district consolidation had on staffing levels.

Coulson (2007) conducted a study to test empirically whether consolidating smaller school districts in Michigan would save taxpayers money. Using multiple regression analyses, Coulson (2007) analyzed the relationship between district enrollment size and per pupil expenditures. The study utilized U.S. Department of Education data from 1999 through 2004 and concluded that while the ideal district size was 2,900 students, most effective consolidations of adjacent districts may have already occurred. Coulson (2007) suggested there was possible savings of $31 million statewide due to district consolidations in a perfect scenario. However, actual savings would be much smaller due to geographic challenges. Coulson (2007) noted the chances were miniscule of having all undersized districts geographically adjacent to other undersized districts in a manner conducive to forming efficiently sized districts. Coulson's

(2007) study offered larger savings of $363 million by deconsolidating large districts into multiple districts, each sized at approximately 2,900 students, but stated such a move was impractical or impossible. Coulson (2007) recommended a better solution to reducing Michigan's education costs was the introduction of market forces such as competition and parental choice. The study did not address the possible impact non-instructional support service consolidations might have had on district finances. The study provided a limited examination on district labor costs but did so at the macro level and with little detail.

Coulson's (2007) data and analysis supported the results of several other investigations regarding efficient district size. While the study provided adequate rationale for the lack of potential savings of further consolidation in Michigan, it offered no rationale for not pursuing deconsolidation. Further, Coulson's (2007) study discarded the theory that economies of scale influenced schools by concluding the following:

> As discussed later, the checkmark shape of the relationship between spending and district size is consistent with public choice theory because spending rises with district size once a threshold size is reached. The relationship is inconsistent with the "demand-driven" theory, which predicts that spending per pupil should continue to fall as size increases due to economies of scale. (p. 2)

This conclusion regarding economies of scale, while perhaps correct in a theoretical economic laboratory, failed to acknowledge that scale economy studies in the real world consistently reported a U-shaped curve. The U-shaped curve occurred due to practical issues such as monetary constraints, increasing scarcity of resources, or similar circumstances that eventually limited the per-unit cost benefits of expansion (Dollery & Fleming, 2006; Rasmussen, 2011).

One item of note was that the Mackinac Center for Public Policy, a conservative think-tank located in Midland, Michigan, underwrote Coulson's (2007) study. The Mackinac Center had been a heavy proponent for market-driven solutions in place of government operations and a strong advocate for school choice. While these positions have been a viable and important part of the school policy landscape, a prudent reader of this study should keep the underwriter's policy stances in mind when reviewing the conclusions reached.

Dority and Thompson (2013) conducted a study for school districts in Nebraska that examined whether per pupil expenditures rose or fell as districts consolidated. Using a cross-sectional regression analysis, this study concluded that per pupil expenditures reached its minimum when district enrollment size was 8,000 students. The study analyzed pre- and post-consolidation district spending patterns between 1992 and 2005 and failed to find consistent evidence that consolidation lowered per pupil spending (Dority & Thompson, 2013). The study did not examine the effect that non-instructional support service consolidation might have had on staffing levels or associated costs.

Consolidation of individual support services. Duncombe and Yinger (2007) conducted a longitudinal fixed effects study to examine the impact of district consolidation on per pupil expenditures. The researchers based the study on the 12 district consolidation events that occurred in New York between 1985 through 1997, using the remaining districts in the state as a comparison group. The study observed that cost savings were largest when two very small districts consolidated, yet significant savings were noted even when two 1,500-student districts combined. The study found district consolidation resulted in reductions in the costs of administration, transportation, and capital costs, concluding, "the cost savings from consolidation appear to be driven almost entirely by economies of size" (Duncombe & Yinger, 2007, p. 29).

Duncombe and Yinger (2007) noted that per pupil expenditures in instructional services, administrative services, and transportation increased immediately following consolidation, then gradually declined in following years. By the time consolidation had reached between four and seven years, the cumulative cost declines were sufficient to offset the early cost increases, thereby creating net ongoing savings (Duncombe & Yinger, 2007). The focus of the study was at the district level, and while the researchers made observations regarding several of the non-instructional service areas, Duncombe and Yinger (2007) did not investigate the impact consolidations had on staffing levels at the district or functional support service level.

Zimmer, DeBoer, and Hirth (2009) conducted a cross-sectional correlational study of 292 Indiana school districts over a three-year period, 2004 through 2006, examining the impact enrollment had on per pupil expenditures. The study concluded the most efficient enrollment size was between 1,300 and 2,903 pupils, with an estimated per pupil cost of $9,414. The study noted that total per pupil costs declined with increased student enrollment up to an optimal size, at which point total per pupil costs rose with higher enrollment. This research supported similar studies in the pattern observed regarding the interplay between district enrollment size and per pupil costs. Also, like other studies, it suggested there were economies of scale available at lower enrollment levels, while higher enrollment levels exhibited diseconomies of scale. The study examined the average salaries and associated costs of teachers and administrators, along with total district salaries. The study noted that while enrollment did not significantly affect teacher salaries, the researcher could not say the same about administrative costs. The study noted some administrative cost scale economies for districts with enrollment up to 3,000 students, at which point the study observed signs of diseconomies of scale (Zimmer et al., 2009). Beyond the examination of the administrative function, the study did not analyze the effect district enrollment had on non-instructional support staffing levels or costs.

Metcalf's (2009) study focused on two items of interest to this research study: 1) the challenges with the consolidation of business office services, and 2) information about the types, quantities, and costs of staffing when the consolidation of business office services occurred. Survey results indicated district superintendents perceived there was limited cost savings from service consolidation of business offices. The study suggested smaller districts were more open to service consolidations; but, once a district reached 900 students, many of districts brought these activities back in-house (Metcalf, 2009). The study had some limitations regarding the period examined, the limited survey response rate, and the focus on districts with 1,500 students or less. This study was notable in that it directly addressed the impact non-instructional support service consolidation had on district costs. However, the study did not examine staffing levels or costs in detail; instead, this study focused on the how the staff members employed in these arrangements had full work schedules due to performing business services for multiple districts.

Several consistent themes resonated through the studies. First, combining small districts offered the best opportunities to lower the average cost per student through district consolidation. However, achieving fiscal efficiencies through whole-district consolidation came with a potential negative impact on student achievement. Next, many districts encountered mitigating circumstances that offset or eliminated the fiscal savings of district-level consolidation (Brasington, 2003; Brenner, 1999; Coulson, 2007; DeLuca, 2013; Duncombe & Yinger, 2007; Maher, 2015; Thompson, 2010; Zimmer, DeBoer, & Hirth, 2009). The majority of these studies focused on consolidations of entire districts or the privatizing of individual services. Only one study focused on the consolidation of specific services, and none of the studies directly examined the impact consolidations had on staffing levels and associated staffing costs.

Qualitative studies. The overarching theme from several qualitative studies was that the success of consolidations hinged on non-financial factors. While the process of consolidations always began on the premise of budgetary savings, non-financial factors created unexpected obstacles or benefits that factored heavily when gauging success. Each study provided a wealth of information regarding the benefits, costs, obstacles, and arguments for and against all forms of efficiency models, including district consolidation, service consolidation, and service contracting (Angelo, 1999; DeLuca, 2014; May, 1998; Menzel, 2016; Metcalf, 2009).

Impact of consolidation on students. Rooney and Augenblick (2009) examined the potential impact consolidation might have on district finances and student achievement in Colorado, using a comprehensive review of the literature as their research technique. This literature review concluded districts in Colorado might find economies of scale through district consolidation but stepped away from determining the most efficient district size or recommending district reorganization. The study concluded the issue was too complex to make solid recommendations on the most efficient district size due to the interplay of a range of factors such as student enrollment, demographics, geography, technology, and politics (Rooney & Augenblick, 2009). Lacking a target district size, the researchers found that an estimate of potential savings was difficult to calculate yet they noted there were other non-fiscal benefits of district consolidation. Similar to Self's (2001) case study of district consolidation in Ohio, Rooney and Augenblick (2009) identified increased student opportunities, a wider variety of academic offerings, increased teacher opportunities, and teacher specialization as positive outcomes of district consolidation. The study did not address non-instructional support service consolidation beyond a cursory review of the literature, with no conclusions rendered.

Support service privatization. Angelo (1999) and May (1998) each conducted descriptive survey studies that investigated non-instructional service privatization efforts and results in New Jersey. May's (1998) study examined 262 districts, or approximately 50% of the school districts in New Jersey, soliciting survey responses from only district superintendents. Angelo's (1999) study examined 384 districts, approximately 69% of the school districts in New Jersey, and asked for survey responses from district superintendents, board presidents, and union leaders. The studies examined the extent of privatization within school non-instructional support services, the rationale behind district decisions to privatize, and the degree of success achieved. Both studies were rich in details concerning the rationale behind privatization of these services, along with the pitfalls and challenges encountered (Angelo, 1999; May, 1998). Both Angelo (1999) and May (1998) reported that superintendents generally felt privatization had provided moderate savings with somewhat equal or better service. These studies provided excellent support for a researcher exploring privatization of services. However, neither study addressed the impact, if any, of having a collaboration of educational entities providing the services instead. Being descriptive surveys, the studies offered evidence on the politics and perceptions behind privatization but were short on actual dollar amounts saved or staffing level variations.

Bryant (2009) conducted a three-district case study examining the reasons behind, and the impact of, privatizing of non-instructional services by school districts. By examining the same questions across three individual districts, Bryant (2009) was able to draw broader conclusions whenever the experiences noted by the tested districts paralleled each other. The study provided information on individual perceptions regarding the privatization decision, and subsequent implementation, from a wide variety of viewpoints. This study included strong evidence about the challenges a district could encounter when hiring private vendors to provide non-instructional support services. The study did not examine the impact privatizing these services had on district finances or staffing, except in a very coarse manner.

Burch (2006) examined privatization of school district services, including both educational and non-instructional services, of one large school district in the U.S. This study focused mainly on the impact that the No Child Left Behind Act of 2001 had on introducing private contractors into the instructional side of school district operations, especially in the areas of data-collection and testing. The study provided some conclusions regarding the impact privatization of instructional services might have on technology, governance, and educational policy (Burch, 2006). The study noted the district encountered challenges in implementing instructional services privatization similar to the challenges reported in studies of non-instructional support services privatization. The study failed to investigate the impact privatization of these services had on cost, capacity, economies of scale, or staffing levels.

Consolidation and efficient district size. Fox (1981) conducted a literature review on economies of scale for school districts, finding inconsistent results across the body of literature available. Fox (1981) raised several methodological issues with the studies he reviewed, noting that future researchers needed to develop better theoretical frameworks. Over twenty years later, Andrews, Duncombe, and Yinger (2002) conducted a literature review designed to update the status of research on the topic of school district economies of scale. Andrews et al. (2002) found that almost all the cost studies that they reviewed only examined district level consolidations, rather than building consolidations, due to the lack of school level expenditure data. The study identified potential cost savings for districts with enrollment of less than 500 up to 4,000 students, with diseconomies of scale noted once student enrollment reaches 6,000. However, despite twenty years elapsing since Fox's research, Andrews et al. (2002) concluded, "there is little convincing evidence on how consolidation actually affects school districts in the long-run"

(p. 13). The study recommended further research into economies of scale for school districts, with a suggestion that these studies utilize a mixture of cross-sectional and longitudinal regression analysis (Andrews et al., 2002).

Consolidation of individual support services. DeLuca (2014) conducted a case study of non-instructional support service consolidation within one Michigan ISD. The study examined the interplay between the financial and non-financial benefits that drove support service consolidation. In the three districts examined, the impetus behind the support service consolidations was due to the loss of staff at the district level, which created an opportunity to shift and share the duties with the local ISD. In so doing, districts noted economies of scale and increased service quality with little pushback from constituents or staff. This study examined the staffing changes that occurred at both the district and ISD level when those entities implemented support service consolidation in a broad manner. However, the case study did not examine the interplay between district-specific characteristics such as enrollment, PP expenditures, and similar factors, nor the impact they might have had on the staffing levels of non-instructional support services.

Non-economic impact of district consolidations. Menzel (2016) conducted a case study of the largest merger of two districts in Michigan over the past three decades. This study was especially rich in detail, as Menzel was heavily involved in the process and had unprecedented access to all facets of this event. Menzel reported educators and the community feared the loss of identity and the impact closing schools had on the region. Business leaders and legislators were concerned with cost-effectiveness, seeing district consolidation as a way to achieve economies of scale and thereby drive down the per pupil cost of education.

Menzel's findings were similar to those of Effiom (2014), Peapples (1986), and Kopatich

(2008) regarding the different perceptions various constituent groups had of whole district consolidation. These studies all reported that district consolidation discussions brought a host of organizational, policy, and political challenges that could negatively influence the overall consolidation experience (Effiom, 2014; Peapples, 1986; Kopatich, 2008; Menzel, 2016). The researchers discussed the potential cost savings from district consolidations in broad terms, and as only one factor of many in the decision-making process. The studies largely ignored other possibilities, such as privatization and service consolidation, recognizing that the districts had already utilized or discarded these options for district-specific reasons.

Mixed method studies. DeLuca (2013) conducted a mixed-method study, examining the extent to which Michigan districts consolidated services to the ISD, the impact this had on expenditures, and how this influenced instructional expenditures. Using expenditure data from 2004 to 2010, he found shared services occurred most often in the areas of payroll, technology, and transportation. The study noted overall expenditure reductions when consolidation occurred in business services, operations and maintenance, and transportation; however, none of the reductions were statistically significant. Except for business services, the study found no statistically significant impact on instructional spending from consolidation (DeLuca, 2013).

DeLuca (2013) followed his financial analysis with interview questions designed to elicit responses on the challenges and influences over service consolidation. The analysis of the questionnaire results, combined with the financial results, sought to answer the questions: 1) What are the sources of spending changes when school districts consolidate services?, and 2) What role do scale economies play when operating expenditures change due to school district service consolidation (DeLuca, 2013)? DeLuca's (2013) research was rich in detail, including not only the data that supported the "what" was happening, but also the "why" behind the underlying support service consolidations. The study did not examine staffing levels or related costs except in a broad manner, revealing the potential for further research.

Augenblick, Palaich and Associates (APA), in partnership with Picus, Odden, and Associates (POA), conducted an extensive research project examining the resources needed by Michigan's school districts to meet the state's academic standards (Augenblick, Palaich and Associates, 2018). The study addressed the adequacy questions using three separate methods. APA and POA identified the Professional Judgement (PJ) approach as the most widely used in similar studies across the nation. This approach utilized a broad cross-section of professional educators around the state to identify district resources needed at all levels of district operations, including staffing of non-instructional support positions.

APA and POA considered using the Cost Function approach, which attempted to estimate the level of funding necessary to reach a given level of achievement. This method tried to control for student characteristics and district demographics. However, due to budget constraints and the difficulty in explaining the complex econometric models to non-researchers, this model was abandoned (Augenblick, Palaich and Associates, 2018).

Finally, APA and POA employed an Evidence Based (EB) approach, whereby they used research to identify effective practices and associated cost factors for providing K-12 education. Once identified, APA/POA applied the research-based effective practices to Michigan districts in order to identify levels of resources and staffing needed. Michigan expert educators then reviewed the research and measured it against their professional judgement. When conflict occurred, the EB section of the study deferred to the research when reaching its conclusions (Augenblick, Palaich and Associates, 2018).

The APA/POA (2018) study provided a per pupil state funding recommendation that ranged from $9,590 to $11,482 based on district size. These baseline figures were the synthesis of many factors, including staffing levels and costs of support services. Both the PJ and EB methods provided some recommendations for staffing of these various functions, but the recommendations relied heavily upon professional judgement. The APA/POA models had little detail about specific non-instructional support functions, instead lumping everything from the superintendent's office to maintenance into one bucket labeled "Central Office". While the report contained some specific staffing level recommendations, both the EB and PJ approaches adjusted the levels based on input from the professional panel (Augenblick, Palaich and Associates, 2018). This study provided the most information germane to the researcher's study but did so based on professional judgment and recommendations from education professionals, rather than using empirical evidence. This revealed a gap in the literature for further research.

Chapter Summary

In a time of significant financial pressure on K-12 school districts in Michigan, school officials must give serious thought to alternative ways of delivering support services. One measure often considered is the consolidation of multiple school districts into a single, larger district. Advocates believe this will provide economies of scale, thereby reducing the per pupil cost of education. It is not uncommon for district consolidation initiatives to encounter community resistance, due to the emotional impact of closing schools. The number of consolidations in Michigan over the past three decades has significantly declined, suggesting that most economies of scale may have already been achieved (Ballard, 2010; Brasington, 2002; Coulson, 2007; DeLuca, 2013; Duncombe & Yinger, 2010).

The use of private contractors providing non-instructional services has been prevalent in Michigan in the areas of transportation, food service, custodial, payroll, business services, and computer services (Argon, 2001; Lafaive & Hohman, 2015). The predicted fiscal windfalls are mostly unmet, though districts can identify other compelling benefits such as service improvement and savings in management time as positive outcomes. The current body of evidence fails to create a compelling case for rapid investment in the contracting of non-instructional support services (Angelo, 1999; Brenner, 1999; DeLuca, 2013; Maher, 2015; May, 1998; O'Toole & Meier, 2004).

The consolidation of non-instructional support services as a means for cost savings remains largely unexplored, with the studies by DeLuca (2013), Metcalf (2009), and Augenblick, Palaich and Associates (2018) providing the most up-to-date information. Proponents suggest there are significant savings in this area that avoid the pitfalls associated with full district mergers or privatization of support services (Eggers et al., 2005; Hawkins, 2009; Hilvert & Swindell, 2013; Maher, 2015; Menzel, 2016).

The literature review revealed a gap in research regarding the size and cost of district staffing for the non-instructional services subject to service consolidation. As noted by both Metcalf (2009) and DeLuca (2013), the state has significant district information available for analysis. This data is readily accessible in a disaggregated form, and the addition of recent data fields allows a researcher to ascertain each workers' status, whether they are an employee or a contractor. Using the new fields, the researcher can identify those non-instructional support services where a service consolidation arrangement was in effect and the impact it had on staffing. Armed with such a rich level of staffing detail, the researcher proceeded to conduct a predictive quantitative analysis of how staffing levels of non-instructional support services vary based upon service consolidation versus keeping the service in-house.

CHAPTER THREE

METHODOLOGY CHAPTER

This chapter explores the tasks, sequencing, and methodology related to the researcher's predictive correlational research study investigating the relationships between non-instructional support staffing and district specific variables such as expenditures, state funding amounts, district size, and district demographics. The researcher included sections designed to outline the research process. The seven sections include problem statement, research questions, research design, research techniques, data collection, data analysis, and research ethics.

Problem Statement

The financial pressures on Michigan to fund school districts adequately have been significant for decades. Fiscal efficiency and academic excellence have been the focus of education policy, with wholesale district mergers often seen as a way to achieve these goals. Local communities, however, realize that the loss of schools due to merges can have an immense negative impact on a community (Lyson, 2002). As a result, policy makers have been hesitant to force district mergers in the face of fierce local resistance, instead leaving those decisions up to individual districts (Arsen, 2011). Meanwhile, as state financial resources dwindled, so has fiscal support of schools, forcing districts to examine alternative ways to educate students and provide services (Baker & Duncombe, 2004; Brasington, 2003; DeLuca, 2013: DeLuca, 2014; Duncombe & Yinger, 2007; Eggers, Snell, Wavra & Moore, 2005; Menzel, 2016; McGoey, 2008; Rooney & Augenblick, 2009).

In K-12 districts, the search for financial efficiencies often begins with examining the costs of district-level support services, including administration, business office, and custodial services. Three important sources of creating school efficiencies have been the merging of entire school districts, the privatizing of specific school support services, and the consolidation of non-instructional support services. The researcher saw an opportunity to expand the current body of literature by examining the impact non-instructional support service consolidation had on district staffing and related staffing costs. Staffing creates the largest expense for educational institutions, yet there had been limited investigation into the size and cost of staffing for the non-instructional services subject to possible service consolidation.

Research Questions

The researcher pursued answers regarding staffing levels and costs within specific support services using a variety of techniques designed to answer the following questions:

1) ***When examining Full Time Equivalents (FTE) by functional area at the district level of non-instructional support services, are the variables of Foundation Allowance, Enrollment, Per Pupil (PP) Expenditures by function, Per Pupil (PP) Wages by function, and Per Pupil (PP) Benefits by function statistically different in consolidated service arrangements as opposed to non-consolidated service arrangements?***

2) ***Is FTE by functional area at the district level of non-instructional support services associated with the model of independent variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, PP Benefits by function, consolidated school districts, and non-consolidated school districts?***

3) ***Does consolidation play a significant role in the model's ability to predict FTE by functional area over time at the district level for non-instructional support services?***

4) ***Does a model regarding school consolidation of non-instructional support services predict FTE by functional area over time at the district level?***

5) ***Does a model regarding the lack of school consolidation of non-instructional support services predict FTE by functional area over time at the district level?***

Research Design

This study used a predictive correlational research design due to the deductive nature of the questions and underlying available data. This was an appropriate method given the wealth of available statewide district-level support services information. Correlational research design allowed for generalizations about the studied phenomenon, while providing some estimating ability (Creswell, 2002; DeLuca, 2013; Frankel, Wallen, & Hyun, 2015). This estimating ability may allow for real world application by school administrators. In this era of financial challenges, research that helps identify the norms in the staffing of non-instructional support services based upon district-specific variables can be invaluable.

The researcher was a school business official; therefore, a quantitative analysis helped avoid personal bias in the research, yet still allowed a focus on practical application. Quantitative analysis does not lend itself to exploring the contextual detail behind the research questions (Creswell, 2002; DeLuca, 2013; Frankel, Wallen, & Hyun, 2015). The literature review revealed there were many non-monetary reasons for districts to explore the consolidation of non-instructional support services. The researcher suggested such topics be considered for future research, since the planned study was not designed to explore the non-monetary reasons that districts entered into service consolidation arrangements.

The study began with an initial analysis of the dataset to ensure it met the underlying assumptions necessary for successful execution of the research plan. The researcher paid particular attention to the assumptions of linearity, independence, and multicollinearity. The researcher addressed the discrepancies noted during this examination, using a variety of techniques that included an intensive examination of the data, use of supplemental testing techniques, and reassessment of the data analysis techniques utilized, as appropriate.

Following the data assessment, the researcher planned a sequence of tests designed to further the understanding of the research questions. The research plan, included in Table 3.1, was as follows: descriptive statistics, correlational analyses, association analyses using cross-sectional regressions, and estimation analyses using a series of fixed effects regressions. In this manner, the researcher anticipated addressing each of the five research questions.

Table 3.1

Research Conceptual Model

Research Question	Research Technique	Data Collection Sources and Techniques	Data Analysis Techniques	Purpose
Preliminary Analysis	Descriptive statistics	2017 data.	Use SPSS tables/graphs to analyze variability, central tendencies, & frequencies.	Familiarization with data. Identify trends.
Preliminary Analysis	Pearson Correlation	2017 data.	Use SPSS to analyze; report using correlation matrixes & scatterplots.	Identify existing relationships between variables.
Question One	Independent samples *t*-test	2017 data.	Use SPSS to conduct the analysis and report *t*-critical items in a table.	Identifies significant variables in consolidated & non-consolidated LEAs.
Question Two	Cross sectional regression analysis	2017 data, with 2014-2016 data in appendices.	Use SPSS to conduct the analysis and report beta co-efficient and R^2 in a table.	Indicates which variables are associated with the dependent variable.
Question Three	Fixed effects regression analysis (with dummy variable Con)	2014 - 2017 data.	Use SPSS to run 1 regression for 4 functional areas, and then use tables to report *p*-values and standardized coefficients.	Determines if consolidation was significant. If significant, proceed to questions 4 & 5.
Question Four	Fixed effects regression analysis (without dummy variable Con)	2014 - 2017 data filtered to **include** districts with consolidated services.	Run SPSS regressions when Con was significance in RQ3 and report standardized coefficients and *p*-values in a table.	Estimates how much FTE changes when districts are in a consolidated service arrangement. Identifies significant variables.
Question Five	Fixed effects regression analysis (without variable Con)	2014 - 2017 data filtered to **exclude** districts with consolidated services.	Run SPSS regressions when Con was significance in RQ3 and report standardized coefficients and *p*-values in a table.	Estimates how much FTE changes when districts do not have a consolidated service arrangement. Identifies significant variables.

Research Techniques

Data set assumptions. The researcher began with tests of the basic underlying assumptions of the data set to examine its representativeness. The researcher noted that Pearson correlations and ordinary least squares regression analysis share the assumptions of linearity, homoscedasticity, normality, and unusual data (Chen, Ender, Mitchell, & Wells, 2003; Muijs, 2011). Regression analysis required checking the two additional assumptions of independence and multicollinearity (Chen, Ender, Mitchell, & Wells, 2003; Muijs, 2011). The researcher addressed all six standard assumptions using a variety of tools available in the IBM's SPSS (SPSS) statistical modeling software to ensure the data set was representative. The researcher also addressed any unusual results using techniques that ensured the data set met the expectations necessary to conduct Pearson correlation and multiple regression analyses.

The researcher next assessed the data set for reasonableness and representativeness with an examination of the two sample groups of districts, those that had consolidated support service arrangements versus districts without such arrangements. The analysis used descriptive statistics to examine the samples and the universe of all districts included in the study, using several key demographic and organizational variables. Each groups' results were compared against each other and against the same results from the population. These comparisons allowed the researcher to test the sample groups against all districts in the study for reasonableness and representativeness. The researcher addressed all issues identified by these tests before progressing to the next step of analysis. During this phase of the study, the researcher noted the *n*-sizes of districts with consolidated service arrangements for Function 220: Instruction Staff Services, Function 230: General Administration, and Function 240: School Administration were too small for the planned research techniques and removed them from the study.

Descriptive statistical analyses. Once the researcher was confident in the quality of the data set, the study turned to additional descriptive statistical procedures to gain a better understanding of the data. Gall et al (2003) described the descriptive method as being the most basic quantitative research method. Charles (1998) suggested the usefulness of descriptive analysis was that it simply presented data in an organized way, without further analytic processes, or prior to undertaking more complex statistical analysis. Data familiarization began with a study using descriptive statistics and Pearson correlations, which allowed the researcher to gain a better understanding of the research problem from these multiple and broad data analyses.

The researcher used descriptive statistics to contextualize the relationships between staffing levels, as measured by FTE at the district level, for each of the functional support services as compared to the independent variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function. The primary unit of measure was staffing FTE by function at the district level at each non-instructional functional area identified in Table 3.2. The researcher conducted a series of descriptive statistics designed to further describe the data and provide insight into the growth or decline of consolidation within non-instructional support services. The study reported outcomes using graphs and tables designed to show the results of the central tendencies, variability, and frequency. The study provided findings of central tendency, specifically means, medians, modes, using tables and selected bar graphs to provide clarity. The researcher reported the results of variability, including range, standard deviation, and variance, using tables generated from SPSS. Examinations of frequency distribution involved the use of histograms, which the researcher evaluated for modality, skewness, and kurtosis. Those tables, graphs, and charts provided a visual depiction of the relationship between FTE and the independent variables.

Table 3.2

Non-instructional Support Services by Function Code

Function Code	Support Services	Typical Jobs and Services
250	Business Services	Accounting, payroll, purchasing, printing
260	Operations and Maintenance Services	Custodial, maintenance, utility costs, security
270	Transportation Services	Bussing, bus drivers, field trip costs
280	Central Support Services	Human resources, Information Technology, pupil accounting

(Michigan Department of Education, 2016)

As part of descriptive statistics, the researcher conducted a series of Pearson correlations to identify relationships between FTE by function at the district level and the examined variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function. The researcher paired FTE at each of the four functional areas with the five independent variables, resulting in 25 individual analyses. In this manner, the study could identify relationships between the variables that helped further develop and describe the data set, with the results of the Pearson correlation reported using a correlation matrix.

Research question one. Research question one used a series of independent samples *t*-tests, examining the variables to see if there were statistically significant differences between districts with and without service consolidation. Figure 3.1 illustrated the decision matrix used by the researcher in test selection. The researcher was examining the differences between two groups; districts that had consolidated services and those that had not. The researcher tested each district once for each fiscal year, with the results for each year standing on their own. Given these facts, Figure 3.1 indicated the independent samples *t*-test was the appropriate statistic.

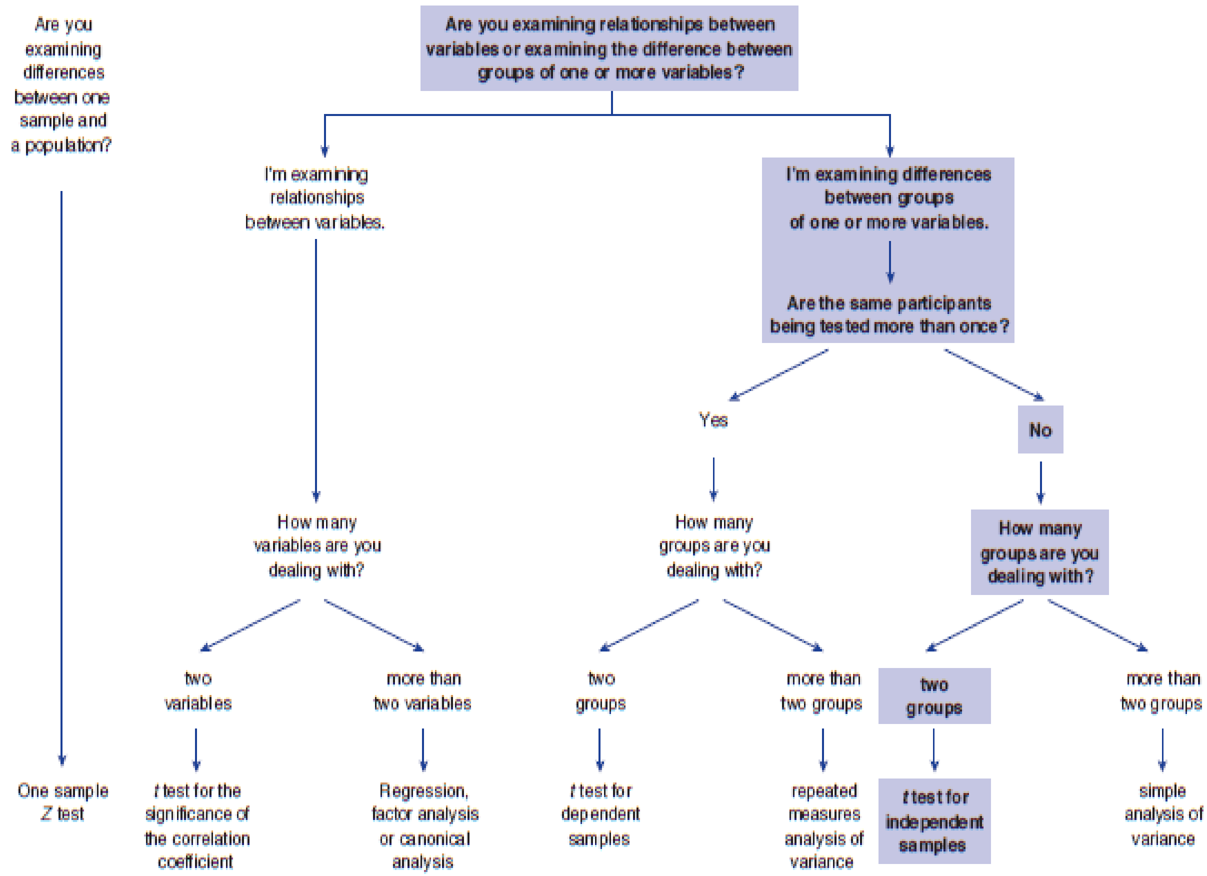

Figure 3.1. Determining That a t-Test Was the Correct Statistic (Salkind, 2017)

The researcher tested the variables of FTE by function, Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function, looking for a statistically significant difference between districts with and without consolidated services. The focus was finding which variables reported significant association as indicated with a $p<.05$. The *t*-tests resulted in the calculation of 25 individual analyses. The researcher used tables to show the results, including sample size, *t*-value, degrees of freedom, and *t*-critical items. Using *t*-test results that included degrees of freedom, mean, and standard deviation, the researcher calculated Cohen's *d* to estimate the effect size of any significant results. This allowed the researcher to estimate the magnitude of the effect these variables exerted (Salkind, 2017). Those variables showing statistical significance answered research question one.

Research question two. The next step in the research process involved a series of cross-sectional regression analyses aimed at answering research question two. Multiple regression analysis allowed for association of the dependent variable based on the influence of multiple other variables. The data set had information on the dependent and independent variables for multiple districts at the same points in time. Cross-sectional multiple regression analysis was an appropriate method for providing insight into the association of the independent variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function with the dependent variable of FTE by function.

The researcher ran the regression formula once for each of the functional areas in Table 3.2 using data from 2017. This produced four individual regressions, with the results reported in tables that included the beta co-efficient and R^2 for each functional area. Recognizing that there could be major variations in results due to annual differences in the data, the researcher produced the same four individual regression for years 2014 through 2016 and examined the results for abnormalities in comparison to the 2017 results. The researcher included the testing results from 2014 through 2016 in the Appendices. A review of each function's 2017 results against their own prior year's results showed strong similarities across all years. This allowed the researcher to rely on the 2017 results when offering insights and rendering conclusions. The researcher used 2017's coefficient of determination as a measure of how much the independent variables explained the variability in the dependent variables, thereby answering research question two.

Research question three. Research question three determined if consolidation played a significant role in estimating how FTE by function at the district level changed. The researcher used a series of fixed effects regression analyses to see if the consolidation variable was a statistically significant factor in estimating changes in FTE by function. The fixed effects regression model used FTE by function as the dependent variable, along with the model's five independent variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function. Included with the independent variables was the consolidation variable Con, a dummy variable with a value of 1 if a service consolidation arrangement existed. The dummy variable allowed the researcher to determine if non-instructional service consolidation had statistical significance.

The researcher used data from 2014 through 2017, running one fixed effects regression analysis for each of the four functional areas noted in Table 3.2. This research step produced four individual regressions, where the researcher examined the *p*-value results of the variable Con to determine if consolidation was a statistically significant estimator of changes in FTE by function. The researcher focused on whether the variable Con reported as statistically significant to answer research question three. The researcher provided tables that reported the standardized beta coefficient and R^2 for each functional area, thereby offering additional context to the research question and the overall study. The results of these tables offered insight into how much the model estimated the change in FTE by function at the district level, along with identifying which model variables provided significant influence.

Using fixed effects regression analysis gave the bonus of reducing omitted variable bias. While a cross-sectional regression analysis, like that used for research question two, can provide insight into FTE changes *between districts* during a specific period of time, it does not control other factors that may influence staffing *within districts* or *over time*. Cross-sectional regression analysis can be a powerful tool, but it was subject to possible omitted variable bias (Dranove, 2012). Eliminating threats to internal validity can be a challenge in non-experimental research due to the lack of a separate control group as part of the study. However, identifying a positive correlation in an estimation study provides some degree of internal validity. Reductions to internal validity threats can occur through testing designed to identify dependent variables that have influence on the dependent variables. In this study, the researcher attempted to reduce omitted variable bias through the application of fixed effects regression analyses, which allowed comparison of each district to itself.

Research questions four and five. To address research questions four and five, the researcher examined only the functional areas where the fixed effects regression analyses from research question three indicated service consolidation had statistical significance. The researcher employed the same fixed effects formula used for research question three, absent the dummy variable Con, for this stage of the research plan. To answer research questions four and five, the researcher ran the revised fixed effects regression formula twice for each functional area where Con reported statistical significance in research question three.

The first iteration of the revised equation identified which model variables were statistically significant when estimating how much FTE by function at the district level changed for districts with consolidated service arrangements. The study did this by applying regression equation three once for each tested function, using data from 2014 through 2017 that included only the districts with consolidated service arrangements in all four years of the study. The results of these examinations allowed the researcher to answer research question four.

The second iteration of the revised regression equation identified which model variables were statistically significant when estimating how much FTE changed for districts lacking consolidated service arrangements. The researcher examined the data from 2014 through 2017, filtered to exclude districts that had consolidated service arrangements in all four of the examined years. The results allowed the researcher to answer research question five.

Data Collection Sources and Techniques

Sources. The data for this study came from a variety of state and national educational databases. The most important sources came from Michigan's Center for Educational Performance and Information (CEPI), which maintained several key databases. The Financial Information Database (FID) housed disaggregated accounting records of all districts in the state. Financial information was extracted based upon three domains: 1) funds (e.g. general fund, food service fund), 2) functions (e.g. instruction, fiscal services, transportation), and 3) objects (e.g. salaries, benefits, purchased services). In this manner, users could combine expenditure records to identify cost centers, such as general fund (fund), transportation (function), and driver salaries (object). Data regarding staffing types and levels, together with their corresponding cost centers, was available through CEPI's Registry of Educational Professionals (REP) database. The REP database contained key information, including FTE by function at the district level, job description and code, and contractor versus employee status. Appendix B included the state's authorization letter approving the release of the research data items required for the study. The researcher also obtained limited demographic information from the U.S. Census Bureau.

The researcher included the sources for each data set element in Table 3.3. As this analysis examined expenditures over time, the researcher adjusted all dollar amounts to June 2018 values using inflation factors from the U.S. Bureau of Labor Statistics, except for Foundation Allowance. To field practitioners, Foundation Allowance was a commonly recognizable district marker, and the researcher was concerned that adjusting this variable would create confusion.

Table 3.3

Data Set Variables by Source

Data Set Variables	Source
Data Set Sources for Key Variables	
Consolidation	Calculation: Consolidated if Contractor FTE > Employee FTE
Educational Attainment	U.S. Census Bureau Report: Annual ACS
Enrollment	CEPI Report: Annual School Data File Student Count
$Enrollment^2$	Calculation: Enrollment X Enrollment
Foundation Allowance	MDE Report: Foundation Allowance by Fiscal Year
FTE by function	Calculation: Employee or Contractor FTE, as appropriate
PP Expenditures by function	Calculation: Expenditures – district total / Enrollment
PP Wages by function	CEPI Data Extract
PP Benefits by function	CEPI Data Extract
Taxable Value Per Pupil	Calculation: Total Taxable Value / Enrollment
Total Revenue Per Pupil	Calculation: Revenue – district total / Enrollment
% Free & Reduced lunch	CEPI Data Extract
Data Set Sources for Non-Key Variables and Calculated Variables	
Expenditures – district total	MDE Report: Annual Bulletin 1014
Expenditures by function	CEPI Data Extract
FTE by function – employees	CEPI Data Extract
FTE by Function – contractors	CEPI Data Extract
Racial/Ethnic Profile	CEPI Report: Annual School Data File Student Count
Revenue – district total	MDE Report: Annual Bulletin 1014
Total Taxable Value	MDE Report: Annual Bulletin 1014
Urbanicity (NCES Code)	CEPI Report: Annual School Data File Student Count

The researcher combined the data extracts into one Excel database containing all relevant information for years 2012 through 2017. The researcher selected 2012 due to it being the first year that districts began consistently reporting to CEPI data that allowed for identification of consolidated service arrangements. The researcher selected 2017 as it provided the most recent year for which all databases of interest had finalized information. Preliminary testing of the data revealed challenges that could skew results from the regression tools employed in the study. This forced the researcher to conduct preliminary analyses using 2012 through 2017 data, then focusing on 2014 through 2017 data for the fixed effects regression analyses.

While Excel had excellent tools that assisted in accumulating data from multiple sources, it lacked the powerful analytical and reporting tools this research study required. Therefore, the researcher imported the comprehensive data set into the statistical analysis software package SPSS. During the evaluation and analysis phase of research, all research testing occurred using SPSS to capitalize on the software's powerful analytical tools and reporting mechanisms.

Establishment of population and samples. Depending on the year, the data set consisted of between 372 and 527 of the possible 538 Local Education Agencies (LEAs) in the state of Michigan between 2012 and 2017. In total, the researcher discarded 11 districts from the study due to data irregularities. Five districts failed to provide to the state the annual reports the data relied upon, thereby making it impossible to obtain their information for this study. The researcher excluded six districts due to verified discrepancies that created data skewing. The study began with an examination of the most recent data, which was from 2017. The data set also contained data from fiscal year 2012 through 2016, with 2012 data being the first year LEAs began reporting information that allowed identification of consolidated service arrangements.

While the data set contained information from 2012 through 2017, the regression tests relied upon districts that consistently maintained their consolidated versus non-consolidated status throughout the period of the tests. The movement of districts into and out these arrangements during 2012 through 2017 created issues with having sufficient *n*-sizes of consolidated districts to obtain usable results. The researcher identified 2014 through 2017 as having the best balance of consolidated district *n*-sizes within the longest period possible.

The differentiation of employee versus contractor was critical to identifying the entities with service consolidation arrangements. The researcher excluded Public School Academies (PSA) and Intermediate School Districts (ISD) from the data, because including them would have incorrectly identified service consolidation arrangements where none existed and would have double counted some of the staff members in the study. Due to the way PSA operators managed their schools, many PSAs reported their workers as contractors rather than as employees. Including PSAs would have resulted in data showing consolidated service arrangements that did not actually exist. The researcher excluded ISDs because most consolidated service arrangements were between ISDs and LEAs, resulting in the state counting the same staff as ISD employees and LEA contractors.

For each function shown in Table 3.2, the data set contained one record for each district in the state, if the function reported an FTE greater than zero. With 538 districts and four service areas in the study, there was a potential for 2,152 records per year. Some districts did not have staff in every area, and the researcher removed several districts due to data discrepancies. The final data set contained 1,757 records per year, with 113 records for those functional areas where districts reported contracted FTE. The remaining 1,644 records were for functional areas where districts reported their staff as employees, meaning a service consolidation arrangement did not exist. The study covered six years, so the complete data set had a total of 10,548 records, of which 679 records corresponded with districts having consolidated service arrangements. The researcher identified the remaining 9,866 records as not having such arrangements.

Establishment of variables. The data available was enough to identify those variables most influential on support service staffing. The state accounting codes noted in Table 3.2 was the primary means of segregation and identification of the service level data. Each functional area contained data on the FTE reported by the district, designation of each staff member as either an employee or a contractor, PP Wages by function, PP Benefits by function, and PP Expenditures by function. District level variables of importance included pupil Enrollment and district Foundation Allowance. Included in the data were district characteristic variables such as Urbanicity, % African American, % Free & Reduced Lunch, Enrollment^2, Total Revenue Per Pupil, and district Taxable Value Per Pupil. Figure 3.2 provided a graphical representation of the data elements included for each district.

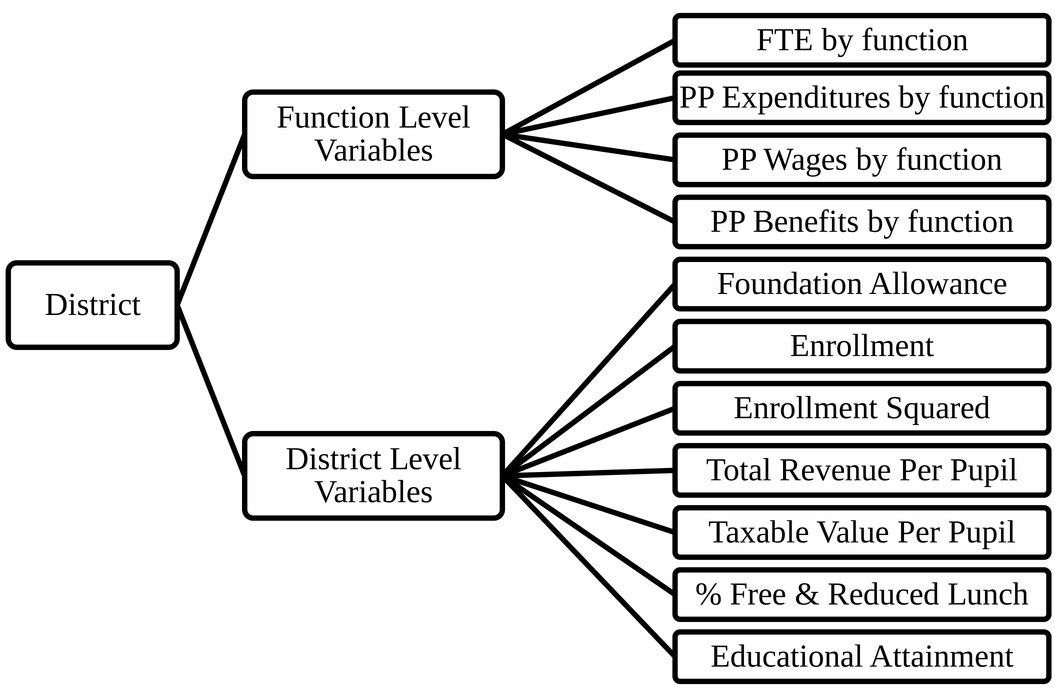

Figure 3.2. Data Set Variables

The study's primary unit of analysis was staffing FTE measured at each of the functional areas shown in Table 3.2, for every district in the state. FTE was a ratio dependent variable that represented the number of full-time and fractional-time employees in each functional area at each district. Included were five control variables: 1) Foundation Allowance, 2) Enrollment, 3) PP Expenditures by function, 4) PP Wages by function, and 5) PP Benefits by function.

Foundation Allowance was a ratio independent variable measured in dollars and represented the amount of money the state provided to each district during each fiscal year on a per pupil basis. The amounts varied from district to district due to historical reasons noted in the literature review and were convenient variables for grouping, segregating, and generalizing district financial characteristics. For the field practitioner, the district Foundation Allowance can be a useful and familiar identifier of generalized district wealth. Enrollment was a ratio independent variable, measured by FTE, of the number of students each district provided services to during each year. Enrollment was another useful and familiar district indicator that field practitioners often referenced when examining school district characteristics.

PP Expenditures by function was a ratio independent variable measured in dollars adjusted to CPI as of June 30, 2018. The researcher calculated PP Expenditures by function for each service noted in Table 3.2, providing a measure of the cost incurred by every district to deliver each non-instructional service. PP Wages by function and PP Benefits by function were both ratio independent variables, measured in dollars adjusted by CPI as of June 30, 2018. These variables measured the direct staffing costs incurred in providing the non-instructional services related to each functional area indicated in Table 3.2. Methodological

Data Analysis Techniques

The initial challenge in this project was differentiating between those districts that had consolidated support services from districts that did not have such arrangements. The researcher used the contractor versus employee designation from the REP database to identify this key variable, along with detecting the specific functional areas consolidated. This differentiation occurred at the non-instructional support service level, using the function codes assigned by the state to each service area. The researcher assumed that oversight and incidental staffing by individuals employed directly by the district might occur, even though the districts consolidated the non-instructional support service as a whole with another entity. This was, in fact, the case as many districts reported support services that contained both employee and contractor FTEs. For those services where the contractor FTE equaled or exceeded the employee FTE, the researcher designated it as a consolidated support service for purposes of the study.

One of the functions of correlational research was to analyze associations. If a strong enough relationship between variables can be established, typically identified with a *p*-value <.05, a researcher can associate an outcome based on the input value (Creswell, 2002; Frankel, Wallen, & Hyun, 2015; Muijs, 2011; Salkind, 2017). The data had to meet some pre-conditions before the researcher could have confidence in the Pearson correlation, *t*-test, and regression analysis output. Failing to check these assumptions could cause issues with the estimated coefficients and standard errors of the output (Chen, Ender, Mitchell, & Wells, 2003; Muijs, 2011). Therefore, the research plan included tests to ensure the data met the necessary standards. As the research plan included using Pearson correlations, *t*-tests, and regression analysis, there were four key assumptions that required testing: linearity, homoscedasticity, normality, and unusual data. Regression analysis also required checking the additional assumptions of independence and multicollinearity (Chen, Ender, Mitchell, & Wells, 2003; Muijs, 2011).

The first major assumption examined was that the relationship between the independent and dependent variables was linear. If the relationship was not actually linear, then the model would not fit the data correctly, resulting in incorrect output (Chen, Ender, Mitchell, & Wells, 2003; Muijs, 2011). To test this assumption, the researcher used SPSS to plot the data points on a scatterplot, and then examined the scatterplots for evidence of a straight line. When the scatterplot showed a straight line, the researcher concluded the relationships were linear.

The second assumption, homoscedasticity, assumed the variance of the residuals was homogeneous compared to predicted values. Residuals equal the observed value of the dependent variable minus the predicted value from the linear regression. The smaller the residuals, the closer the model was able to predict the outcome (Chen, Ender, Mitchell, & Wells, 2003; Muijs, 2011). If the numbers of large residuals comprised greater than 10% of the output, the data may not meet the linearity test, and the researcher would need to examine other methods to achieve this assumption (Muijs, 2011). The researcher plotted the data in a scatterplot and examined the distribution for any distinctive patterns. In a well-fitted model, the variance of the residuals around zero should plot uniformly and randomly, in which case the researcher could conclude the homoscedasticity assumption was satisfied (Chen, Ender, Mitchell, & Wells, 2003).

The researcher next tested if the residuals had a normal distribution, meaning that 95% of them fell between -2.0 and 2.0 standard deviations. This assumption had significant influence on the *p*-values for the *t*-tests that the study performed during this research project. To test for normal distribution of the residuals, the researcher used SPSS to examine the skewness and kurtosis of the data set. The researcher deemed skewness acceptable if it fell within a range of -1.0 to 1.0 and kurtosis was acceptable in a range of -2.0 to 2.0. Further analysis included creating a histogram for a visual representation of the distribution and examining a normal Q-Q plot of the unstandardized residuals. In this manner, the researcher determined the residuals met the condition of being normally distributed (Chen, Ender, Mitchell, & Wells, 2003).

The next assumption the researcher investigated was that of unusual data. One or more data points that were significantly different from the population could have a substantial effect on the Pearson correlation and regression analysis results. There were three ways data could be unusual: outliers, leverage, and influence. Outliers were those data points that had a large residual. Outliers were not necessarily problems, since they might simply indicate a sample peculiarity. However, outliers could also signal other issues, such as data entry errors or similar input problems (Chen, Ender, Mitchell, & Wells, 2003; Muijs, 2011). Leverage was the measurement of how far a data point deviated from the mean of that variable. Such observations could have a disproportionate effect on linear regression coefficient estimates. Finally, a data point had influence if removing the observation substantially changed the coefficient estimates. By using tests designed to measure the three types of differences, the researcher could determine if there was unusual data that might skew the results (Chen, Ender, Mitchell, & Wells, 2003).

The test for unusual data began by with the researcher plotting the data points into a scatterplot and examining the result for outliers to rule out data input or clerical errors. In several instances, the researcher located and corrected such issues. The researcher created a table of standardized residuals, identifying those cases with values greater than 2.0 or less than -2.0 for investigation. The researcher examined Centered Leverage Values for those data points that exceeded $(2k+2)/n$, where k was the number of predictors and n the number of observations. The researcher made an examination of Cook's Distance, which represented a combination of leverage and standardized residuals. For Cook's Distance, the higher the value the more influence that point had. The researcher looked for results greater than 4/*n*, where *n* was the number of observations.

The researcher examined the results looking for points that met all three tests. Any data points that met all three tests could skew the regression results; so, the researcher intended to eliminate them (Chen, Ender, Mitchell, & Wells, 2003). Due to district clerical errors and missing information, the researcher removed from the data set 11 districts that failed all three tests. The researcher believed that eliminating these districts had little impact on the subsequent testing, as the they made up a small percentage of all districts in the study.

Regression analysis required the data set met two additional assumptions, the first of which was independence. The assumption of independence involved ensuring the errors from one observation were not correlated with errors from other observations. This issue could occur if the study included data on the same variables over time, much as this study planned to do. The researcher examined the Durbin-Watson statistic to test for correlated residuals. The researcher deemed this assumption violated if the Durbin-Watson statistic showed a value below 1.0 or above 3.0. Successful results from the Durbin-Watson statistic provided assurance regarding compliance with the independence assumption (Chen, Ender, Mitchell, & Wells, 2003).

Multicollinearity was the next assumption the researcher examined, concluding that this assumption was violated when two variables were nearly perfect linear combinations of one another (Chen, Ender, Mitchell, & Wells, 2003). A strong correlation between the predictor variable or the independent variables created issues in estimating the relationship between the dependent and independent variables. The goal was for the predictor variables being orthogonal, meaning they were statistically independent; thereby, allowing each variable to contribute efficiently to the estimation model. Muijs (2011) suggested that when there existed a strong correlation between variables, the researcher should consider combining variables.

While the focus of this study involved regression analysis, multicollinearity was not necessarily a requirement for obtaining usable results in the context of this study's purpose. Gujarati (2004) indicated the effect of high multicollinearity included having ordinary least squares regression estimators with large variances and covariances, and that the *t*-statistic of one or more of the coefficients would tend to be statistically insignificant. However, R^2, the overall goodness-of-fit measure, can still be very high. If the purpose of the regression analysis included prediction or estimation, then multicollinearity would not be a serious problem because higher R^2 meant the prediction was better (Gujarati, 2004). Christopher Achen (1982) noted:

> Beginning students of methodology occasionally worry that their independent variables are correlated – the so-called multicollinearity problem. But multicollinearity violates no regression assumptions. Unbiased, consistent estimates will occur, and their standard errors will be correctly estimated. The only effect of multicollinearity is to make it hard to get coefficient estimates with small standard error. But having a small number of observations also has that effect, as does having independent variables with small variances. (In fact, at a theoretical level, multicollinearity, few observations and small variances on the independent variables are essentially the same problem.) Thus "What should I do about multicollinearity?" is a question like "What should I do if I don't have many observations?" No statistical answer can be given. (p. 82-83)

Since one focus of the researcher's study was estimation, multicollinearity made identifying specific variables' impact on the regression analysis more difficult, yet the combination of these highly correlated variables could improve the equation's fit as reflected in an increased R^2. The researcher did not eliminate the variables with high correlations, instead relying on the R^2 results to determine which variables multicollinearity became an issue. This was accomplished using a two-step process. First, the researcher ran the original regression equations with all variables and noted the R^2. This was followed by a second regression equation, called the "parsimony model", where the researcher tested for the least complex model of variables that could generally explain the data set, as determined by the highest R^2. The focus was on finding a balance between trying to capture the highest R^2 value with the least number of variables (Bingham & Fry, 2010). In this manner, the researcher was able to determine the most efficient estimation equation, with the highest goodness-of-fit.

Having tested the data to determine how well it met the basic assumptions necessary to conduct the planned study, the researcher examined the data to ensure it was representative. The researcher reviewed the eleven variables used in the study, examining the mean and standard deviations for districts with service consolidation arrangements, districts without service consolidation arrangements, and all districts in the study. The researcher conducted this examination using the most recent data from fiscal year 2017, with outcomes reflected in Table 4.1. The researcher studied the results for discernable patterns or variances that might indicate the two samples were not representative of the universe of all districts included in the study. The results indicated the samples were representative of all districts in the study.

The researcher next examined the two samples of LEAs against the data set population for four characteristics commonly encountered during the literature review of: 1) urbanicity,

2) district enrollment size, 3) student socioeconomic status, and 4) student racial and ethnic composition (DeLuca, 2013). The study did this by comparing the distributions of these characteristics for districts with service consolidation arrangements, districts without service consolidation arrangements, and all districts in the study. The purpose of this examination was to gain a richer understanding of the data, the samples, and all districts in the study.

The researcher based the LEA's *urbanicity* upon the "urban-centric locale" classification published by the National Center for Educational Statistics (2015) Common Core of Data and included in the CEPI data sets. Those classifications contained four categories: 1) city, 2) suburban, 3) town, and 4) rural. The study measured *District enrollment size* by the 2017 district student enrollment included in the CEPI data sets and placed districts into one of six enrollment size categories: 1) <= 500; 2) 501 – 2,500; 3) 2,501 – 5,000; 4) 5,001 – 10,000; 5) 10,001 – 15,000; 6) 15,000+. *Student socioeconomic status* was determined by measuring each districts' percentage of students qualified to receive free and reduced lunch in 2017 in the CEPI data set. The study divided district socioeconomic status into five categories: 1) <= 20%; 2) 21% - 40%; 3) 41% - 60%; 4) 61% - 80%; 5) >= 81%. In a similar manner, the study categorized districts based upon their *student racial and ethnic composition*, using the percentage of African American students reported in the 2017 CEPI data set. The data placed districts into four categories: 1) <= 1%; 2) 2% - 5%; 3) 6% - 33%; 4) >= 34%. The researcher then compared the sample distributions of these characteristics against the total study's distribution to examine representativeness, and to assist the researcher in identifying patterns during later data analysis.

As expected, the sample distributions compared reasonably against each other and against the state's distribution in each of the tested variables. In the event the distributions were not comparable, the researcher anticipated investigating for potential errors before concluding one of the samples was not representative but did not encounter this problem. With a solid data set established, the researcher used SPSS to analyze the data at the different non-instructional functional areas to determine preferred staffing levels and corresponding costs, while differentiating between consolidated and non-consolidated service districts.

Using descriptive statistics and frequencies, the researcher explored the relationships between staffing levels at each of the non-instructional support services as compared to the model of independent variables. The dependent variable was the FTE at each of the functional areas per district, as compared to the independent variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function. The researcher used the descriptive statistics of central tendency, variability, and frequency to classify and summarize the FTE as compared to the independent variables. Analysis began with the central tendency tests of means, medians, and modes to help describe the data, reporting the results using tables. To understand better the distribution of the data points, the researcher conducted tests of variability, specifically range, standard deviation, and variance, and reported the results using tables. The researcher concluded with an examination of frequency distribution by using histograms to assist in the examination of the data's modality, skewness, and kurtosis.

To assist with understanding and familiarization of the data, the researcher examined whether there was a correlation between the FTE and the independent variables using a product moment correlation coefficient, or Pearson correlation exercise. This allowed the researcher to determine what relationship existed between FTE by function and the model variables. The researcher reported the results using a correlation matrix that included the *r*-coefficient, sample size, and *p*-values, and provided scatterplots with a regression line for visual depiction.

The researcher anticipated the next step in the research plan would answer the first research question:

1) *When examining FTE by functional area at the district level of non-instructional support services, are the variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function statistically different in consolidated service arrangements as opposed to non-consolidated service arrangements?*

The researcher subjected each of the non-instructional support service areas identified in Table 3.2 to an independent samples *t*-test to determine what services showed statistically significant changes in FTE between consolidated and non-consolidated services. This test was conducted once for each service, for each year in the study. In this study, the researcher aggregated the independent variables into logical subsets, then used tables to report the *t*-test results comprising sample size, *t*-value, degrees of freedom, and *t*-critical items. Also reported were the mean and standard deviation for each of consolidated districts and non-consolidated districts groups. The researcher placed the results of these tests into tables and used them to answer research question one.

Using the *t*-test results that included degrees of freedom, mean, and standard deviation, the researcher calculated Cohen's *d* to estimate the effect size of any results that reported significance. The researcher computed Cohen's *d* using the means and standard deviations from the *t*-test results for independent samples. Effect size measurements allowed the researcher to estimate how different the two groups were, which helped evaluate the magnitude of the effect that the variables exerted (Salkind, 2017). Effect size reported the relative position of one group to another, with smaller effect size scores indicating the two groups were very similar and overlapped to a large degree. Similarly, the larger the effect size score, the less the two groups overlapped (Dunlap, 1999; Salkind, 2017).

The researcher intended this study for use by field practitioners who are not always deeply trained in statistical methods. To facilitate discussion, the researcher interpreted the effect size results using McGraw and Wong's (1992) index of effect size. This index, called the common language effect size indicator, showed the probability that a random score from one of the *t*-test groups would be larger than a random score from the second *t*-test group. While McGraw and Wong (1992) provided a method for using means and standard deviations to calculate the index, Dunlap (1999) expanded upon their method by showing how Cohen's *d* results could also be used to calculate the common language effect size indicator. The researcher identified the common language effect size indicator as an easy to understand method for discussing the results without the need for an expertise in statistics.

The descriptive statistics, Pearson correlation exercise, and *t*-test analyses did not hold constant many other variables that influence FTE, so the researcher next conducted a series of cross-section regression analyses designed to answer the second research question:

> 2) *Is FTE by functional area at the district level of non-instructional support services associated with the model of independent variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, PP Benefits by function, consolidated school districts, and non-consolidated school districts?*

The cross-sectional regression analysis included examining the effect that the model independent variables had on the dependent variable of FTE by function at the district level, thereby answering the second research question. Using this model allowed the researcher to analyze the panel data sets in a manner designed to isolate relationships between districts during a specific period of time. This series of regression analyses allowed the researcher to identify which variables were associated with FTE, and which variables explained the magnitude of the variability of FTE, after controlling for several common control variables.

The researcher conducted this examination for each functional area using data from 2017, by means of the following equation:

$$FTE_i = \alpha_i + \beta_1 Con_i + \mathbf{SDstructure}_i\beta_2 + \beta_3 Found_i + \beta_4 Enroll_i + \beta_5 PPE_i \quad (1)$$

$$+ \beta_6 Wages_i + B_7 Ben_i + \mu_i$$

where:

FTE	= full time district staffing equivalent for a specific service
i	= school districts (i=1-538)
Con	= district consolidates service in target year (Dummy)
SDstructure*i*	= a vector of school district characteristics (control variables)
	• Enrollment^2
	• Total Revenue Per Pupil
	• Taxable Value Per Pupil
	• % Free & Reduced Lunch
	• Educational Attainment
Found	= Foundation Allowance
Enroll	= Enrollment
PPE	= PP Expenditures by function
Wages	= PP Wages by function
Ben	= PP Benefits by function
μ	= unobserved error

The focus variable of Con_i was a dummy variable, where a value of 1 was assumed when service consolidation had occurred in district *i*. $\mathbf{SDstructure}_i$ was a vector of structural characteristics of district *i* that could affect district resource usage. Including these known characteristics reduced the error created by unobserved characteristics. Monk & Hussain (2000) suggested the district characteristics of per pupil expenditures, per pupil property wealth, percentage of students qualified for free and reduced lunch, and the district size measured by enrollment all impacted resource allocation. Since staffing costs compromised a notable portion of district expenditures, the researcher examined these same characteristics in relation to FTE. A quadratic term for district enrollment was included to ensure the capture of any scale effects caused by size. The study measured educational attainment using the percent of residents age 25 or older with at least a high school diploma to capture any influence that local resident educational status might have on residents' influence in convincing districts to provide services. By including these known characteristics as part of the equation, the researcher reduced the error created by unobserved characteristics. This allowed the researcher to estimate the differences between districts with consolidated service arrangements, as compared to districts without such arrangements. This also allowed the researcher to identify relationships between the model variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function in an effort to determine the degree of influence each variable of interest had on FTE by function at the district level. For this research project, the researcher conducted four models (1-year x 4 services) using Equation 1.

While a cross-sectional regression analysis provided insight into estimating FTE changes *between districts* during a specific period, it did not control other factors that might influence staffing *within districts*. Cross-sectional regression analysis was a powerful tool, but it was subject to possible omitted variable bias (Dranove, 2012). The researcher believed the data set was sufficiently rich that any unobservable variables would become part of the regression noise, thereby offsetting any omitted variable bias. However, one cannot be certain that was the case; therefore, the researcher turned to another technique designed to address omitted variable bias.

The two regression techniques that offered the best chance to address omitted variable bias for this study was either a *random effects model* or a *fixed effects model*. The decision on which model to use depended upon whether there exist omitted variables that might be correlated to the explanatory variables in the model. In studies where there were no omitted variables, or the omitted variables were not correlated to the explanatory variables, a random effects model offered unbiased estimates of coefficients and produces the smallest standard errors. However, if it was possible there were omitted variables with correlations to the explanatory variables, a fixed effects model offered the better model as it allowed for controlling time invariant and unobservable factors (Dranove, 2012; Wooldridge, 2010).

A fixed effects model allowed the researcher to identify relationships over time and across units of observation while offering two advantages over other model choices. First, by measuring same-district time-varying variables across time, each district became its own control group. Second, the model controlled for unobserved variables and stable characteristics that may or may not be measurable. The fixed effect model, because it used each district as its own control, allowed for before and after service consolidation analysis, while controlling for time invariant and unobservable factors such as geographic location, dispersion, and community preferences (DeLuca, 2013; Dranove, 2012; Wooldridge, 2010).

Those unobservable factors may well have existed in this study; therefore, the researcher chose the fixed effects model as it appeared to be the more conservative approach. A fixed effects regression model allowed the researcher to estimate how much the FTE by function changed. It also permitted the researcher to determine whether the presence of a service consolidation arrangement was statistically significant. This section of the investigation answered the following research question:

3) *Does consolidation play a significant role in the model's ability to predict FTE by functional area over time at the district level for non-instructional support services?*

In the fixed effects model, the FTE was the dependent variable for estimating the service-specific spending influences within districts, using the following equation:

$$FTE_{jit} = \alpha_i + \beta_1 Con_{ji} + \mathbf{SDstructure}_{it}\beta_2 + \beta_3 Found_{it} + B_4 Enroll_{it} \quad (2)$$

$$B_5 PPE_{it} + \beta_6 Wages_{it} + \beta_7 Ben_{it} + I_t + \theta_i + \mu_{it}$$

where:

FTE	= full time district staffing equivalent for a specific service
j	= functional service area per Table 3.2
i	= school districts (i=538)
t	= year
Con	= district consolidate (Dummy) (*Equation 2*)
SDstructure	= a vector of school district characteristics (control variables) • Enrollment^2 • Total Revenue Per Pupil • Taxable Value Per Pupil • % Free & Reduced Lunch • Educational Attainment
Found	= Foundation Allowance
Enroll	= Enrollment
PPE	= PP Expenditures by function
Wages	= PP Wages by function
Ben	= PP Benefits by function
I	= a vector of years to capture unobserved characteristics that vary over time but are common to all districts (dummy)
θ	= unobserved district characteristics that are stable over time
μ	= unobserved error

Equation 2 was a fixed effects model that measured the FTE for each support service *j* in district *i* in year *t*. Con was a dummy variable with a value of 1 if a service consolidation existed for functional area *j* in district *i*. $\mathbf{SDstructure}_{it}$ was the vector of control variables included in Equation 1. Including these known characteristics reduced the error created by unobserved characteristics. Vector *I* was a set of dummy variables that collected any systemic influences not accounted for by the observable inputs that varied over time but were common to all districts. θ_i was a fixed effect that collected all unobserved characteristics that were stable over time. The researcher estimated each functional service area once, using data from 2014 through 2017.

Once again, the researcher noted that the movement of districts into and out service consolidation arrangements during 2012 through 2017 created issues with having sufficient *n*-sizes of consolidated districts to obtain usable results. The researcher identified the period of 2014 through 2017 as having the best balance of adequate *n*-sizes of consolidated districts while covering the longest period possible. Additionally, this range included the most recent period, offering results that were more indicative of current conditions.

The focus was the dummy variable Con_{ji}, which assumed a value of 1 for districts that had consolidated that particular service *j* in district *i*. The expectation was Con_{ji} would show a statistically significant negative value for those functional areas where service consolidation had occurred. If Con_{ji} showed a positive or statistically insignificant value, this suggested the service consolidation failed to reduce the staffing in that area, even though service consolidation existed.

In instances where the fixed effects regressions using formula 2 showed Con having statistical significance, the researcher investigated further to determine what impact consolidated service arrangements versus non-consolidated service arrangements had on FTE by function at the district level. This section of the investigation answered the following research questions:

4) *Does a model regarding school consolidation of non-instructional support services predict FTE by functional area over time at the district level?*

5) *Does a model regarding the lack of school consolidation of non-instructional support services predict FTE by functional area over time at the district level?*

The researcher conducted these tests using a fixed effects model similar to Equation 2, absent the dummy variable Con. FTE by function at the district level was the dependent variable for estimating the service-specific spending influences within districts, using the equation three:

$$FTE_{jit} = \alpha_i + \mathbf{SDstructure}_{it}\beta_1 + \beta_2 Found_{it} + B_3 Enroll_{it} + B_4 PPE_{it} + B_5 Wages_{it} + \beta_6 Ben_{it} + I_t + \theta_i + \mu_{it} \quad (3)$$

where:

FTE	= full time district staffing equivalent for a specific service
j	= functional service area per Table 3.2
i	= school districts (i=unknown)
t	= year
SDstructure	= a vector of school district characteristics (control variables) • Enrollment^2 • Total Revenue Per Pupil • Taxable Value Per Pupil • % Free & Reduced Lunch • Educational Attainment
Found	= Foundation Allowance
Enroll	= Enrollment
PPE	= PP Expenditures by function
Wages	= PP Wages by function
Ben	= PP Benefits by function
I	= a vector of years to capture unobserved characteristics that vary over time but are common to all districts (dummy)
θ	= unobserved district characteristics that are stable over time
μ	= unobserved error

Equation 3 was a fixed effects model that measured the FTE for each functional area *j* in district *i* in year *t*. $\mathbf{SDstructure}_{it}$ was the same vector of control variables included in Equations 1 and 2. The model variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function were once again included. Vector *I* was a set of dummy variables that collected any systemic influences not accounted for by the observable inputs that varied over time but were common to all districts. θ_i was a fixed effect that collected all unobserved characteristics that were stable over time. The researcher tested twice each functional service area where Con had statistical significance in Equation 2. The first iteration used the same data from Equation 2 filtered to include districts with consolidated service arrangements. The researcher used the results to answer research question four. The second iteration used the data from Equation 2 filtered to exclude districts with consolidated service arrangements. The researcher used the results to answer research question five.

Research Ethics

Acknowledging that participation in this research study by school district administrators might open them up to criticism or potential harm, the researcher practiced appropriate research ethics throughout the study. The researcher was initially certified in the University of Michigan – Flint's eResearch training module: Human Subjects- Social and Behavior. The researcher was subsequently certified in the University of Michigan – Flint's Program for Education and Evaluation in Responsible Research and Scholarship training module: Responsible Conduct of Research and Scholarship Training. The researcher obtained authorization from the Institutional Review Board (IRB) of the University of Michigan – Flint and the approval letter included in Appendix A indicated this study was exempt from IRB regulations as it was considered non-regulated. The researcher practiced appropriate research ethics throughout the study.

The researcher received permission from CEPI to access the district level data, with the approval letter included in Appendix B. As a prerequisite, the researcher agreed to the following: "This research project used data collected and maintained by MDE and/or Michigan's Center for Educational Performance and Information. Results, information, and opinions solely represent the analysis, information, and opinions of the author and have not been endorsed by, or reflect the views or positions of, grantors, MDE and CEPI or any employee thereof" (D. Judd & P. Howell, personal communication, March 27, 2018).

Chapter Summary

In this chapter, the researcher explained the problem statement, research questions, and methodological design of the study. The study provided a review of the theory and practice behind the correlational research design. The researcher followed this by exploring the rationale behind the selection of this methodology, including the use of descriptive statistics and regression analysis. The researcher reviewed data collection sources and techniques used in the research, along with an in-depth discussion of how the data was analyzed. Finally, the researcher reviewed and explained the ethical implications of the research, and the researcher's methods for alleviating them discussed.

CHAPTER FOUR

ANALYSIS AND FINDINGS

This analysis and findings chapter provided the results and outlined the limitations of the researcher's predictive correlational research study, investigating the relationships between non-instructional support staffing and district-specific variables, such as per pupil expenditures, foundation allowance, district size as measured by enrollment, and district demographics. This chapter included all analyses of the statistical procedures conducted using IBM's SPSS (SPSS) software. The sections were subdivided to address each research question separately, beginning with examining the underlying assumptions, continuing with descriptive statistics to explore the sample and characteristics, and followed by findings and analyses for each research question.

Preliminary Analysis

The data analyses began with tests designed to determine whether the data met the assumptions of normality, linearity, homoscedasticity, multicollinearity, outliers, and residual errors. The preliminary analysis of the data set indicated several outliers that could not be explained by the researcher's data entry mistakes. Upon examination, several districts had clear errors in their Center for Educational Performance and Information (CEPI) submissions, which fell into one of two types. The first common error was districts reporting zero in the Full Time Equivalent (FTE) field, yet also reporting wages and benefits in the expenditure fields. This error was likely due to the district data-entry person being unfamiliar with the reporting procedures for the Registry of Educational Personnel (REP) database and thereby entering incomplete information (Center for Educational Performance and Information, 2019). The researcher removed these districts from the data set, as inclusion would skew the results.

The second common error was districts recording sizeable consolidated services expenditures yet reporting few or no FTE for that function. This occurred most often in Function 260 – Operations and Maintenance Services and Function 270 – Transportation Services. In these instances, the researcher examined each district's state-mandated transparency reporting webpages for evidence supporting a non-instructional support service arrangement. In every case, the researcher found evidence that the district had privatized the service but had not included the privatized workers' FTE in their REP data submission. The researcher removed those districts from the data set to avoid skewing the results. In total, the researcher removed eleven out of the 538 total districts in the state, or 2% of total number of Local Education Agencies (LEAs), comprising approximately 10.8% of the state's student enrollment.

Following the researcher's investigation and reduction of outlier errors, the variable of FTE continued to exhibit heteroscedasticity. The researcher noted that 32.4% of Michigan LEAs reported 500 students or less, while 56.6% reported enrollment of 1,000 or less. Once a smaller-sized district hired an employee for a specific function, the district was unlikely to employ a second person until it reached a significantly larger size, thereby causing the skewing. To address this inherent skewing of the data, the researcher turned to data transformation techniques for the dependent variable. Pek, Wong, and Wong (2018) and Manikandan (2010) observed that data transformation was the most often used method for addressing heteroscedasticity issues.

Osborne (2011) noted that transforming data points that were negative, or that fell between zero and one, would have less than desirable results. Negative numbers and zero often could not be transformed using common methods, such as logarithmic or squaring, in a manner that provided meaningful results. Osborne (2011) recommended data originally anchored at zero, such as the data in this study, have a constant applied by simply adding 1.0 to the variable value. This effectively shifted the variable's anchor point from zero to 1.0, allowing for better results when a data transformation method was applied. Applying the constant shifted the data's mean, yet left untouched the standard deviation, variance, skewness, and kurtosis (Osborne, 2011). The researcher anchored the variable of FTE by function at the district level using the following formula: original FTE + 1.0 = revised FTE. The researcher tested several data transformations, settling on the logarithmic base 10 scale, or Log_{10}, as having the best fit.

Sample. To examine representativeness of the data set, the researcher used descriptive statistics to provide a broad and basic analysis. The initial analysis of the eleven variables used in the study calculated the mean and standard deviations for districts with service consolidation arrangements, districts without service consolidation arrangements, and all districts in the study. This assessment used the most recent data from fiscal year 2017, with results reported in Table 4.1 and Appendix D. In 2017, the researcher identified 108 districts with at least one service consolidation, identified 419 districts with no service consolidation arrangements, and discarded 11 districts due to data quality issues. As a result, the researcher's study examined 527 of the 538 districts in the state, or 98% of the population.

A review of Table 4.1 indicated that the study's variables exhibited no discernable patterns when examining consolidation of services versus non-consolidation of services, or when comparing either group to all the districts in the study, except for PP Wages and PP Benefits. The lower means and standard deviations of these employment costs for the districts with consolidated service arrangements was not unexpected, as the premise of service consolidation relied upon the district shedding employee costs that were shifted to another entity, such as the Intermediate School District (ISD). The district then paid for those services through a contractual service agreement, with the costs showing up as increased non-employee expenses.

Table 4.1

Representativeness of Sample - 2017

Variables	Non-consolidated Districts (*n*=419)	Consolidated Districts (*n*=108)	All Districts (*n*=527)
FTE – Staffing			
M	0.78	0.85	0.78
SD	0.54	0.71	0.55
Foundation Allowance			
M	7,700	7,712	7,701
SD	581	616	582
Enrollment Size			
M	2,476	2,434	2,474
SD	2,564	3,036	3,586
PP Expenditures			
M	487	610	492
SD	486	419	484
PP Wages			
M	188	68	183
SD	205	106	203
PP Benefits			
M	123	49	120
SD	142	80	141
Enrollment-squared			
M	12,707,690	15,078,714	12,808,201
SD	31,078,294	47,718,226	31,952,595
Total Revenue Per Pupil			
M	11,110	11,387	11,122
SD	3,973	4,979	4,020
Taxable Value Per Pupil			
M	316,549	322,995	316,822
SD	551,781	375,979	545,438
% Free & Reduced lunch			
M	47	50	47
SD	18	17	18
Educational Attainment			
M	34	35	34
SD	8	7	8

The researcher next examined the two samples of LEAs against the group of all districts in the study for four characteristics commonly encountered during the literature review: 1) urbanicity, 2) district enrollment size, 3) student socioeconomic status, and 4) student racial and ethnic composition. The researcher did this by using 2017 data to compare the distributions of these characteristics for LEAs with service consolidation arrangements, districts without service consolidation arrangements, and all districts in the study. The purpose of this examination was to gain a richer understanding of the data. The *n*-size of districts without service consolidation arrangements made up 80% of the districts in the study, with the characteristics of the two groups showing comparable results. For clarity purposes, Table 4.2 only showed the characteristics data of the consolidated service districts and for all districts included in the study.

An LEA's urbanicity was based upon the "urban-centric locale" classification published by the National Center for Educational Statistics (NCES) and included in the CEPI data sets (CEPI, 2016). Those classifications contained four categories: 1) city, 2) suburban, 3) town, and 4) rural, each with three sub-categories. The "Percent Difference" column of Table 4.2 showed that the variation between districts with service consolidation arrangements and all districts included in the study was 8% or less. In order to determine how well the percentages of the sample (n = 108) reflected the percentages of the population (n = 527) in terms of distributions, a one-sample chi-square goodness-of-fit test was conducted with the null hypothesis being the proportion of LEAs in each urbanicity category shown in Table 4.2 was equal. The chi-square analysis showed that that the urbanicity of consolidated service districts reflected the urbanicity of all districts in the general population of all districts, X^2 (10, N=108) = 5.81, p = .831.

Panel two of Table 4.2 showed the enrollment sizes for districts with service consolidation arrangements were within 6% of the enrollment size for all districts included in the study, an indication that the service consolidation sample was representative of all districts included in the study. In order to determine how well the percentages of the sample (n = 108) reflected the percentages of the population (n = 527) in terms of distributions, a one-sample chi-square goodness-of-fit test was conducted with the null hypothesis being the proportion of LEAs in each enrollment size category shown in Table 4.2 was equal. The chi-square analysis showed that that the enrollment of consolidated service districts reflected the enrollment of all districts in the general population of all districts, X^2 (5, N=108) = 8.73, p = .12.

Panel three suggested the LEA sample for district with consolidated service arrangements was not representative of all school districts included in the study in terms of racial and ethnic makeup, based upon the percentage of African American students. In order to determine how well the percentages of the sample (n = 108) reflected the percentages of the population (n = 527), a one-sample chi-square goodness-of-fit test was conducted with the null hypothesis being the proportion of LEAs in each ethnicity category in Table 4.2 was equal. The chi-square analysis showed that that the ethnicity of consolidated service districts did not reflect the ethnicity of all districts in the general population of all districts, X^2 (3, N=108) = 10.46, $p < .05$. This likely occurred due to one of the districts eliminated from the study due to data issues included Detroit Public Schools, the largest district in the state, along with several surrounding districts. These districts reported a higher percentage of African American students than the rest of the state and may offer further opportunities for research.

The final panel suggested the LEA sample for districts with consolidated service arrangements was representative of all LEAs in the study as measured by socio-economic status based upon the number of students qualified for free-or-reduced-price lunch. In order to determine how well the percentages of the sample (n = 108) reflected the percentages of the population (*n* = 527) in terms of distributions, a one-sample chi-square goodness-of-fit test was conducted with the null hypothesis being the proportion of LEAs in each free-or-reduced-price lunch category shown in Table 4.2 was equal. The chi-square analysis showed that there was no difference in poverty, as measured by free-or-reduced-price lunch participants between LEAs with consolidated services and all LEAs The chi-square analysis showed that that the poverty levels, as measured by free-or-reduced lunch participants, of consolidated service districts reflected the poverty levels of all districts in the general population of all districts, X^2 (4, *N*=108) = 3.18, *p* = .53.

An examination of Table 4.2 indicated that urbanicity, enrollment size, and **s**ocioeconomic status exhibited no discernable patterns when examining consolidation of services. However, 89% of the consolidation of services occurred in districts with 5,000 or fewer students, with over 71% occurring in districts with 2,500 students or less. The results appeared consistent with the findings of Andrews, Duncombe, and Yinger (2002) who found districts of 500 or less pupils had sizeable potential cost savings when moving towards a district size of 2,000 to 4,000 students. This study focused on whole-district mergers and provided some evidence regarding how district size might relate to efforts at achieving economies of size. In such an environment, less invasive methods of achieving cost efficiencies, such as service consolidation, could be an attractive alternative. This suggested that smaller districts might find consolidation for support services attractive, since small districts might not need full time workers in all functional areas, thus making consolidation an option for accessing the services of these uniquely trained experts.

Table 4.2

*Characteristics of Study Samples - 2017**

Characteristics	Service Consolidation Number of Districts	Service Consolidation Percent	Statewide Districts Number of Districts	Statewide Districts Percent	Percent Difference
Urbanicity					
City	8	7.41%	30	5.69%	1.71%
Suburban	36	33.33%	141	26.76%	6.58%
Town	18	16.67%	89	16.89%	-0.22%
Rural	46	42.59%	267	50.66%	-8.07%
Enrollment Size					
<=500	15	13.9%	91	17.3%	-3.4%
501-2,500	62	57.4%	269	51.0%	6.4%
2,501-5,000	20	18.5%	112	21.3%	-2.7%
5,001-10,000	7	6.5%	45	8.5%	-2.1%
10,001-15,000	2	1.9%	8	1.5%	0.3%
15,000+	2	1.9%	2	0.4%	1.5%
% African American					
<=1%	56	51.9%	334	63.4%	-11.5%
2%-5%	14	13.0%	75	14.2%	-1.3%
6%-33%	28	25.9%	84	15.9%	10.0%
>=34%	10	9.3%	34	6.5%	2.8%
% Free & Reduced lunch					
<=20%	6	5.6%	46	8.7%	-3.2%
21%-40%	22	20.4%	125	23.7%	-3.3%
41%-60%	48	44.4%	229	43.5%	1.0%
61%-80%	28	25.9%	110	20.9%	5.1%
>=81%	4	3.7%	17	3.2%	0.5%

* Based on 108 LEAs with at least 1 service consolidation arrangement and 527 total LEAs.

Descriptive statistics. To gain a better understanding of the makeup of school districts in Michigan, the researcher reviewed each functional area to determine the number of districts with and without consolidated service arrangements. Table 4.3 reported the results of this review for each year in the study, 2012 through 2017. This table recognized the ever-evolving world of school district service consolidation, along with that of school mergers and dissolution, in a summarized manner. It made no distinction between why districts changed their consolidation decisions between years, which could include things like entering into a new service arrangement, departing from an existing arrangement, or dissolving the entire district.

During the examination, the researcher noted the small *n*-sizes of the districts that had consolidated services in Functions 220: Instructional Support Services, Function 230: General Support Services, and Function 240: School Administration. Clarke and Wheaton (2007) conducted a literature review where they noted there was little consensus on the minimum group sizes needed for dependable fixed effects regression analysis, with 15 to 30 observations per group the rule of thumb. Several studies indicated observations of between 10 and 30 per group were the minimum required for using the more advanced regression techniques (Bryk & Raudenbush, 1992; Kreft & de Leeuw, 1998; Mass & Hox, 2004; Raudenbush & Sampson, 1999). To obtain adequate R^2 measurements, Harrell (2015) suggested a minimum of 15 observations per group for every 100 cases in the data set, noting that smaller sample sizes tended to reduce the estimating ability of the model. Based on the body of existing research, the researcher set a minimum *n*-size of 15 for this study. As a result, the researcher removed functions 220, 230, and 240 from the study, concluding the *n*-sizes of consolidated districts were too small to provide usable results from the more advanced techniques used in the study.

Table 4.3

District n-size by Function 2012 - 2017

Year and Group	220 Support Svcs-Inst	230 Support Svcs-General	240 School Admin	250 Bus-iness Svcs	260 Opns & Maint	270 Trans	280 Central Support
2012							
n-size: Consolidated	1	7	2	7	44	21	18
n-size: Non-Consolidated	471	512	510	436	466	471	373
n-size: Total	472	519	512	443	510	492	391
2013							
n-size: Consolidated	6	3	1	12	54	25	15
n-size: Non-Consolidated	465	516	510	430	454	462	382
n-size: Total	471	519	511	442	508	487	397
2014							
n-size: Consolidated	7	1	1	18	52	29	15
n-size: Non-Consolidated	452	516	508	417	443	440	379
n-size: Total	459	517	509	435	495	469	394
2015							
n-size: Consolidated	4	3	2	17	62	33	16
n-size: Non-Consolidated	451	510	509	394	422	419	361
n-size: Total	454	513	511	411	484	452	377
2016							
n-size: Consolidated	2	2	0	16	48	27	21
n-size: Non-Consolidated	447	513	505	386	417	404	351
n-size: Total	449	515	505	402	465	431	372
2017							
n-size: Consolidated	2	3	0	17	64	28	20
n-size: Non-Consolidated	453	513	502	396	403	401	359
n-size: Total	455	516	502	413	467	429	379

The researcher used descriptive statistics to contextualize the relationships between staffing levels and service consolidation across the four key functional areas remaining in the study. The researcher examined findings of central tendency, variability, and frequency, with Tables 4.4 through 4.6 and Appendix D reporting those results. Table 4.4 reported descriptive statistics for all Michigan LEAs in the study, with data stratified by their function codes. Table 4.5 reported descriptive statistics for those districts with consolidated service arrangements in 2017, while Table 4.6 reported descriptive statistics for those districts without consolidated service arrangements in 2017. Figure 4.1 included selected histograms for the four critical functional areas in the study. Following the $\log_{10}$ transformations, the histograms showed normal distributions for all functional areas. The following discussion focused on the descriptive statistics in Table 4.4 through Table 4.6, along with the histograms in Figure 4.1.

Table 4.4

Descriptive Statistics FTE Log$_{10}$ by Function – All Districts (2017)

Statistic	Function 250 (*n*=413)	Function 260 (*n*=467)	Function 270 (*n*=429)	Function 280 (*n*=379)
Mean	0.55	0.97	0.93	0.57
Median	0.58	1.00	1.00	0.60
Mode	0.30	0.30	0.30	0.30
Std. Deviation	0.36	0.59	0.60	0.50
Variance	0.13	0.35	0.36	0.25
Skewness	-0.35	-0.25	-0.36	-0.17
Kurtosis	1.04	0.01	0.46	0.37
Range	-0.92 – 1.48	-1.10 – 2.67	-1.70 – 2.45	-1.22 – 1.93

Table 4.5

Descriptive Statistics FTE Log_{10} by Function – Consolidated Service Districts (2017)

Statistic	Function 250 (*n*=17)	Function 260 (*n*=64)	Function 270 (*n*=28)	Function 280 (*n*=20)
Mean	0.00	1.18	0.98	0.49
Median	0.00	1.29	1.08	0.54
Mode	0.30	-0.60 [a]	0.30	0.00
Std. Deviation	0.47	0.54	0.71	0.60
Variance	0.22	0.29	0.51	0.36
Skewness	-0.35	-0.78	-0.64	0.66
Kurtosis	-0.14	2.38	0.41	0.50
Range	-0.92 – 0.85	-0.60 – 2.67	-0.64 – 2.32	-0.46 – 1.93

a: Multiple modes exist. The smallest value was shown.

Table 4.6

Descriptive Statistics FTE Log_{10} by Function – Non-Consolidated Service Districts (2017)

Statistic	Function 250 (*n*=396)	Function 260 (*n*=403)	Function 270 (*n*=401)	Function 280 (*n*=359)
Mean	0.58	0.94	0.92	0.57
Median	0.60	0.96	0.99	0.60
Mode	0.30	0.30	0.30	0.30
Std. Deviation	0.33	0.59	0.59	0.50
Variance	0.11	0.35	0.35	0.25
Skewness	-0.04	-0.18	-0.34	-0.23
Kurtosis	0.33	-0.12	0.48	0.41
Range	-0.60 – 1.48	-1.10 – 2.41	-1.70 – 2.45	-1.22 – 1.69

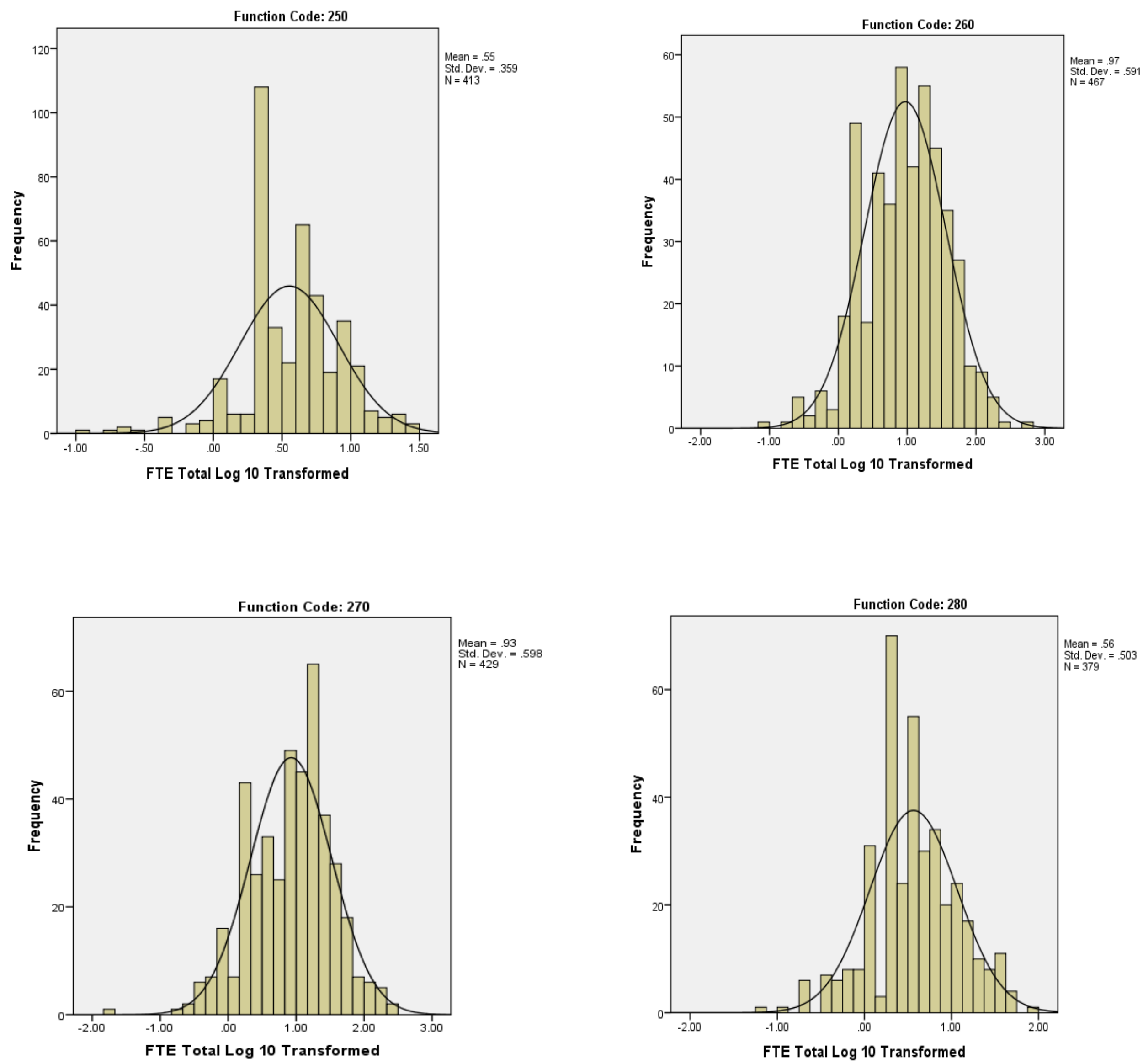

Figure 4.1. Total FTE Histograms for Functions 220 thru 280 (2017)

A review of Table 4.4 indicated there were 413 districts showing activity in Function 250: Business Services in 2017. The same table reported Function 250 was symmetrical and mesokurtic, with skewness and kurtosis scores falling within normal parameters despite its unique histogram shape. The histogram in Figure 4.1 showed a peak at 0.40, followed by a valley at 0.60 and a second peak at 0.70 (Muijs, 2011; Salkind, 2017). Table 4.5 reported 17 districts with consolidation arrangements having a mean FTE of 0.00 ± 0.47. This was lower than that reported of all districts in the study of 0.55 ± 0.36 in Table 4.4. In a similar manner, Table 4.6 reported 396 districts without consolidation arrangements for Function 250, with a mean FTE of 0.58 ± 0.33. With *n*-sizes close to one another, the researcher was not surprised that the FTE means and standard deviations between all districts and those districts without service consolidation arrangements were close to one another.

A review of Table 4.4 indicated there were 467 districts displaying activity in Function 260: Operations and Maintenance Services in 2017. Table 4.4 also indicated Function 260 had a normal distribution that was symmetrical and mesokurtic. The histogram in Figure 4.1 contained peaks at 0.30 and at 0.90, with no notable valleys (Muijs, 2011; Salkind, 2017). Table 4.5 reported there were 64 districts with consolidation arrangements having a mean FTE of 1.18 ± 0.54, which was slightly higher than that reported of all Michigan districts of 0.97 ± 0.59 from Table 4.4. Table 4.6 reported 403 districts without consolidation arrangements for Function 260, with a mean FTE of 0.94 ± 0.59. Once again, the means and standard deviations between all districts and those without service consolidations were close to one another.

Table 4.4 indicated there were 429 districts showing activity in Function 270: Transportation Services in 2017 and that this area had a normal distribution that was symmetrical and mesokurtic. The histogram in Figure 4.1 contained a peak at 0.30 followed by a valley at 0.75 and a final peak at 1.30 (Muijs, 2011; Salkind, 2017). Table 4.5 indicated there were 28 districts with service consolidations, reporting a mean FTE of 0.98 ± 0.71, which was slightly higher than that reported of all Michigan districts of 0.93 ± 0.60 in Table 4.4. Table 4.6 reported 401 districts without consolidation arrangements for Function 270, with a mean FTE of 0.92 ± 0.59. Like the prior service areas, the means and standard deviations between all districts and those without service consolidations were close to one another.

A review of Table 4.4 indicated there were 379 districts showing activity in Function 280: Central Support Services in 2017. Table 4.4 also reported that Function 280 had a normal distribution that was symmetrical and mesokurtic. The histogram in Figure 4.1 revealed small peaks at 0.15, 0.25, and 0.50 (Muijs, 2011; Salkind, 2017). Table 4.5 reported there were 20 districts with service consolidation arrangements having a mean FTE of 0.49 ± 0.60, which was slightly lower than that reported of all Michigan districts of 0.57 ± 0.50 in Table 4.4. Similarly, Table 4.6 indicated there were 359 districts without service consolidation arrangements, with a mean FTE 0.57 ± 0.50. As expected, the means and standard deviations between all districts and those without service consolidation arrangements were close to one another.

Overall, Table 4.4 through Table 4.6 indicated the larger sample of non-consolidated service districts had similar results when compared to all Michigan LEAs included in the study, while consolidated service districts exhibited symmetrical and mesokurtic data universally. Recognizing that most data sets never attain a perfect distribution, the researcher was satisfied with the skewness, kurtosis, and distributions of the data. The researcher cautioned that the data was transformed using $Log_{10,}$ requiring it to be back transformed and re-anchored to zero before applying any results for real world application (Osborne, 2011).

Figure 4.2 displayed the percent of districts that had consolidated services in each of the non-instructional support areas in 2017. The most consolidated service was Function 260: Operations and Maintenance Services at 13.68%, with Function 270: Transportation Services a distant second at 6.51%. Figure 4.2 indicated that districts consolidated Function 280: Central Support Services and Function 250: Business Services at the rate of 5.28% and 4.12% respectively.

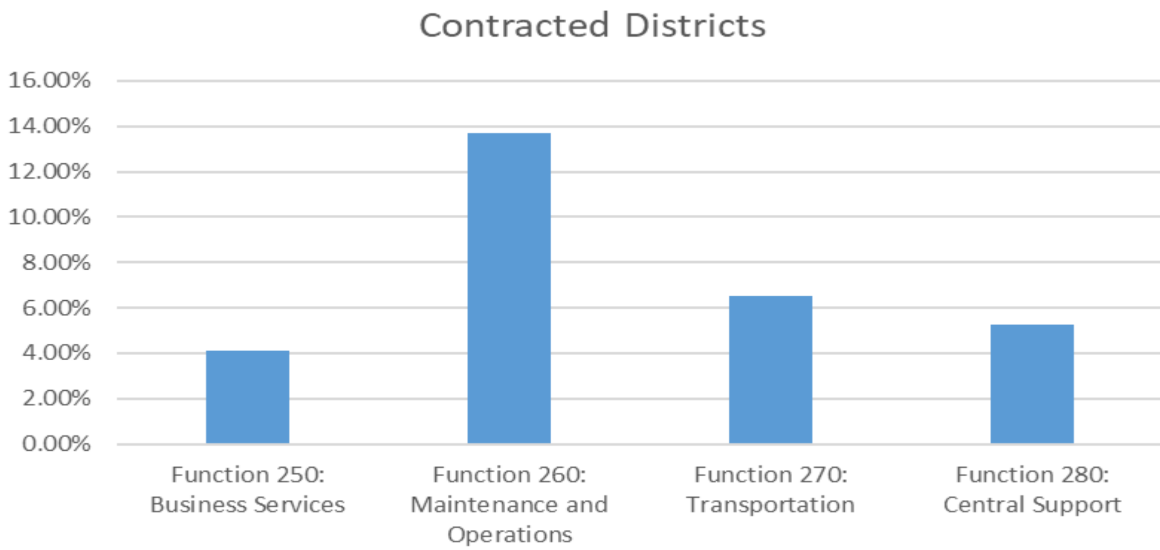

Figure 4.2. Percentage of Districts Consolidating by Service (2017)

Correlation. To gain a better understanding of the data set and its unique relations, the researcher next examined whether there were correlations between the model variables using a product moment correlation coefficient, or Pearson correlation exercise. Of particular interest in this study, the researcher was looking to determine what relationship existed, if any, between FTE by function and the other model variables. The researcher reported the results in the correlation matrixes of Tables 4.7 through Table 4.10, including the *r*-coefficients, sample sizes, and *p*-values. In Table 4.7, the researcher provided the Coefficient General Interpretation to describe the strength of the relationships between variables.

Table 4.7

Interpreting a Correlation Coefficient

Size of the Correlation	Coefficient General Interpretation
.8 to 1.0	Very strong relationship
.6 to .8	Strong relationship
.4 to .6	Moderate relationship
.2 to .4	Weak relationship
.0 to .2	Weak or no relationship

(Salkind, 2017)

Table 4.8 for Function 250: Business Services showed the variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, PP Benefits by function, and Con, all reported significance at $p<.05$ with at least one other variable. FTE showed a weak and negative relationship with Con, r = -0.32, and a moderate and positive correlation with Enrollment, r = 0.49. FTE also showed weak and negative relationships with Foundation Allowance, r = -0.14, and PP Expenditures by function, r = -0.19. Con reported weak and negative relationships with PP Wages by function, r = -0.20, and PP Benefits by function, r = -0.20. Enrollment reported a weak and positive relationship with Foundation Allowance, r = 0.25, along with weak and negative relationships with PP Expenditures by function, r = -0.29, PP Wages by function, r = -0.22, and PP Benefits by function, r = -0.22.

PP Expenditures by function showed a very strong and positive relationship with PP Wages by function, r = 0.88, and PP Benefits by function, r = 0.90, while at the same time PP Wages by function showed a very strong and positive relationship with PP Benefits by function,

$r = 0.94$. These strong relationships were expected, as payroll and benefits costs typically compose a large majority of total school expenditures. In Michigan during 2016, salaries and benefits accounted for 44% and 30% of total district expenditures, respectively. Overall, salaries and benefits consumed 74% of Michigan school budgets in 2017-18 (Michigan Department of Education, 2019). Naturally, these very strong associations raised the question of multicollinearity.

Scholars considered multicollinearity violated when two variables were nearly perfect linear combinations of one another (Chen, Ender, Mitchell, & Wells, 2003). When the predictor variable or the independent variables correlated strongly to one another, this created issues in estimating the relationship between the dependent and independent variables. However, the focus of this study involved regression analysis, where multicollinearity was not necessarily a requirement for obtaining usable results. Gujarati (2004) indicated the consequences of high multicollinearity included having Ordinary Least Squares (OLS) estimators with large variance and covariance, with the result that the *t*-statistic of one or more of the coefficients would tend to be statistically insignificant. However, R^2, the goodness-of-fit measure, can still be very high.

If the purpose of the regression analysis was estimation, then multicollinearity was not a serious problem because higher R^2 meant the estimation was better (Gujarati, 2004). Since part of the study's purpose was estimation, the influence of high multicollinearity made identifying specific variables' impact on the regression analysis more difficult, yet the combination of these correlated variables could improve the equation's fit and would be reflected in an increased R^2. Given the purpose of this study, the researcher accepted these limitations by not eliminating variables with high correlations, instead relying on the OLS R^2 results to help determine for which variables multicollinearity might become an issue. The researcher accomplished this by running multiple regression analyses designed on finding a balance between capturing the highest R^2 value while using the least number of variables (Bingham & Fry, 2010). The was further explored in the research question two findings section of this report.

Table 4.8

Correlation Matrix – Function 250 (2017)

Variable		FTE	Con (solidated)	Found-ation Allow-ance	Enroll-ment	PP Expend. by function	PP Wages by function
Con (solidated)	*r*	-.32					
	p	***					
	n	413					
Foundation Allowance	*r*	.14	-.05				
	p	***	.31				
	n	413	413				
Enrollment	*r*	.49	-.09	.25			
	p	***	*	***			
	n	413	413	413			
PP Expend. by function	*r*	-.19	-.04	.02	-.29		
	p	***	.48	.72	***		
	n	413	413	413	413		
PP Wages by function	*r*	-.08	-.20	.05	-.22	.88	
	p	*	***	.33	***	***	
	n	413	413	413	413	413	
PP Benefits by function	*r*	-.06	-.20	.04	-.22	.90	.94
	p	.24	***	.47	***	***	***
	n	413	413	413	413	413	413

*p<.10. **p<.05. ***p<.01 (2-tailed).

Table 4.9 for Function 260: Operations and Maintenance Services showed the variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, PP Benefits by function, and Con all reported statistical significance at $p < .05$ with at least one other variable. FTE by function showed weak and positive relationships with Con, $r = 0.14$, and a moderate and positive relationship with Enrollment, which had an *r*-coefficient of 0.39. FTE by function had a weak and negative relationship with PP Expenditures by function, $r = -0.25$. Con reported a weak and negative relationship with PP Wages by function, $r = -0.25$, and PP Benefits by function, $r = -0.25$. Foundation Allowance reported a moderate and positive correlation with PP Expenditures by function with an r-coefficient of 0.52, along with weak and positive correlations with Enrollment, $r = 0.16$, PP Wages by function, $r = 0.27$, and PP Benefits by function, $r = 0.24$. Enrollment had weak and negative correlations with PP Expenditures by function, $r = -0.16$, PP Wages by function, $r = -0.10$, and PP Benefits by function, $r = -0.08$. At the same time, PP Expenditures by function had a strong and positive correlation with PP Wages by function, $r = 0.65$, and a moderate and positive relationship with PP Benefits by function, with an *r*-coefficient of 0.57. Finally, PP Wages by function reported a very strong and positive relationship to PP Benefits by function at $r = 0.95$. Once again, the high correlations among the expenditure related variables were not unexpected.

Table 4.9

Correlation Matrix – Function 260 (2017)

Variable		FTE	Con (solidated)	Found-ation Allow-ance	Enroll-ment	PP Expend. by function	PP Wages by function
Con (solidated)	*r*	.14					
	p	***					
	n	467					
Foundation Allowance	*r*	-.05	-.01				
	p	.27	.91				
	n	467	467				
Enrollment	*r*	.39	.07	.16			
	p	***	.16	***			
	n	467	467	467			
PP Expend. by function	*r*	-.25	-.09	.52	-.16		
	p	***	*	***	***		
	n	467	467	467	467		
PP Wages by function	*r*	-.04	-.25	.27	-.10	.64	
	p	.38	***	***	**	***	
	n	467	467	467	467	467	
PP Benefits by function	*r*	.01	-.25	.24	-.08	.57	.95
	p	.83	***	***	*	***	***
	n	467	467	467	467	467	467

**p*<.10. ***p*<.05. ****p*<.01 (2-tailed).

Similar to Function 250 and Function 260, Table 4.10 showed that Function 270: Transportation Services reported Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, PP Benefits by function, and Con all had statistical significance at $p<.05$ with at least one other variable. FTE by function reported a weak and positive correlation with Enrollment, having an $r = 0.24$. Con showed a weak and negative relationship with PP Wages by function, $r = -0.21$, and PP Benefits by function, $r = -0.21$. Foundation Allowance reported a moderate and positive correlation with PP Expenditures by function, $r = 0.43$, along with weak and positive correlations with Enrollment, $r = 0.16$, PP Wages by function, $r = 0.35$, and PP Benefits by function, $r = 0.32$. Enrollment had weak and negative correlations with PP Expenditures by function, $r = -0.16$, PP Wages by function, $r = -0.17$, and PP Benefits by function, $r = -0.15$.

Similar to Function 250, PP Expenditures by function for Function 270 reported a very strong and positive relationship with PP Wages by function, $r = 0.90$, and PP Benefits by function, $r = 0.88$, while at the same time PP Wages by function showed a very strong and positive relationship with PP Benefits by function, $r = 0.95$. The researcher expected that the correlations among these variables would be high, since all three variables were linked to district expenditures.

Table 4.10

Correlation Matrix – Function 270 (2017)

Variable		FTE	Con (solidated)	Found-ation Allow-ance	Enroll-ment	PP Expend. by function	PP Wages by function
Con (solidated)	*r*	.02					
	p	.66					
	n	429					
Foundation Allowance	*r*	-.07	-.01				
	p	.16	.90				
	n	429	429				
Enrollment	*r*	.24	.04	.16			
	p	***	.42	***			
	n	429	429	429			
PP Expend. by function	*r*	-.09	-.01	.43	-.16		
	p	**	.91	***	***		
	n	429	429	429	429		
PP Wages by function	*r*	-.04	-.21	.35	-.17	.90	
	p	.46	***	***	***	***	
	n	429	429	429	429	429	
PP Benefits by function	*r*	-.04	-.21	.32	-.15	.88	.95
	p	.47	***	***	***	***	***
	n	429	429	429	429	429	429

*$p<.10$. **$p<.05$. ***$p<.01$ (2-tailed).

The data in Table 4.11 for Function 280: Central Support Services showed the variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, PP Benefits by function, and Con all reported statistical significance at $p < .05$ with at least one other variable. FTE by function showed a weak and positive relationship with Foundation Allowance, $r = 0.21$, and PP Expenditures by function, $r = 0.31$. FTE by function also reported a strong and positive correlation to Enrollment, $r = 0.62$, along with moderate and positive correlations with PP Wages by function, $r = 0.41$, and PP Benefits by function, $r = 0.42$. Con showed weak and negative relationships with Enrollment, $r = -0.08$, PP Wages by function, $r = -0.18$, and PP Benefits by function, $r = -0.18$. Foundation Allowance had weak and positive correlations with Enrollment, $r = 0.23$, PP Expenditures by function, $r = 0.27$, PP Wages by function, $r = 0.29$, and PP Benefits by function, $r = 0.30$. Enrollment reported weak and positive relationships with PP Expenditures by function, $r = 0.11$, PP Wages by function, $r = 0.24$, and PP Benefits by function, $r = 0.27$. Finally, like the other three functions previously examined, the expenditure-related variables showed strong or very strong correlations with one another. PP Expenditures reported a strong and positive correlation with PP Wages by function, $r = 0.64$, and PP Benefits by function, $r = 0.65$, while PP Wages by function reported a very strong correlation with PP Benefits by function, $r = 0.96$. Once again, the researcher anticipated these strong relationships since they had already shown up in the previous functional area analyses, and because payroll and benefits costs typically compose a large part of total school expenditures.

Table 4.11

Correlation Matrix – Function 280 (2017)

Variable		FTE	Con (solidated)	Found-ation Allow-ance	Enroll-ment	PP Expend. by function	PP Wages by function
Con (solidated)	*r*	-.03					
	p	.52					
	n	379					
Foundation Allowance	*r*	.21	.02				
	p	***	.66				
	n	379	379				
Enrollment	*r*	.62	-.08	.23			
	p	***	.11	***			
	n	379	379	379			
PP Expend. by function	*r*	.31	-.10	.27	.11		
	p	***	*	***	**		
	n	379	379	379	379		
PP Wages by function	*r*	.41	-.18	.29	.24	.64	
	p	***	***	***	***	***	
	n	379	379	379	379	379	
PP Benefits by function	*r*	.42	-.18	.30	.27	.65	.96
	p	***	***	***	***	***	***
	n	379	379	379	379	379	379

*p<.10. **p<.05. ***p<.01 (2-tailed).

Preliminary Analysis: Analysis and findings. In summary, the researcher noted that for all functional areas, service consolidation was significantly and negatively correlated with PP Wages by function and PP Benefits by function. This aligned with the expectation that service consolidation would drive down payroll costs, as these offloaded positions become payroll expenses of another entity. Enrollment in all functional areas was significantly correlated with the majority of examined variables. In all areas examined, the researcher found at least one of the cost-related variables of PP Expenditures by function, PP Wages by function, or PP Benefits by function were significant. This became a consistent theme throughout the study and a discussion about the implication of these findings occurred in the following chapter.

Research Question One Findings

Up to this point, the researcher's testing examined the representativeness of the data, established the underlying assumptions, and allowed familiarization with the data. The next step involved analysis aimed at answering the first research question:

1) *When examining FTE by functional area at the district level of non-instructional support services, are the variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function statistically different in consolidated service arrangements as opposed to non-consolidated service arrangements?*

The researcher subjected each of the support service areas to an independent samples *t*-test to determine which, if any, showed statistically significant differences between districts with consolidated service arrangements and those without consolidated service arrangements. For each year in the study, the researcher conducted this test once for each of the six variables, in each of the four non-instructional support services in Table 3.2. There were 24 *t*-tests conducted per year, with in a total of 144 *t*-tests across the six years of the study. The researcher reported the 2017 test results in Tables 4.12 through 4.15, with the other years' results in Appendix E.

The null hypothesis was *no statistically significant difference existed* within the examined variables when comparing districts with consolidated service arrangements and those without consolidated service arrangements. The alternative hypothesis was *a statistically significant difference existed* within the examined variables when comparing districts with consolidated service arrangements and those lacking service consolidation arrangements. The researcher set the level of significance at $p<.05$ using a two-tailed test. The test statistic used for this question was the *t*-test. The researcher compared the obtained *t*-test statistics to the *t*-critical value of 1.96, with results exceeding the *t*-critical value signifying the significance level was less than 0.05. Results with significance levels less than 0.05 indicated that there was a statistically significant difference between the groups (Salkind, 2017). When the *t*-test statistics showed that there was statistical significance between the two groups, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis.

For variables where the *t*-test indicated statistical significance, the researcher calculated Cohen's *d* to determine the effect size. Effect size reported the relative position of one group to another, with smaller effect size scores indicating the two groups were similar and overlapped to a large degree. (Dunlap, 1999; Salkind, 2017). To facilitate discussion, the researcher interpreted the effect size using the common language effect size indicator, which showed the probability that a random score from one of the *t*-test groups would be larger than a random score from the second *t*-test group (Dunlap, 1999; McGraw & Wong, 1992). The researcher intended this study for field practitioners and saw the common language effect size indicator as an easily understandable way to discuss the results without needing expertise in statistics.

Function 250: Business services. Table 4.12 showed three variables in Function 250 that reported statistically significant differences between districts with non-instructional service consolidation arrangements and districts without such arrangements. FTE by function was significantly different for consolidated service districts (*M* = -0.01, *SD* = 0.49) when compared to non-consolidated service districts (*M* = 0.58, *SD* = 0.33), $t(411) = 6.85$, $p < 0.01$, $d = 1.70$. PP Wages by function was significantly different for consolidated service districts (*M* = 8.62, *SD* = 19.27) when compared to non-consolidated service districts (*M* = 88.75, *SD* = 78.07), $t(411) = 4.22$, $p < 0.01$, $d = 1.41$. Similarly, PP Benefits by function was significantly different for consolidated service districts (*M* = 6.23, *SD* = 14.17) when compared to non-consolidated service districts (*M* = 60.45, *SD* = 54.08), $t(411) = 4.12$, $p < 0.01$, $d = 1.37$. All three significant variables reported a Cohen's *d* of 1.37 or higher, indicating a large effect size and that consolidated service districts had at least a 92% probability of reporting lower values in FTE by function, PP Wages by function, and PP Benefits by function than non-consolidated service districts (Dunlap, 1999; McGraw & Wong, 1992).

Examining the mean scores showed that districts with consolidated service arrangements for Function 250 had lower staffing levels, and corresponding lower payroll and fringe benefit costs, than districts directly employing their personnel in this area. Function 250 reported the variables of FTE by function, PP Wages by function, and PP Benefits by function had statistically significant differences when comparing districts with service consolidation arrangements to districts without such arrangements. With one or more of the examined variables reporting statistical differences between the two groups, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis. These results answered research question one for Function 250: Business Services.

Table 4.12

Independent Samples t-test for Function 250 (2017, N=413)

Variable	Consolidated (*n*=17) *M*	Consolidated (*n*=17) *SD*	Non-Consolidated (*n*=396) *M*	Non-Consolidated (*n*=396) *SD*	*df*	*t*	*p*	*d*
FTE by Function ***	-0.01	0.49	0.58	.033	411	6.85	0.00	1.70
Foundation Allowance	7560	146	7696	552	411	1.01	0.31	
Enrollment *	1553	1576	2686	2675	411	1.73	0.08	
PP Expend. by function	192.81	112.13	221.54	166.46	411	0.70	0.48	
PP Wages by function***	8.62	19.27	88.75	78.07	411	4.22	0.00	1.41
PP Benefits by function***	6.23	14.17	60.45	54.08	411	4.12	0.00	1.37

*$p<.10$. **$p<.05$. ***$p<.01$.

Function 260: Operations and maintenance services. For Function 260, Table 4.13 showed three characteristics that reported statistically significance differences between districts with service consolidation arrangements and districts that did not have such arrangements. FTE by function was significantly different for districts with consolidated services (M = 1.18, SD = 0.54) compared to those without consolidated services (M = 0.94, SD = 0.59), $t(465) = -3.05$, $p < 0.01$, $d = 0.42$. The Cohen's *d* statistic of 0.42 reported a medium effect size and indicated that consolidated service districts had a 61% probability of reporting higher FTE than non-consolidated districts.

PP Wages by function was significantly different for consolidated service districts (M = 102.55, SD = 79.29) when compared to non-consolidated service districts (M = 221.83, SD = 170.26), $t(174) = 9.14$, $p < 0.01$, $d = 0.90$. PP Benefits by function was significantly different for consolidated service districts (*M* = 74.97, *SD* = 60.44) when compared to non-consolidated service districts (*M* = 157.25, *SD* = 115.90), $t(150) = 8.65$, $p < 0.01$, $d = 0.89$. The Cohen's *d* statistics of approximately 0.90 indicated large effect sizes and that consolidated service districts had a 74% probability of reporting lower values in PP Wages by function and PP Benefits by function than non-consolidated districts (Dunlap, 1999; McGraw & Wong, 1992).

A review of the mean scores suggested that districts with consolidated service arrangements for Function 260 had higher staffing levels, and lower staffing costs, than districts directly employing their personnel in this area. The independent samples *t*-tests showed the variables of FTE by function, PP Wages by function, and PP Benefits by function had statistically significant differences when comparing districts with service consolidation arrangements to districts without such arrangements. With one or more of the examined variables reporting statistical differences between the two groups, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis. These results answered research question one for Function 260: Operations and Maintenance Services.

Table 4.13

Independent Samples t-test for Function 260 (2017, N=467)

Variable	Consolidated (n=64)		Non-Consolidated (n=403)					
	M	*SD*	*M*	*SD*	*df*	*t*	*p*	*d*
FTE by Function ***	1.18	0.54	0.94	0.59	465	-3.05	0.00	0.42
Foundation Allowance	7706	601	7715	608	465	0.12	0.91	
Enrollment	2862	3423	2376	2410	465	-1.41	0.16	
PP Expend. by function*	881.03	274.50	1027.29	624.44	465	1.84	0.07	
PP Wages by function ***	102.55	79.29	221.83	170.26	174	9.14	0.00	0.90
PP Benefits by function***	74.97	60.44	157.25	115.90	150	8.65	0.00	0.89

**p*<.10. ***p*<.05. ****p*<.01.

Function 270: Transportation services. Table 4.14 showed two variables with significant differences between districts with service consolidation arrangements and districts without consolidation arrangements in Function 270. PP Wages by function was significantly different for consolidated service districts (M = 22.61, SD = 53.15) when compared to non-consolidated service districts (M = 209.55, SD = 218.40), $t(427) = 4.52$, $p < 0.01$, $d = 1.18$. PP Benefits by function was significantly different for consolidated service districts (M = 18.52, SD = 45.34) when compared to non-consolidated service districts (M = 131.19, SD = 136.85), $t(427) = 4.34$, $p < 0.01$, $d = 1.11$. The Cohen's *d* statistics of 1.18 and 1.11, respectively, indicated large effect sizes and that consolidated service districts had approximately an 80% probability of reporting lower values in PP Wages by function and PP Benefits by function than districts without such arrangements in this area (Dunlap, 1999; McGraw & Wong, 1992).

The mean scores suggested that districts consolidating their Function 270 services had lower payroll and benefit costs as compared to districts that directly employed these same personnel. The independent samples *t*-test results showed that the variables of PP Wages by function and PP Benefits by function were statistically significant when comparing consolidated to non-consolidated service districts. With one or more of the examined variables reporting statistical differences between the two groups, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis. These results answered research question one for Function 270: Transportation Services.

Table 4.14

Independent Samples t-test for Function 270 (2017, N=429)

	Consolidated (*n*=28)		Non-Consolidated (*n*=401)					
Variable	*M*	*SD*	*M*	*SD*	*df*	*t*	*p*	*d*
FTE by function	0.98	0.72	0.92	0.59	427	-0.44	6.58	
Foundation Allowance	7678	657	7692	597	427	0.13	0.90	
Enrollment	2732	3242	2318	2546	427	-0.82	0.42	
PP Expend. by function	551.14	430.55	562.03	494.79	427	0.11	0.91	
PP Wages by function ***	22.61	53.15	209.55	218.40	427	4.52	0.00	1.18
PP Benefits by function***	18.52	45.34	131.19	136.85	427	4.34	0.00	1.11

*$p<.10$. **$p<.05$. ***$p<.01$.

Function 280: Central support services. For Function 280, Table 4.15 showed two district characteristics that reported statistically significant differences between districts with service consolidation arrangements and districts that did not have such arrangements. PP Wages by function was significantly different for consolidated service districts (*M* = 31.91, *SD* = 51.69) when compared to non-consolidated service districts (*M* = 71.58, *SD* = 48.90), $t(377) = 3.52$, $p < 0.01$, $d = 0.79$. PP Benefits by function were significantly different for consolidated service districts (*M* = 20.65, *SD* = 33.47) when compared to non-consolidated service districts (*M* = 47.29, *SD* = 33.21), $t(377) = 3.49$, $p < 0.01$, $d = 0.80$. The Cohen's *d* statistics for these variables of 0.79 and 0.80 showed large effect sizes and that consolidated service districts had a 71% probability of reporting lower values in PP Wages by function and PP Benefits by function than districts without such an arrangement for this area (Dunlap, 1999; McGraw & Wong, 1992).

The mean scores suggested that districts consolidating their Function 280 services had lower wages and benefits costs than districts directly employing these same personnel. The independent samples *t*-test results showed the variables of PP Wages by function and PP Benefits by function were statistically significant when comparing consolidated and non-consolidated service districts. With one or more of the examined variables reporting statistical differences between the two groups, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis. These results answered research question one for Function 280: Central Support Services.

Table 4.15

Independent Samples t-test for Function 280 (2017, N=379)

Variable	Consolidated (n=20)		Non-Consolidated (n=359)					
	M	*SD*	*M*	*SD*	*df*	*t*	*p*	*d*
FTE by function	0.49	0.60	0.57	0.50	377	0.65	0.52	
Foundation Allowance	7765	662	7709	560	377	-0.44	0.66	
Enrollment	1892	2422	2879	2717	377	1.59	0.11	
PP Expend. by function*	190.83	121.28	243.87	121.82	377	1.90	0.06	
PP Wages by function ***	31.91	51.69	71.58	48.90	377	3.52	0.00	0.79
PP Benefits by function***	20.65	33.47	47.29	33.21	377	3.49	0.00	0.80

*p<.10. **p<.05. ***p<.01.

Research question one overall analysis. While the previous discussion focused on 2017 data, the researcher included in Appendix E comparable data and analysis for each of the years 2012 through 2016 in table form. The researcher noted the results of the prior years were similar to 2017 and opted to include only the 2017 data during the discussion in the interests of brevity and clarity. Table 4.16 summarized the results of the *t*-test analysis for ease of reference regarding the findings for research question one by showing those variables reporting significance, along with their *p*-values and Cohen's *d* effect size scores.

The researcher observed the consistent and significant group differences between districts with consolidated services and those without such services. Of particular note, the study found significant differences in the areas of wage and benefits costs in all functional areas. On the other hand, Foundation Allowance, Enrollment, and PP Expenditures by function did not report significant differences in any of the functional areas between districts with and without consolidated service arrangements. Meanwhile, FTE by function at the district level reported statistically significant differences when examining Function 250: Business Services and Function 260: Operations and Maintenance Services. In most cases where the study found significant differences, the effect sizes were large. The results of these analyses, as revealed in Table 4.16, answered research question one. The researcher included further discussion of the findings and their ramifications in the next chapter.

Table 4.16

Research Question One Summary Findings (2017)

Variable	Function 250: Business Services (*n*=413)		Function 260: Opns & Maint Svcs (*n*=467)		Function 270: Transport Svcs (*n*=429)		Function 280: Central Support Svcs (*n*=379)	
	p	*d*	*p*	*d*	*p*	*d*	*p*	*d*
FTE by function***	0.00	1.70	0.00	0.42				
Foundation Allowance								
Enrollment								
PP Expend. by function								
PP Wages by function***	0.00	1.41	0.00	0.90	0.00	1.18	0.00	0.79
PP Benefits by function***	0.00	1.37	0.00	0.89	0.00	1.11	0.00	0.80

*p<.10. **p<.05. ***p<.01.

Research Question Two Findings

The researcher next conducted a series of cross-section regression analyses designed to answer the second research question:

2) *Is FTE by functional area at the district level of non-instructional support services associated with the model of independent variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, PP Benefits by function, consolidated school districts, and non-consolidated school districts?*

This series of regression analyses allowed the researcher to identify which variables were associated with FTE, and which variables explained the magnitude of the variability of FTE for each functional service area. The study included the unstandardized variable results in the various tables as points of reference. However, the researcher concentrated on the standardized results, including them alongside the unstandardized results in the tables, for analysis, interpretation, and conclusions. The null hypothesis was *no relationship existed* between FTE by function at the district level and the independent variables. The alternative hypothesis was *the independent variables had relationships* with FTE by function at the district level. Results with significance levels less than 0.05 indicated the independent variable had a statistically significant relationship with FTE by function at the district level. The test statistic for this question was the *p*-values for the individual variables in the model. Results with *p*-values less than 0.05 signified the regression model variable was significantly associated with FTE by function at the district level. When the *p*-value for one or more of the model's independent variables showed there was a statistical significance with FTE by function at the district level, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis. The researcher used the results of these tests, along with their values, to answer research question two.

The examinations applied the most recent data from 2017 to the following equation:

$$FTE_i = \alpha_i + \beta_1 Con_i + \mathbf{SDstructure}_i\beta_2 + \beta_3 Found_i + \beta_4 Enroll_i + \beta_5 PPE_i + \beta_6 Wages_i + B_7 Ben_i + \mu_i \quad (1)$$

where:

FTE	= full time district staffing equivalent for a specific service
i	= school districts (i=1-538)
Con	= district consolidates service in target year (Dummy)
SDstructure*i*	= a vector of school district characteristics (control variables) • Enrollment^2 • Total Revenue Per Pupil • Taxable Value Per Pupil • % Free & Reduced Lunch • Educational Attainment
Found	= Foundation Allowance
Enroll	= Enrollment
PPE	= PP Expenditures by function
Wages	= PP Wages by function
Ben	= PP Benefits by function
μ	= unobserved error

The focus variable of Con_i was a dummy variable, where a value of 1 was assumed when service consolidation had occurred in district *i*. $\mathbf{SDstructure}_i$ was a vector of structural characteristics of district *i* that impacted district resource usage. Including these known characteristics as part of the equation reduced the error created by unobserved characteristics. In this manner, the researcher could estimate the differences between consolidated versus non-consolidated service districts at a specific point in time, while also identifying relationships between the model variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function. The researcher conducted four models (one per year x four services) using Equation 1 for functions 250 through 280, and omitted Functions 220, 230, and 240 because of the reported small *n*-sizes of consolidated service districts in these three areas. For clarity purposes in further discussions, the researcher referred to this as the "full model". The results in Table 4.17, Table 4.19, Table 4.21, and Table 4.23 showed that several of the full model variables had a strong relationship with FTE by function at the district level in all areas.

While the original model provided the best goodness-of-fit, as determined by the highest R^2, the principal of parsimony compelled the researcher to explore a model of orthogonal variables that could explain the data set. The focus was on finding a balance between capturing the highest R^2 value while using the least number of variables (Bingham & Fry, 2010). Table 4.18, Table 4.20, Table 4.22, and Table 4.24 showed the model for each functional area that accomplished this goal, which the researcher referred to as the "parsimony model".

Table 4.17 through Table 4.24 conveyed the statistical significance of the variables involved in the regression model for each of their respective functional areas. Each table showed the variables' unstandardized beta coefficient (*B*) and standard error, along with the standardized beta coefficient (β), standard error, *p*-value, and 95% confidence interval. Included were the R^2 values, which indicated how much the regression model explained the overall goodness-of-fit.

The researcher examined each functional area's outcomes, comparing the goodness-of-fit results of the full model to the parsimony model, to determine which model reported the greater R^2. In this manner, the researcher was able to determine which of the models reported a greater goodness-of-fit and was better suited for estimating. The researcher used the results of the better model for analysis and reporting, with a summary shown in Table 4.25.

Function 250 Business Services: Regression analysis. In the area of Function 250: Business Services, the coefficient of determination indicated the full model explained 38.7% of the variability in FTE by function. Table 4.17 showed that several individual variables made significant contributions to the model, with Con (β= -0.13, p<.01), Enrollment^2 (β= -0.25, *p*<.01), and Taxable Value Per Pupil (*β*= -0.15, *p*<.05) having significant and negative relationships with FTE by function. This suggested that as the variables of Enrollment^2 and Taxable Value Per Pupil increased, FTE would decrease. Several variables reported significant and positive relationships with FTE by function, including: Enrollment (*β*= 0.51, *p*<.01), PP Benefits by function (*β*= 1.03, *p*<.05), and % Free & Reduced Lunch (*β*= 0.07, *p*<.05). In other words, as the variables of Enrollment, PP Benefits by function, and % Free & Reduced Lunch increased, so would FTE. Con's results indicated that compared to non-consolidated districts, consolidated districts had 0.13 standard deviations fewer FTE in this function under the full model.

Table 4.18 indicated the parsimony model confirmed the significance of the full model regression equation for Function 250, explaining 37.9% of the variability. The parsimony model reported significant relationships with FTE by function to the independent variables of Con, Enrollment, PP Benefits by function, Enrollment^2, and Taxable Value Per Pupil. The variable % Free and Reduced Lunch, which showed significance in the full model, did not report significance in the parsimony model. With that sole exception, the researcher noted that the model offered the same significant individual variables as the full model, including Con (*β*= -0.08, *p*<.01), Enrollment (*β*= 0.33, *p*<.01), PP Benefits by function (*β*= 0.23, *p*<.05), Enrollment^2 (*β*= -0.17, *p*<.01), and Taxable Value Per Pupil (*β*= -0.10, *p*<.01). Like the full model, the researcher noted that as the variables Enrollment^2, and Taxable Value Per Pupil increased, FTE would decrease. Meanwhile, as Enrollment and PP Benefits by function increased, so would FTE. Compared to non-consolidated districts, consolidated districts had 0.08 standard deviations fewer FTE for Function 250 under the parsimony model.

Overall, the regression analysis found the full model as the better model for Function

250. While the parsimony model accounted for a portion of the variability in FTE, as indicated by an R^2 of 0.379, the full model accounted for a higher amount of the variability, as reflected by an R^2 of 0.387. The researcher noted that while multicollinearity might exist, one purpose of the researcher’s study was estimating. When the purpose was estimation, then the researcher accepted multicollinearity when the combination of the correlated variables improved the equation’s fit as reflected in an increased R^2 (Gujarati, 2004). The variables of Total Revenue Per Pupil, Foundation Allowance, PP Expenditures by function, and PP Wages by function did not significantly contribute to the full model, but the cumulative effect of the full model explained 38.7% of the variability in FTE by function. The full model variables of Con, Enrollment, PP Benefits by function, Enrollment^2, Taxable Value Per Pupil, and % Free and Reduced Lunch all made significant contributions. As a result, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thus answering the second research question for Function 250: Business Services.

Table 4.17

Model Summary for Regression Statistics – Function 250 (2017)

	Unstandardized		Standardized		95% CI β		
Variable	*B*	SE *B*	β	SE β	Lower	Upper	*p-value*
Independent Variables							
Con(solidated) ***	-0.39	0.08	-0.13	0.03	[-0.08,	-0.08]	0.00
Foundation Allowance	0.00	0.00	0.03	0.04	[-0.04,	0.10]	0.43
Enrollment ***	0.00	0.00	0.51	0.08	[0.35,	0.67]	0.00
PP Expend. by function*	0.00	0.00	-0.84	0.43	[-1.70,	0.01]	0.05
PP Wages by function	0.00	0.00	-0.07	0.44	[-0.93,	0.79]	0.87
PP Benefits by function **	0.00	0.00	1.03	0.45	[0.15,	1.91]	0.02
SDstructure Variables							
Enrollment^2 ***	0.00	0.00	-0.25	0.07	[-0.39,	-0.11]	0.00
Total Revenue Per Pupil	0.00	0.00	-0.10	0.31	[-0.70,	-0.50]	0.74
Taxable Value Per Pupil **	0.00	0.00	-0.15	0.07	[-0.29,	-0.02]	0.03
% Free & Reduced lunch **	0.00	0.00	0.07	0.03	[0.00,	0.13]	0.04
Educational Attainment	-0.00	0.00	-0.03	0.04	[-0.10,	0.05]	0.49
Intercept	0.19	0.26	-0.39	0.12	[-0.624,	-0.16]	0.47
R^2				0.387			

*p<.10. **p<.05. ***p<.01.

Table 4.18

Parsimony Model Summary for Regression Statistics – Function 250 (2017)

	Unstandardized		Standardized		95% CI β		
Variable	*B*	SE *B*	β	SE β	Lower	Upper	*p-value*
Independent Variables							
Con(solidated) ***	-0.44	0.07	-0.08	0.01	[-0.11,	-0.06]	0.00
Foundation Allowance							
Enrollment ***	0.00	0.00	0.33	0.04	[0.25,	0.40]	0.00
PP Expend. by function							
PP Wages by function							
PP Benefits by function **	0.00	0.00	0.23	0.10	[0.04,	0.42]	0.02
SDstructure Variables							
Enrollment^2 ***	0.00	0.00	-0.17	0.04	[-0.24,	-0.09]	0.00
Total Revenue Per Pupil							
Taxable Value Per Pupil ***	0.00	0.00	-0.10	0.03	[-0.16,	-0.05]	0.00
% Free & Reduced lunch	0.00	0.00	0.03	0.02	[-0.01,	0.06]	0.11
Educational Attainment							
Intercept ***	0.27	0.06	0.62	0.04	[0.55,	0.69]	0.00
R^2				0.379			

*p<.10. **p<.05. ***p<.01.

Function 260 Operations and Maintenance Services: Regression analysis. In the area of Function 260: Operations and Maintenance Services, the coefficient of determination indicated the full model explained 27.2% of the variability in FTE by function. Table 4.19 showed that several individual variables made contributions to the model, with PP Expenditures by function (β= -0.46, p<.05) and Enrollment^2 (β= -0.48, p<.01) having significant and negative relationships with FTE by function. Several variables reported significant and positive relationships with FTE by function, including Con (β= 0.10, p<.01), Enrollment (β= 0.80, p<.01), and PP Benefits by function (β= 0.83, p<.05). Put succinctly, as the variables PP Expenditures by function and Enrollment^2 increased, FTE would decrease. On the other hand, when the variables Enrollment and PP Benefits by function increased, so did FTE. Con's results indicated that compared to non-consolidated districts, consolidated districts had 0.10 standard deviations more FTE in this function under the full model.

Table 4.20 indicated the parsimony model confirmed the significance of the full model regression equation for Function 260, explaining 26.7% of the variability. The parsimony model reported significant relationships with FTE by function to the independent variables of Con, Enrollment, PP Expenditures by function, PP Benefits by function, and Enrollment^2. The researcher noted that the parsimony model offered the same significant individual variables as the full model, including Con (β= 0.06, p<.01), Enrollment (β= 0.46, p<.01), PP Expenditures by function (β= -0.32, p<.01), PP Benefits by function (β= 0.41, p<.01), and Enrollment^2 (β= -0.28, p<.01). Very much like the full model, when the variables Enrollment^2 and PP Expenditures by function increased, FTE would go down. Similarly, when the variables Enrollment, and PP Benefits by function increased, so did FTE. Con's results showed that compared to non-consolidated districts, consolidated districts had 0.06 standard deviations fewer FTE in this function under the parsimony model.

Overall, the regression analysis identified the full model as the better model in Function 260. While the parsimony model accounted for a portion of the variability in FTE, as indicated by an R^2 of 0.267, the full model accounted for a higher amount of the variability, as indicated by an R^2 of 0.272. The researcher noted that while multicollinearity might exist, one purpose of the researcher's study was estimating. When the purpose was estimation, then the researcher accepted multicollinearity when the combination of the correlated variables improved the equation's fit as reflected in an increased R^2 (Gujarati, 2004). While several of the model variables did not significantly contribute to the full model, the cumulative effect of the full model explained 27.2% of the variability in FTE by function. The full model variables of Con, Enrollment, PP Expenditures by function, PP Benefits by function, and Enrollment^2 and all made significant contributions. As a result, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thus answering the second research question for Function 260: Operations and Maintenance Services.

Table 4.19

Model Summary for Regression Statistics – Function 260 (2017)

	Unstandardized		Standardized		95% CI β		
Variable	*B*	SE *B*	β	SE β	Lower	Upper	*p-value*
Independent Variables							
Con(solidated) ***	0.29	0.07	0.10	0.02	[0.05,	0.14]	0.00
Foundation Allowance	0.00	0.00	-0.00	0.06	[-0.13,	0.12]	0.94
Enrollment ***	0.00	0.00	0.80	0.12	[0.55,	1.04]	0.00
PP Expend. by function **	0.00	0.00	-0.46	0.19	[-0.84,	-0.08]	0.02
PP Wages by function	0.00	0.00	-0.15	0.40	[-0.95,	0.64]	0.70
PP Benefits by function **	0.00	0.00	0.83	0.35	[0.14,	1.51]	0.02
SDstructure Variables							
Enrollment^2 ***	0.00	0.00	-0.48	0.12	[-0.70,	-0.25]	0.00
Total Revenue Per Pupil	0.00	0.00	-0.19	0.37	[-0.91,	0.52]	0.60
Taxable Value Per Pupil	0.00	0.00	-0.01	0.06	[-0.12,	0.99]	0.87
% Free & Reduced lunch	0.00	0.00	0.08	0.06	[-0.03,	0.19]	0.18
Educational Attainment	-0.00	0.00	-0.03	0.06	[-0.15,	0.09]	0.64
Intercept ***	0.71	0.43	0.50	0.13	[0.25,	0.75]	0.00
R^2				0.272			

*p<.10. **p<.05. ***p<.01.

Table 4.20

Parsimony Model Summary for Regression Statistics – Function 260 (2017)

	Unstandardized		Standardized		95% CI β		
Variable	*B*	SE *B*	β	SE β	Lower	Upper	*p-value*
Independent Variables							
Con(solidated) ***	0.39	0.09	0.06	0.01	[0.03,	0.08]	0.00
Foundation Allowance							
Enrollment ***	0.00	0.00	0.46	0.06	[0.33,	0.58]	0.00
PP Expend. by function ***	0.00	0.00	-0.32	0.05	[-0.42,	-0.22]	0.00
PP Wages by function							
PP Benefits by function ***	0.00	0.00	0.41	0.07	[0.27,	0.55]	0.00
SDstructure Variables							
Enrollment^2 ***	0.00	0.00	-0.28	0.06	[-0.40,	-0.15]	0.00
Total Revenue Per Pupil							
Taxable Value Per Pupil							
% Free & Reduced lunch							
Educational Attainment							
Intercept ***	0.73	0.07	1.07	0.03	[1.01,	1.13]	0.00
R^2				0.267			

**p*<.10. ***p*<.05. ****p*<.01.

Function 270 Transportation Services: Regression analysis. For Function 270: Transportation Services, the coefficient of determination indicated the full model explained 17.9% of the variability in FTE. Table 4.21 showed that several individual variables made contributions to the model, with Enrollment^2 (β= -0.30, p<.05), Total Revenue Per Pupil (β= -1.51, p<.01), and Taxable Value Per Pupil (β= -0.38, p<.01) having significant and negative relationships with FTE. The variables that reported significant and positive relationships with FTE for Function 270 included Con (β= 0.12, p<.05), Enrollment (β= 0.49, p<.01), and PP Wages by function (β= 1.16, p<.05). Another way of looking at these results is to note that as Enrollment^2, Taxable Value Per Pupil, and Total Revenue Per Pupil increased, FTE for Function 270 decreased. However, FTE tended to increase whenever the variables of Enrollment and PP Wages by function increased. Con's results indicated that compared to non-consolidated districts, consolidated districts had 0.12 standard deviations more FTE in this function under the full model.

Table 4.22 indicated the parsimony model confirmed the significance of the full model regression equation for Function 270, explaining 16.2% of the function's variability. The parsimony model reported significant relationships with FTE by function to the independent variables of Con, PP Wages by function, and Total Revenue Per Pupil. The researcher noted that the parsimony model offered only three significant individual variables, as compared to six variables in the full model. These variables included Con (β= 0.05, p<.05), PP Wages by function (β= 0.30, p<.01), and Total Revenue Per Pupil (β= -0.62, p<.01), which were the same in both models. Similar to the full model, FTE tended to decrease when Total Revenue Per Pupil improved, while increases in PP Wages by function resulted in FTE increases for Function 270. The positive or negative effects exerted on FTE by each of the significant variables from the parsimony model was similar to that experienced with the full model. Con's results indicated that compared to non-consolidated districts, consolidated districts had 0.05 standard deviations more FTE in this function under the parsimony model.

Overall, the regression analysis identified the full model as the better model in Function 270. While the parsimony model accounted for a portion of the variability in FTE, as indicated by an R^2 of 0.162, the full model accounted for a higher amount of the variability, as shown by an R^2 of 0.179. The researcher noted that while multicollinearity might exist, one purpose of the researcher's study was estimating. When the purpose was estimation, then the researcher accepted multicollinearity when the combination of the correlated variables improved the equation's fit as reflected in an increased R^2 (Gujarati, 2004). While several of the model variables did not significantly contribute to the full model, the cumulative effect of the full model explained 17.9% of the variability in FTE for Function 270. The full model variables of Con, Enrollment, PP Wages by function, Enrollment^2, Total Revenue Per Pupil, and Taxable Value Per Pupil all made significant contributions. As a result, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thus answering the second research question for Function 270: Transportation Services.

Table 4.21

Model Summary for Regression Statistics – Function 270 (2017)

	Unstandardized		Standardized		95% CI *β*		
Variable	*B*	SE *B*	*β*	SE *β*	Lower	Upper	*p-value*
Independent Variables							
Con(solidated) **	0.35	0.13	0.12	0.04	[0.03,	0.20]	0.01
Foundation Allowance	0.00	0.00	0.07	0.07	[-0.07,	0.22]	0.32
Enrollment ***	0.00	0.00	0.49	0.14	[0.21,	0.77]	0.00
PP Expend. by function	0.00	0.00	0.49	0.33	[-0.15,	1.13]	0.14
PP Wages by function **	0.00	0.00	1.16	0.41	[0.35,	1.97]	0.01
PP Benefits by function	0.00	0.00	-0.05	0.34	[-0.72,	0.61]	0.87
SDstructure Variables							
$Enrollment^2$ **	0.00	0.00	-0.30	0.13	[-0.55,	-0.04]	0.02
Total Revenue Per Pupil ***	0.00	0.00	-1.51	0.47	[-2.44,	-0.58]	0.00
Taxable Value Per Pupil ***	0.00	0.00	-0.38	0.09	[-0.56,	-0.20]	0.00
% Free & Reduced lunch	-0.00	0.00	-0.02	0.06	[-0.14,	0.11]	0.77
Educational Attainment	-0.01	0.01	-0.08	0.07	[-0.22,	0.07]	0.29
Intercept *	0.70	0.49	0.23	0.12	[0.00,	0.47]	0.05
R^2				0.179			

*$p<.10$. **$p<.05$. ***$p<.01$.

Table 4.22

Parsimony Model Summary for Regression Statistics – Function 270 (2017)

	Unstandardized		Standardized		95% CI β		
Variable	*B*	SE *B*	β	SE β	Lower	Upper	*p-value*
Independent Variables							
Con(solidated) **	0.36	0.12	0.05	0.02	[0.00,	0.09]	0.03
Foundation Allowance							
Enrollment	0.00	0.00	0.11	0.08	[-0.06,	0.26]	0.20
PP Expend. by function							
PP Wages by function ***	0.00	0.00	0.30	0.06	[0.19,	0.41]	0.00
PP Benefits by function							
SDstructure Variables							
Enrollment^2 *	0.00	0.00	-0.13	0.07	[-0.27,	0.01]	0.07
Total Revenue Per Pupil ***	0.00	0.00	-0.62	0.21	[-1.04,	-0.20]	0.00
Taxable Value Per Pupil	0.00	0.00	0.03	0.03	[-0.03,	0.08]	0.35
% Free & Reduced lunch							
Educational Attainment							
Intercept ***	0.84	0.13	0.83	0.05	[0.73,	0.93]	0.00
R^2				0.162			

*p<.10. **p<.05. ***p<.01.

Function 280 Central Support Services: Regression analysis. For Function 280: Central Support Services, the coefficient of determination showed the full model explained 55.6% of the variability in FTE by function. Table 4.23 reported that several individual variables made contributions to the model, with Enrollment^2 (β= -0.39, p<.01) and Taxable Value Per Pupil (β= -0.24, p<.05) having significant and negative relationships with FTE by function. Other variables reported significant and positive relationships with FTE by function, including Con (β= 0.07, p<.05), Enrollment (β= 0.76, p<.01), PP Expenditures by function (β= 0.74, p<.05), and PP Wages by function (β= 2.56, p<.05). Basically, as the variables Enrollment^2 and Taxable Value Per Pupil increased, so would FTE. On the other hand, FTE would increase when the variables of Enrollment, PP Expenditures by function, and PP Wages by function increased. Con's results indicated that compared to non-consolidated districts, consolidated districts had 0.07 standard deviations more FTE in this function under the full model.

Table 4.24 indicated the parsimony model confirmed the significance of the full model regression equation for Function 280, explaining 51.9% of the function's variability. The parsimony model reported significant relationships with FTE by function to the variables of Enrollment, PP Expenditures by function, PP Wages by function, Enrollment^2, and Taxable Value Per Pupil. The researcher noted that the parsimony model offered the same significant individual variables as the full model, including Enrollment (β= 0.45, p<.01), PP Expenditures by function (β= 0.82, p<.01), PP Wages by function (β= 0.26, p<.01), Enrollment^2 (β= -0.29, p<.01), and Taxable Value Per Pupil (β= -0.09, p<.05). Like the full model, the researcher noted that as the variables Enrollment^2 and Taxable Value Per Pupil decreased, FTE for function 280 would increase. In a similar manner, FTE would increase whenever the variables of Enrollment, PP Expenditures by function, and PP Wages by function reported increases. Con's results were not significant.

Overall, the regression analysis identified the full model as the better model in Function 280. While the parsimony model accounted for a portion of the variability in FTE, as indicated by an R^2 of 0.519, the full model accounted for a higher amount of the variability, as indicated by an R^2 of 0.556. The researcher noted that while multicollinearity might exist, one purpose of the researcher's study was estimating. When the purpose was estimation, then the researcher accepted multicollinearity when the combination of the correlated variables improved the equation's fit as reflected in an increased R^2 (Gujarati, 2004). While several of the variables did not significantly contribute to the full model, the cumulative effect explained 55.6% of the variability in FTE by function. The full model variables of Con, Enrollment, PP Expenditures by function, PP Wages by function, Enrollment^2, and Taxable Value Per Pupil all made significant contributions. As a result, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thus answering the second research question for Function 280: Central Support Services.

Table 4.23

Model Summary for Regression Statistics – Function 280 (2017)

Variable	Unstandardized *B*	Unstandardized SE *B*	Standardized *β*	Standardized SE *β*	95% CI *β* Lower	95% CI *β* Upper	*p-value*
Independent Variables							
Con(solidated) **	0.22	0.08	0.07	0.03	[0.02,	0.12]	0.01
Foundation Allowance	0.00	0.00	0.01	0.04	[-0.08,	0.09]	0.90
Enrollment ***	0.00	0.00	0.76	0.10	[0.57,	0.96]	0.00
PP Expend. by function **	0.00	0.00	0.74	0.35	[0.04,	1.43]	0.04
PP Wages by function **	0.00	0.00	2.56	0.96	[0.68,	4.45]	0.01
PP Benefits by function	-0.00	0.00	-0.32	0.89	[-2.08,	1.44]	0.72
SDstructure Variables							
Enrollment^2 ***	0.00	0.00	-0.39	0.09	[-0.56,	-0.23]	0.00
Total Revenue Per Pupil	0.00	0.00	-0.36	0.33	[-1.02,	0.30]	0.28
Taxable Value Per pupil **	0.00	0.00	-0.24	0.09	[-0.41,	-0.06]	0.01
% Free & Reduced lunch	-0.00	0.00	-0.03	0.04	[-0.11,	0.05]	0.49
Educational Attainment	-0.00	0.00	-0.06	0.05	[-0.15,	0.04]	0.24
Intercept ***	0.22	0.31	0.78	0.15	[0.47,	1.08]	0.00
R^2				0.556			

*p<.10. **p<.05. ***p<.01.

Table 4.24

Parsimony Model Summary for Regression Statistics – Function 280 (2017)

	Unstandardized		Standardized		95% CI β		
Variable	*B*	SE *B*	β	SE β	Lower	Upper	*p-value*
Independent Variables							
Con(solidated)	0.21	0.08	0.02	0.02	[-0.01,	0.05]	0.13
Foundation Allowance							
Enrollment ***	0.00	0.00	0.45	0.06	[0.34,	0.56]	0.00
PP Expend. by function ***	0.00	0.00	0.82	0.18	[0.46,	1.18]	0.00
PP Wages by function ***	0.00	0.00	0.26	0.08	[0.09,	0.42]	0.00
PP Benefits by function							
SDstructure Variables							
$Enrollment^2$ ***	0.00	0.00	-0.29	0.05	[-0.38,	-0.19]	0.00
Total Revenue Per Pupil							
Taxable Value Per Pupil **	0.00	0.00	-0.09	0.04	[-0.16,	-0.02]	0.01
% Free & Reduced lunch							
Educational Attainment							
Intercept ***	-0.05	0.05	0.93	0.07	[0.79,	1.06]	0.00
R^2				0.519			

*p<.10. **p<.05. ***p<.01.

Research question two overall analysis. Table 4.25 summarized the results for research question two, while including all the individual variables that reported significance under the full models, along with the models' R^2. Enrollment and at least two of the cost related variables of PP Expenditures by function, PP Wages by function, and PP Benefits by function reported statistical significance in every functional area. Additionally, Con, the variable for consolidation, reported as statistically significant for all four of the functional service areas. While the parsimony model provided excellent results, the full model consistently reported higher goodness-of-fit, indicating the full model would be better at estimating. These results answered research question two, with a discussion of the findings included in the next chapter.

Table 4.25

Research Question Two Summary Findings (2017)

Variable	Function 250: Business Services β (SE β)	p	Function 260: Opns & Maint Svcs β (SE β)	p	Function 270: Transport Svcs β (SE β)	p	Function 280: Central Support Svcs β (SE β)	p
Independent Variables								
Con(solidated)	-.13 (.03)	.00	.10 (.03)	.00	.12 (.04)	.01	.07 (.03)	.01
Foundation Allowance								
Enrollment	.51 (.08)	.00	.80 (.12)	.00	.49 (.14)	.00	.76 (.10)	.00
PP Expenditures by func.			-.46 (.19)	.02			.74 (.35)	.04
PP Wages by function					1.16 (.41)	.01	2.56 (.96)	.01
PP Benefits by function	1.03 (.45)	.02	.83 (.45)	.02				
SDstructure Variables								
$Enrollment^2$	-.25 (.07)	.00	-.48 (.12)	.00	-.30 (.13)	.02	-.39 (.09)	.00
Total Revenue Per Pupil					-1.51 (.47)	.00		
Taxable Value Per Pupil	-.15 (.07)	.03			-.38 (.09)	.00	-.24 (.09)	.01
% Free & Reduced lunch	.07 (.03)	.04						
R^2	.387		.272		.179		.556	
# Observed	413		468		430		379	
# Consolidated	17		64		28		20	

*p<.10. **p<.05. ***p<.01.

Research Question Three Findings

The researcher next conducted a series of fixed effects regression analyses designed to answer the third research question:

> 3) *Does consolidation play a significant role in the model's ability to predict FTE by functional area over time at the district level for non-instructional support services?*

These series of regression analyses allowed the researcher to determine whether the model variables could estimate the change in FTE by function at the district level, and whether the presence of a service consolidation arrangement had statistical significance. The null hypothesis was that *consolidation was not significant* when estimating changes of the FTE by function at the district level. The alternative hypothesis was *the model variable for consolidation, Con, was significant* when estimating the changes of FTE by function at the district level. The researcher set the level of significance at $p < .05$ using a two-tailed test. Results with significance levels less than 0.05 indicated the regression model variable could estimate changes in FTE by function at a significant level. When there was statistical significance between the regression model variable Con and FTE by function at the district level, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis. The researcher reported the results and values of those tests in Tables 4.26 through 4.29 and used the results to answer research question three.

The examinations used panel data from each year 2014 through 2017, applying that combined data to the following equation:

$$FTE_{jit} = \alpha_i + \beta_1 Con_{ji} + \mathbf{SDstructure}_{it}\beta_2 + \beta_3 Found_{it} + B_4 Enroll_{it} \quad (2)$$

$$B_5 PPE_{it} + \beta_6 Wages_{it} + \beta_7 Ben_{it} + I_t + \theta_i + \mu_{it}$$

where:

FTE	= full time district staffing equivalent for a specific service
j	= functional service area per Table 3.2
i	= school districts (i=538)
t	= year
Con	= district consolidate (Dummy) (*Equation 2*)
SDstructure	= a vector of school district characteristics (control variables) • Enrollment^2 • Total Revenue Per Pupil • Taxable Value Per Pupil • % Free & Reduced Lunch • Educational Attainment
Found	= Foundation Allowance
Enroll	= Enrollment
PPE	= PP Expenditures by function
Wages	= PP Wages by function
Ben	= PP Benefits by function
I	= a vector of years to capture unobserved characteristics that vary over time but are common to all districts (dummy)
θ	= unobserved district characteristics that are stable over time
μ	= unobserved error

Equation 2 was a fixed effects model that measured the FTE for each support service *j* in district *i* in year *t*. Con was a dummy variable with a value of 1 if a service consolidation existed for service *j* in district *i*. $\mathbf{SDstructure}_{it}$ was the same vector of control variables included in Equation 1. By including these known characteristics as part of the equation, the error created by unobserved characteristics was reduced. Included were the model independent variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function. Vector *I* was a set of dummy variables that collected any systemic influences not accounted for by the observable inputs that varied over time but were common to all districts. θ_i was a fixed effect that collected all unobserved characteristics that were stable over time. The study estimated each functional area once, using data from 2014 through 2017, for a total of four models. The focus was the dummy variable Con_{ji}, with the expectation that it would show a statistically insignificant value if service consolidation had little influence on staffing levels. If Con_{ji} showed a statistically significant value, this suggested service consolidation had an influence on staffing levels and required further investigation.

Function 250 Business Services: Fixed effects regression analysis. The results in Table 4.26 indicated that after controlling for each of the model variables and for time, Con (β= -0.32, p=.00) contributed significantly to the model and was negatively related to FTE at the district level in Function 250. In other words, consolidated districts reported FTEs that were 0.32 standard deviations lower than districts without consolidated service arrangements in Function 250. FTE for Function 250 was significantly and negatively related to the variables of $Enrollment^2$ (β= -0.34, p=.00), Taxable Value Per Pupil (β= -0.06, p=.03), and PP Expenditures by function (β= -0.12, p=.00). Enrollment (β= 0.64, p=.00) was the single significant variable with a positive relationship to FTE by function.

The researcher noted that the consolidation of services was a significant variable when estimating FTE. Table 4.26 suggested that FTE tended to decline 0.32 standard deviations when districts had a service consolidation arrangement in place for Function 250: Business Services. As a result, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thereby answering research question three for Function 250. Research questions four and five were based upon Con showing statistical significance in research question three. Since the results in Table 4.26 indicated Con was significant, the researcher selected Function 250: Business Services for further evaluation in research questions four and five.

Table 4.26

Model Summary for Fixed Effects Regression – Function 250 (2014-2017)

Variable	β	SE β	95% CI Lower	95% CI Upper	*p-value*
Independent Variables					
Con(solidated) ***	-0.32	(0.06)	[-0.43,	-0.21]	0.00
Foundation Allowance	0.02	(0.03)	[-0.04,	0.07]	0.52
Enrollment ***	0.64	(0.06)	[0.52,	0.75]	0.00
PP Expend. by function ***	-0.12	(0.03)	[-0.19,	-0.06]	0.00
PP Wages by function	0.00	(0.06)	[-0.12,	0.12]	0.98
PP Benefits by function	0.08	(0.05)	[-0.03,	0.18]	0.14
SDstructure Variables					
Enrollment^2 ***	-0.34	(0.06)	[-0.45,	-0.23]	0.00
Total Revenue Per Pupil	-0.01	(0.01)	[-0.02,	0.01]	0.36
Taxable Value Per Pupil **	-0.06	(0.03)	[-0.11,	-0.00]	0.03
% Free & Reduced Lunch*	0.04	(0.02)	[-0.00,	0.08]	0.05
Educational Attainment	-0.02	(0.03)	[-0.07,	0.03]	0.47
Intercept ***	-0.38	(0.03)	[-0.43,	-0.32]	0.00

*p<.10. **p<.05. ***p<.01.

Function 260 Operations and Maintenance Services: Fixed effects regression analysis. The results in Table 4.27 indicated that after controlling for each of the model variables and that of time, the consolidation variable Con (β= 0.34, p=.00) contributed significantly to the model and was positively related to FTE at the district level in Function 260. In other words, consolidated districts reported FTEs that were 0.34 standard deviations higher than district without consolidated service arrangements in Function 260. FTE for Function 260 was significantly and negatively related to the variables of Enrollment^2 (β= -0.51, p=.00), Taxable Value Per Pupil (β= -0.07, p=.00), and PP Expenditures by function (β= -0.05, p=.00). On the other hand, Enrollment (β= 0.90, p=.00) was significantly and positively related to FTE.

The researcher noted that the consolidation of services was a significant variable when estimating FTE. The results in Table 4.27 suggested that FTE tended to increase 0.34 standard deviations when districts had a service consolidation arrangement in place for Function 260: Operations and Maintenance Services. As a result, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thereby answering research question three for Function 260. Research questions four and five were based upon Con showing statistical significance in research question three. Since the results in Table 4.27 indicated Con was a significant variable in the model, the researcher selected Function 260: Operations and Maintenance Services for further evaluation in research questions four and five.

Table 4.27

Model Summary for Fixed Effects Regression - Function 260 (2014-2017)

Variable	β	SE β	95% CI Lower	95% CI Upper	*p-value*
Independent Variables					
Con(solidated) ***	0.34	(0.06)	[0.23,	0.45]	0.00
Foundation Allowance	-0.04	(0.04)	[-0.11,	0.03]	0.29
Enrollment ***	0.90	(0.09)	[0.73,	1.08]	0.00
PP Expend. by function ***	-0.05	(0.01)	[-0.08,	-0.03]	0.00
PP Wages by function	-0.01	(0.07)	[-0.14,	0.13]	0.93
PP Benefits by function	0.05	(0.06)	[-0.06,	0.17]	0.35
SDstructure Variables					
$Enrollment^2$ ***	-0.51	(0.09)	[-0.68,	-0.35]	0.00
Total Revenue Per Pupil	-0.00	(0.01)	[-0.02,	0.02]	0.72
Taxable Value Per Pupil ***	-0.07	(0.03)	[-0.13,	-0.02]	0.00
% Free & Reduced Lunch	0.01	(0.03)	[-0.05,	0.07]	0.74
Educational Attainment	-0.03	(0.04)	[-0.11,	0.51]	0.51
Intercept ***	0.39	(0.43)	[0.31,	0.48]	0.00

*p<.10. **p<.05. ***p<.01.

Function 270 Transportation Services: Fixed effects regression analysis. The results in Table 4.28 indicated that after controlling for each of the model variables and for time, the consolidation variable Con (β= 0.08, p=0.36) did not significantly contribute to the model in Function 270. FTE for Function 270 was significantly and negatively related to the variables of Enrollment^2 (β= -0.45, p=.00), Foundation Allowance (β= -0.12, p=.01), and PP Expenditures by function (β= -0.06, p=.01). Enrollment (β= 0.90, p=.00) and PP Wages by function (β= 0.15, p=.011) both reported as significant variables with positive relationships to FTE by function.

The researcher noted that consolidation of services was not a significant variable when estimating FTE. As a result, the researcher failed to reject the null hypothesis and rejected the alternative hypothesis, thereby answering research question three for Function 270. Research questions four and five were based upon Con showing statistical significance in research question three. Since the results in Table 4.28 indicated Con was not a significant variable in the model, the researcher conducted no further testing for Function 270: Transportation Services.

Table 4.28

Model Summary for Fixed Effects Regression - Function 270 (2014-2017)

Variable	β	SE β	95% CI Lower	95% CI Upper	*p-value*
Independent Variables					
Con(solidated)	0.08	(0.09)	[-0.09,	0.25]	0.36
Foundation Allowance **	-0.12	(0.05)	[-0.21,	-0.03]	0.01
Enrollment ***	0.71	(0.11)	[0.49,	0.93]	0.00
PP Expend. by function **	-0.06	(0.02)	[-0.10,	-0.02]	0.01
PP Wages by function **	0.15	(0.06)	[0.04,	0.27]	0.01
PP Benefits by function	-0.08	(0.05)	[-0.19,	0.03]	0.13
SDstructure Variables					
$Enrollment^2$ ***	-0.45	(0.10)	[-0.65,	-0.25]	0.00
Total Revenue Per Pupil	-0.01	(0.01)	[-0.03,	0.01]	0.51
Taxable Value Per Pupil	-0.04	(0.03)	[-0.09,	0.02]	0.20
% Free & Reduced Lunch	-0.04	(0.04)	[-0.11,	0.03]	0.27
Educational Attainment	0.01	(0.05)	[-0.08,	0.10]	0.80
Intercept ***	0.34	(0.05)	[0.24,	0.44]	0.00

*$p<.10$. **$p<.05$. ***$p<.01$.

Function 280 Central Support Services: Fixed effects regression analysis. The results in Table 4.29 indicated that after controlling for each of the model variables and for time, the consolidation variable Con (β= 0.09, p=0.10) did not contribute significantly to the model in Function 280. FTE for Function 280 was significantly and negatively related to the variables of Enrollment^2 (β= -0.54, p=.00), Taxable Value Per Pupil (β= -0.13, p=.03), Educational Attainment (β= -0.11, p=.01), and PP Expenditures by function (β= -0.14, p=.00). Enrollment (β= 0.980, p=.00) was the single significant variable with a positive relationship to FTE by function.

The researcher noted that consolidation of services was not a significant variable when estimating FTE. As a result, the researcher failed to reject the null hypothesis and rejected the alternative hypothesis, thereby answering research question three for Function 280. Research questions four and five were based upon Con showing statistical significance in research question three. Since the results in Table 4.29 indicated Con was not a significant variable in the model, the researcher conducted no further testing for Function 280: Central Support Services.

Table 4.29

Model Summary for Fixed Effects Regression - Function 280 (2014-2017)

Variable	β	SE β	95% CI Lower	95% CI Upper	*p-value*
Independent Variables					
Con(solidated)	0.09	(0.06)	[-0.02,	0.20]	0.10
Foundation Allowance	0.04	(0.04)	[-0.04,	0.11]	0.35
Enrollment ***	0.98	(0.09)	[0.81,	1.16]	0.00
PP Expend. by function ***	-0.14	(0.04)	[-0.22,	-0.06]	0.00
PP Wages by function	0.10	(0.05)	[-0.00,	0.20]	0.05
PP Benefits by function	0.02	(0.05)	[-0.08,	0.11]	0.76
SDstructure Variables					
Enrollment^2 ***	-0.54	(0.08)	[-0.69,	-0.38]	0.00
Total Revenue Per Pupil	-0.01	(0.01)	[-0.03,	0.00]	0.15
Taxable Value Per Pupil **	-0.13	(0.06)	[-0.24,	-0.01]	0.03
% Free & Reduced Lunch	0.03	(0.03)	[-0.03,	0.08]	0.40
Educational Attainment **	-0.11	(0.04)	[-0.18,	-0.03]	0.01
Intercept ***	-0.47	(0.04)	[-0.55,	-0.39]	0.00

*p<.10. **p<.05. ***p<.01.

Research question three overall analysis. The researcher summarized the testing results for research question three in Table 4.30. The variable of focus, Con, showed statistical significance for Function 250: Business Services and Function 260: Operations and Maintenance Services. As a result, the researcher selected these two functions for further testing in research questions four and five. Con failed to show statistical significance for Function 270: Transportation Services or for Function 280: Central Support Services; therefore, the researcher did not select these functions for further testing.

An examination of Table 4.30 showed that several of the model variables were statistically significant, while revealing some obvious patterns. Enrollment^2, Enrollment, and PP Expenditures by function reported as significant across all four tested functions, while the variable of Taxable Value Per Pupil reported as significant in all functional areas except Function 270. One unexpected result was the negative and significant relationship between FTE and PP Expenditures by function across all four tested areas. Interestingly, the staffing cost variables of PP Wages by function and PP Benefits by function failed to report as significant across most functional areas. In other words, while overall expenditures by functional area were significantly related to staffing levels, the variables that directly made up staffing costs were not significant. Finally, the local district wealth indicator of Taxable Value Per Pupil reported as significant and negatively related to FTE in three of the four examined areas. The researcher provided a discussion of the findings and their implications in the next chapter.

Table 4.30

Research Question Three Summary Findings (2014 - 2017)

Variable	Function 250: Business Services		Function 260: Opns & Maint Svcs		Function 270: Transport Svcs		Function 280: Central Support Svcs	
	β (SE *β*)	*p*	*β* (SE *β*)	*p*	*β* (SE *β*)	*p*	*β* (SE *β*)	*p*
Independent Variables								
Con(solidated)	-.32 (.06)	.00	.34 (.06)	.00				
Foundation Allowance					-.12 (.05)	.01		
Enrollment	.64 (.06)	.00	.90 (.09)	.00	.71 (.11)	.00	.98 (.09)	.00
PP Expenditures by func.	-.12 (.03)	.00	-.05 (.01)	.00	-.06 (.02)	.01	-.14 (.04)	.00
PP Wages by function					.15 (.06)	.01		
PP Benefits by function								
SDstructure Variables								
Enrollment^2	-.34 (.06)	.00	-.51 (.09)	.00	-.45 (.10)	.00	-.54 (.08)	.00
Total Revenue Per Pupil								
Taxable Value Per Pupil	-.06 (.03)	.03	-.07 (.03)	.00			-.13 (.06)	.03
% Free & Reduced lunch								
Educational Attainment							-.11 (.04)	.01

**p*<.10. ***p*<.05. ****p*<.01.

Research Questions Four and Five Findings

In instances where the fixed effects regressions using Equation 2 showed Con having statistical significance, the researcher investigated further to determine what impact consolidated service arrangements and non-consolidated service arrangements had on the change in FTE by function at the district level. As noted above, Equation 2 reported Function 250: Business Services and Function 260: Operations and Maintenance Services as the only areas that showed service consolidation had statistical significance. As a result, the researcher selected these two functional areas for further examination. The researcher designed this section of the investigation to answer the fourth and fifth research questions:

4) *Does a model regarding school consolidation of non-instructional support services predict FTE by functional area over time at the district level?*

5) *Does a model regarding the lack of school consolidation of non-instructional support services predict FTE by functional area over time at the district level?*

For research question four, the null hypothesis was *the model variables were not significant* when predicting FTE by function at the district level when examining only those districts with consolidated service arrangements. The alternative hypothesis was *that the model variables were significant* when predicting FTE by function at the district level when examining only those districts with consolidated service arrangements. The researcher set the level of significance at $p<.05$ using a two-tailed test. Results with significance levels less than 0.05 indicated the variable was significant when estimating FTE by function at the district level, and the researcher could reject the null hypothesis. The researcher reported the results and values of those tests for research question four in Table 4.31 and Table 4.32, answering research question four.

For research question five, the null hypothesis was that none of the model variables was significant in predicting FTE by function at the district level when examining only those districts lacking consolidated service arrangements. The alternative hypothesis was that one or more of the model variables were significant when predicting FTE by function at the district level when examining only those districts without consolidated service arrangements. The researcher set the level of significance at $p<.05$ using a two-tailed test. Results with significance levels less than 0.05 indicated the variable was significant when estimating FTE by function at the district level, and the researcher could reject the null hypothesis. The researcher reported the results and values of those tests in Table 4.33 and Table 4.34, then used the results to answer research question five.

Using a fixed effects model similar to Equation 2, absent the dummy variable Con, the FTE was the dependent variable for estimating the service-specific spending influences within districts. The examinations used panel data from each year 2014 through 2017, applying that combined data to the following equation:

$$FTE_{jit} = \alpha_i + \textbf{SDstructure}_{it}\beta_1 + \beta_2 Found_{it} + B_3 Enroll_{it} + B_4 PPE_{it} + B_5 Wages_{it} + \beta_6 Ben_{it} + I_t + \theta_i + \mu_{it} \quad (3)$$

where:

FTE	= full time district staffing equivalent for a specific service
j	= functional service area per Table 3.2
i	= school districts (i=unknown)
t	= year
SDstructure	= a vector of school district characteristics (control variables) • Enrollment^2 • Total Revenue Per Pupil • Taxable Value Per Pupil • % Free & Reduced Lunch • Educational Attainment
Found	= Foundation Allowance
Enroll	= Enrollment
PPE	= PP Expenditures by function
Wages	= PP Wages by function
Ben	= PP Benefits by function
I	= a vector of years to capture unobserved characteristics that vary over time but are common to all districts (dummy)
θ	= unobserved district characteristics that are stable over time
μ	= unobserved error

Equation 3 was a fixed effects model that measured the FTE for each support service *j* in district *i* in year *t*. $\textbf{SDstructure}_{it}$ was the same vector of control variables included in Equations 1 and 2. The model variables of Foundation Allowance, Enrollment, PP Expenditures by function, PP Wages by function, and PP Benefits by function were once again included. Vector *I* was a set of dummy variables that collected any systemic influences not accounted for by the observable inputs that vary over time but were common to all districts. θ_i was a fixed effect that collected all unobserved characteristics that were stable over time. For each functional service area where Con had statistical significance in Equation 2, the researcher conducted two additional fixed effects regression estimates. The first iteration used the same data from Equation 2, filtered to include districts with consolidated service arrangements. The researcher used the results from this iteration to answer research question four. The second iteration used the same data from Equation 2, filtered to exclude districts with consolidated service arrangements. The researcher used the results from the second iteration to answer research question five.

The researcher removed Con from Equation 2 to create Equation 3. This recognized that the decision to enter or dissolve consolidated service arrangements could change on an annual basis. The researcher recoded as non-consolidated any functional area that changed its consolidation status during the years 2014 through 2017, reporting them as non-consolidated for purposes of research questions four and five. Table 4.31 and Table 4.33 showed which model variables had a relationship with FTE by function at the district level for those districts that reported consolidated service arrangements each year, 2014 through 2017. Table 4.32 and Table 4.34 reported which model variables had relationships with FTE by function for districts that did not report consolidated service arrangements for the years 2014 through 2017.

Function 250 Business Services: Fixed effects regression analysis - Consolidated. Table 4.31 reported the regression results of equation 3 for those districts that had consolidated service arrangements between 2014 and 2017 in Function 250: Business Services. The results indicated that FTE in Function 250 was significantly and positively related to the model variable Enrollment (β= 3.10, p=.00). In addition, the variable of Enrollment^2 (β= -6.42, p=.00) reported a significant relationship with FTE at the district level in Function 250. These results indicated that FTE tended to increase as Enrollment numbers improved in the districts.

The researcher noted that several of the variables reporting significance in equation 2 failed to report as significant in equation 3. However, the model variable Enrollment reported as significant in this test, just as it did with research question three. As a result, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thereby answering research question four for Function 250.

Table 4.31

Fixed Effects Analysis Function 250 – Consolidated Districts: (2014-2017, n=16)

			95% CI		
Variable	β	SE β	Lower	Upper	*p-value*
Independent Variables					
Foundation Allowance	-0.30	(0.16)	[-0.63,	0.03]	0.07
Enrollment ***	3.10	(0.79)	[1.48,	4.71]	0.00
PP Expend. by function	-0.00	(0.09)	[-0.18,	0.18]	0.98
PP Wages by function	0.26	(1.73)	[0.15,	0.88]	0.88
PP Benefits by function	0.48	(1.48)	[-2.49,	3.44]	0.75
SDstructure Variables					
Enrollment^2 ***	-6.42	(1.81)	[-10.11,	-2.74]	0.00
Total Revenue Per Pupil	-0.00	(0.05)	[-0.11,	0.11]	0.95
Taxable Value Per Pupil	0.14	(0.28)	[-0.43,	0.70]	0.62
% Free & Reduced lunch	-0.06	(0.11)	[-0.28,	0.17]	0.61
Educational Attainment	0.16	(0.14)	[-0.13,	0.44]	0.26
Intercept **	-1.25	(0.42)	[-2.09,	-0.40]	0.01

*p<.10. **p<.05. ***p<.01.

Function 250 Business Services: Fixed effects regression analysis – Non-Consolidated. Table 4.32 reported the results of regression equation 3 for those districts that did not have consolidated service arrangements between 2014 and 2017 in Function 250: Business Services. These results indicated that FTE for Function 250 was significantly and positively related to the model variable Enrollment (β= 0.61, p=.00) and was significantly and negatively related to the model variable PP Expenditures by function (β= -0.15, p=.00). In addition, the **v**ariables of Enrollment^2 (β= -0.32, p=.00), Taxable Value Per Pupil (β= -0.06 p=.03), and % Free and Reduced Lunch (β= 0.06, p=.01) reported significant relationships with FTE in Function 250. These results indicated that FTE tended to increase as Enrollment or % Free and Reduced Lunch increased. In a similar manner, FTE would increase whenever the variables of PP Expenditures by function, Enrollment^2, or Taxable Value Per Pupil declined.

The researcher noted that all the same variables in equation 3 reported significance in equation 2, which offered some assurance of the overall model's ability to estimate FTE by function for those entities that were not part of a consolidated service arrangement. Of interest, the two model variables of Enrollment and PP Expenditures by function reported as significant variables in this examination, just as they did in research question three's test results. With the two model variables of Enrollment and PP expenditures by function reported as significant, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thereby answering research question five for Function 250.

Table 4.32

Fixed Effects Analysis Function 250 – Non-Consolidated Districts: (2014-2017, n=386)

			95% CI		
Variable	β	SE β	Lower	Upper	*p-value*
Independent Variables					
Foundation Allowance	0.02	(0.03)	[-0.03,	0.07]	0.48
Enrollment ***	0.61	(0.06)	[0.49,	0.72]	0.00
PP Expend. by function ***	-0.15	(0.04)	[-0.22,	-0.08]	0.00
PP Wages by function	0.02	(0.06)	[-0.10,	0.14]	0.75
PP Benefits by function	0.08	(0.05)	[-0.02,	0.19]	0.12
SDstructure Variables					
Enrollment^2 ***	-0.32	(0.05)	[-0.42,	-0.21]	0.00
Total Revenue Per Pupil	-0.01	(0.01)	[-0.02,	0.01]	0.35
Taxable Value Per Pupil **	-0.06	(0.01)	[-0.11,	-0.01]	0.03
% Free & Reduced lunch **	0.06	(0.02)	[0.02,	0.10]	0.01
Educational Attainment	-0.03	(0.06)	[-0.09,	0.02]	0.23
Intercept ***	-0.36	(0.03)	[-0.41,	-0.30]	0.00

*p<.10. **p<.05. ***p<.01.

Function 260 Operations and Maintenance Services: Fixed effects regression analysis - Consolidated. Table 4.33 reported the results of regression equation 3 for those districts that had consolidated service arrangements between 2014 and 2017 in Function 260: Operations and Maintenance Services. The regression results indicated that FTE for Function 260 was significantly and negatively related to the model variable Foundation Allowance (β= -0.32, p=.00) and was significantly and positively related to model variable Enrollment (β= 0.71, p=.00). In addition, $Enrollment^2$ (β= -0.35, p=.02) reported a significant relationship with FTE for Function 260. These results indicated that FTE tended to increase as Enrollment went up. In a similar manner, FTE tended to increase whenever the variables of Foundation Allowance or $Enrollment^2$ declined.

The researcher noted that several of the significant variables in equation 2 failed to report as significant in equation 3. However, the two model variables of Foundation Allowance and Enrollment did report as significant, like the results for research question three. Based on these results, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thereby answering research question five for Function 260.

Table 4.33

Fixed Effects Analysis Function 260 – Consolidated Districts: (2014-2017, n=48)

			95% CI		
Variable	β	SE β	Lower	Upper	*p-value*
Independent Variables					
Foundation Allowance ***	-0.32	(0.09)	[-0.49,	-0.14]	0.00
Enrollment ***	0.71	(0.20)	[0.32,	1.11]	0.00
PP Expend. by function	-0.04	(0.03)	[-0.10,	0.03]	0.29
PP Wages by function	-0.26	(0.20)	[-0.66,	0.14]	0.20
PP Benefits by function	0.28	(0.17)	[-0.06,	0.62]	0.11
SDstructure Variables					
Enrollment^2 **	-0.35	(0.15)	[-0.65,	-0.05]	0.02
Total Revenue Per Pupil	0.00	(0.04)	[-0.07,	0.07]	0.99
Taxable Value Per Pupil	-0.03	(0.09)	[-0.21,	0.14]	0.72
% Free & Reduced lunch	0.06	(0.07)	[-0.09,	0.20]	0.43
Educational Attainment	-0.13	(0.10)	[-0.32,	0.07]	0.20
Intercept ***	0.86	(0.10)	[0.65,	1.06]	0.00

*p<.10. **p<.05. ***p<.01.

Function 260 Operations and Maintenance Services: Fixed effects regression analysis – Non-Consolidated. Table 4.34 reported the results of regression equation 3 for those districts that did not have consolidated service arrangements between 2014 and 2017 in Function 260: Operations and Maintenance Services. These results indicated that FTE for Function 260 was significantly and positively related to the model variable Enrollment (β= 0.88, p=.00) and was significantly and negatively related to the model variable PP Expenditures by function (β= -0.07, p=.00). In addition, Enrollment^2 (β= -0.50, p=.00) and Taxable Value Per Pupil (β= -0.08, p=.00) reported significant relationships with FTE at the district level in Function 260. These results indicated that FTE tended to increase as Enrollment went up. In a similar manner, FTE tended to increase whenever the variables of PP Expenditures by function, Enrollment^2, or Taxable Value Per Pupil declined.

The researcher noted that most of the same variables in equation 3 reported significance in equation 2. Of note, the two model variables of Enrollment and PP Expenditures by function reported as significant variables in this examination, just as they did in research question three's test results. With the two model variables of Enrollment and PP Expenditures by function reported as significant, the researcher rejected the null hypothesis and failed to reject the alternative hypothesis, thereby answering research question five for Function 260.

Table 4.34

Fixed Effects Analysis Function 260 – Non-Consolidated Districts: (2014-2017, n=403)

Variable	β	SE β	95% CI Lower	95% CI Upper	*p-value*
Independent Variables					
Foundation Allowance	-0.03	(0.04)	[-0.11,	0.05]	0.49
Enrollment ***	0.88	(0.10)	[0.69,	1.07]	0.00
PP Expend. by function ***	-0.07	(0.01)	[-0.10,	-0.05]	0.00
PP Wages by function	0.08	(0.08)	[-0.65,	0.23]	0.27
PP Benefits by function	-0.01	(0.07)	[-0.14,	0.12]	0.88
SDstructure Variables					
Enrollment^2 ***	-0.50	(0.09)	[-0.69,	-0.32]	0.00
Total Revenue Per Pupil	-0.00	(0.01)	[-0.02,	0.02]	0.81
Taxable Value Per Pupil ***	-0.08	(0.03)	[-0.13,	0.02]	0.00
% Free & Reduced lunch	0.01	(0.03)	[-0.05,	0.08]	0.69
Educational Attainment	-0.02	(0.04)	[-0.11,	0.06]	0.61
Intercept ***	0.40	(0.05)	[0.31,	0.49]	0.00

*p<.10. **p<.05. ***p<.01.

Research questions four and five overall analysis. The researcher summarized the results of the testing for the last two research questions in Table 4.35. The results for research question four, which examined just those districts with consolidated service arrangements in each year from 2014 through 2017, found Enrollment and Enrollment^2 as significant variables for both function 250 and function 260. Function 260 reported one additional variable, Foundation Allowance, as significant also. The results for this question were different from that of research question two or research question three, both of which reported several other variables as significant. These results for research question four suggested that beyond enrollment-related factors, it was difficult to identify any other variables that might contribute towards estimating FTE for either Function 250 or Function 260 when only examining those districts with consolidated service arrangements.

Next the researcher examined the results for research question five, which examined those districts that did not have consolidated service arrangements each year from 2014 through 2017. The researcher noted the results more closely aligned with those from research questions two and three. Both Function 250 and Function 260 reported the pupil count centric variables of Enrollment and Enrollment^2 as significant, along with PP Expenditures by function and Taxable Value Per Pupil. Of interest, these same variables also reported as significant in research questions two and three for the same functions. Function 250 also reported the % Free and Reduced lunch variable as significant, something this variable had done earlier in research question two, but not repeated in research question three. The researcher provided a full discussion of these findings and their implications in the next chapter.

Table 4.35

Research Questions Four and Five Summary Findings (2014 – 2017)

	Function 250: Business Services				Function 260: Opns & Maint Svcs			
	Consolidated		Not Consolidated		Consolidated		Not Consolidated	
Variable	*β* (SE *β*)	*p*	*β* (SE *β*)	*p*	*β* (SE *β*)	*p*	*β* (SE *β*)	*p*
Independent Variables								
Con(solidated)								
Foundation Allowance					-.32 (.09)	.00		
Enrollment	3.10 (.79)	.00	.61(.06)	.00	.71 (.20)	.00	.88 (.10)	.00
PP Expenditures by func.			-.15 (.04)	.00			-.07 (.01)	.00
PP Wages by function								
PP Benefits by function								
SDstructure Variables								
Enrollment^2	-6.42 (1.81)	.00	-.32 (.05)	.00	-.35 (.15)	.02	-.50 (.09)	.00
Total Revenue Per Pupil								
Taxable Value Per Pupil			-.06 (.01)	.03			-.08 (.03)	.00
% Free & Reduced lunch			.06 (.02)	.01				
Educational Attainment								

**p*<.10. ***p*<.05. ****p*<.01.

Chapter Summary

This chapter described the analysis and findings of the researcher's predictive correlational research study that investigated the relationships between non-instructional support staffing and district specific variables of Foundation Allowance, PP Expenditures by function, PP Wages by function, and PP Benefits by function, along with common district demographic structural variables common to all districts. This chapter began with an examination of the tests and techniques used to establish the underlying assumptions necessary to conduct correlational and regression analyses. The researcher concluded the data met those assumptions.

The researcher next conducted tests to examine the representativeness of the data set, along with the two samples comprised of districts with service consolidation arrangements versus districts without service consolidation arrangements. Table 4.1 reported the results of those tests, and the researcher concluded the data set and samples were representative of the population. This was followed by further analyses using descriptive statistics to become familiar with the data set, identify trends, and make other basic observations. The researcher reported the results of the descriptive statistical analysis in Tables 4.2 through 4.6, along with Figure 4.1 and Figure 4.2.

To gain a better understanding of the data set and its unique characteristics, the researcher next examined whether there were correlations between FTE by function at the district level and the different independent variables using a product moment correlation coefficient, or Pearson correlation exercise. In this manner, the researcher was able to determine what relationship existed, if any, between FTE by function at the district level and the examined variables. The researcher reported the results in the correlation matrixes of Tables 4.8 through 4.11, including the *r*-coefficients, sample sizes, and *p*-values.

The researcher explored and answered research question one using a series of *t*-tests on data from 2012 through 2017, with results including sample size, *t*-value, degrees of freedom, mean, and standard deviation reported in Tables 4.12 through 4.15 and Appendix E. When comparing districts with and without support service consolidation arrangements, the examination revealed that there were statistically significant differences in Function 250: Business Services, Function 260: Operations and Maintenance Services, and Function 280: Central Support Services. The researcher noted that based on their reported mean values, consolidated service districts tended to have lower wages and benefits costs in all examined functional areas. In almost every case where the study found a significant difference, the effect size was large. The researcher summarized the comprehensive results in Table 4.16 to answer research question one. The study included further discussion and implications in the next chapter.

The researcher answered research question two employing a series of cross-sectional regression analyses using data from 2017, with results reported in Tables 4.17 through 4.24, then summarized in Table 4.25. Function 250: Business Services reported several variables with significant relationships with FTE, comprised of Enrollment, $Enrollment^2$, PP Benefits by function, Taxable Value Per Pupil, and % Free and Reduced Lunch. Also included as significant was the consolidation variable, Con, which reported a negative and weak influence on FTE by function, suggesting consolidation arrangements was associated with lower staffing levels. The full model was better at estimating than the parsimony model for Function 250, reporting the higher R^2 of .0387 with a large effect size.

Function 260: Operations and Maintenance Services reported several variables with significant relationships with FTE by function, comprised of $Enrollment^2$, Enrollment, PP

Expenditures by function, and PP Benefits by function. Also included was the consolidation variable, Con, which reported a positive and weak influence on FTE, suggesting consolidation arrangements was associated with higher staffing levels. The full model was better at estimating than the parsimony model for Function 260, reporting the higher R^2 of .272 with a moderate effect size.

Function 270: Transportation Services reported several variables with significant relationships with FTE, comprised of Enrollment^2, Total Revenue Per Pupil, Taxable Value Per Pupil, Enrollment, and PP Wages by function. Also included was the consolidation variable, Con, which reported a positive and weak influence on FTE, suggesting consolidation arrangements was associated with higher staffing levels. The full model was better at estimating than the parsimony model for Function 270, reporting the higher R^2 of .179 with a moderate effect size.

Function 280: Central Support Services reported several variables with significant relationships with FTE, comprised of Enrollment^2, Taxable Value Per Pupil, Enrollment, PP Expenditures by function, and PP Wages by function. Also included was the consolidation variable, Con, which reported a positive and weak influence on FTE, suggesting consolidation arrangements was associated with higher staffing levels. The full model was better at estimating than the parsimony model for Function 270, reporting the higher R^2 of .556 with a large effect size.

The study summarized overall results for research question two in Table 4.25, which also assisted in answering research question two. Of the model variables, Enrollment was statistically significant for every function. At least two of the cost related variables of PP Expenditures by function, PP Wages by function, and PP Benefits by function reported statistically significant in every functional area, while the consolidation variable, Con, reported as statistically significant for all four of the service areas. The researcher provided further discussion about the ramifications of these findings in the next chapter.

Research question three applied a series of fixed effects regression analyses to data covering 2014 through 2017 to determine if consolidation played a significant role in the model's ability to estimate FTE by function at the district level. The researcher reported the results in Tables 4.26 through 4.29, with those areas reporting consolidation as significant selected for further testing. Consolidation showed statistical significance for Function 250: Business Services and Function 260: Operations and Maintenance Services. As a result, the researcher selected these two functions for further testing in research questions four and five. Consolidation failed to show statistical significance for Function 270: Transportation Services or for Function 280: Central Support Services, and therefore the researcher did not select these areas for further testing. Several other model variables reported significance in the fixed effects regression analyses, with the results summarized in Table 4.30.

Research questions four and five looked at the association between FTE by function at the district level with the independent variables when examining only those districts with service consolidation arrangements, and again when examining only those districts without such arrangements. Based on the results from research question three, the researcher selected Function 250: Business Services and Function 260: Operations and Maintenance Services for further testing. The study used the fixed effects regression Equation 3 for research questions four and five, which included all the same variables as Equation 2 except the consolidation variable Con, filtered to include or exclude districts based on their consolidation status. In research question four, the researcher filtered the data set to include only those districts with service consolidation arrangements. For research question five, the researcher next filtered the data to include only those districts lacking service consolidation arrangements. Tables 4.31 through 4.34 provided the regression results for all testing related to research questions four and five, with a summary shown in Table 4.35.

The research question four results were sparse, with Enrollment and Enrollment^2 reporting significance in the two examined areas, Function 250 and Function 260. Otherwise, no other variable reported significant in either function, except for Foundation Allowance in Function 260. These results for research question four suggested that beyond enrollment-related factors, none of the other model variables contributed significantly towards estimating FTE for either Function 250 or Function 260 when only examining those districts with consolidated service arrangements.

Research question five testing indicated the model variables of Enrollment and PP Expenditures by function were significant for both Function 250 and Function 260 when estimating district FTE by function. The variables of Enrollment^2, Taxable Value Per Pupil and % Free and Reduced Lunch also reported significant for Function 250. For Function 260, the only other variables that reported significance were Enrollment^2 and Taxable Value Per Pupil. The researcher included Table 4.35 to summarize the information and answer research question five. A further discussion about the essence of the findings and corresponding implications were including in the next chapter.

CHAPTER FIVE

CONCLUSION

The researcher conducted a predictive correlational research study designed to examine the impact non-instructional support service consolidation had on staffing and related costs. This study explored the association between common district variables and staffing levels, measured by Full Time Equivalents (FTE), at the individual district level using data covering 2012 through 2017. The study further investigated whether those same variables had an estimation ability for staffing levels at each of the non-instructional support service areas. The intent was to identify efficient practices and to provide research-based information about staffing levels for those support services, along with the impact that consolidation of services had on staffing levels and costs. The study relied upon annual cost and staffing data sent by districts to the state of Michigan.

The researcher used five research questions to analyze whether the district variables of Foundation Allowance, Enrollment, Per Pupil Expenditures by function, Per Pupil Wages by function, and Per Pupil Benefits by function had a relationship with staffing levels, and whether the relationship varied when a district entered into a consolidated service arrangement with another educational entity. The study conducted the analysis independently for each of the four service areas identified in Table 5.1. The researcher reported a critical analysis of the results in chapter four and included key findings in Table 5.3. This conclusion chapter contains a summary and interpretation of findings, limitations, and recommendations for future research.

Discussion

This study focused on the four service support areas found in Table 5.1, which also included a description of each area's critical services. At the beginning of the study, the researcher examined several other areas, but removed them due to excessively low *n*-sizes and recommended these service areas for further investigation in future studies. Table 5.2 showed the most critical variables, along with their descriptions, that the researcher identified during the study. The researcher's conclusions focused on these critical variables and the impact they had on the four non-instructional support service areas shown in Table 5.1.

Table 5.1

Non-instructional Support Services by Function Code

Function Code	Support Services	Typical Jobs and Services
250	Business Services	Accounting, purchasing, printing
260	Operations and Maintenance Services	Custodial, maintenance, utility costs, security
270	Transportation Services	Bussing, bus drivers, field trip costs
280	Central Support Services	Human resources, Information Technology, pupil accounting

(Michigan Department of Education, 2016)

Table 5.2

Critical Variables with Descriptions

Critical Variable Name	Description
Full Time Equivalent (FTE)	A ratio dependent variable representing staffing levels based on the number of full-time and fractional-time employees in each non-instructional support service area at each district.
Consolidated	A dummy variable, named "Con" in the testing, which assumed a value of 1 when service consolidation had occurred in that non-instructional support service for a district.
Enrollment	A ratio independent variable measuring the number of students each district provided services to during each year.
Per Pupil (PP) Expenditures	A ratio dependent variable, measured in dollars, representing a measure of the cost incurred by each district to deliver the non-instructional support service.
Per Pupil (PP) Wages	A ratio dependent variable, measured in dollars, representing a measure of the cost of salary and wages incurred by each district to deliver the non-instructional support service.
Per Pupil (PP) Benefits	A ratio dependent variable, measured in dollars, representing a measure of the costs of payroll taxes, benefits, and related non-wage payroll items incurred by each district to deliver the non-instructional support service.

Descriptive statistics analysis. An examination of the distribution of Michigan districts found that between 2012 and 2017, approximately 20% of the districts had one or more service consolidation arrangements in the areas of Business Services, Operations and Maintenance Services, Transportation Services, and Central Support Services. Among the districts that implemented service consolidation, 71% had enrollment of 2,500 students or less. The enrollment mean of service consolidation districts (n=108) was 2,434 students (SD = 3,036), which was not statistically different from the enrollment mean of 2,476 students (SD = 2,564) for non-consolidated service districts (*n* = 419). District sizes were highly concentrated between 500 and 2,500 students, with 57% of them falling within that range. Michigan districts clearly shied away from getting overly large, with only 10.4% exceeding 5,000 students. Work by Duncombe and Yinger (2010) reported that when two or more districts merged, the most efficient district size was between 2,500 and 4,000 students. The high concentration of districts that fell below that range indicated there may be opportunities for economies of scale through district mergers.

When examining the distribution of services subject to consolidation, the researcher noted that those support areas considered closer to the classroom, such as Instructional Staff Services (*n* = 2) and School Administration (*n* = 0), had so few consolidation arrangements that the researcher removed them from the study. In contrast, those areas much further from the classroom, such as Transportation Services (*n* = 28) and Operations and Maintenance Services (*n* = 64), had many instances of service consolidation. The overall distribution pattern indicated that those non-instructional support services closest to the classroom were the least likely to have consolidation arrangements. The researcher did not identify the reasons for this pattern as such an investigation was beyond the scope of the study. However, these results reinforced the findings of several studies, which reported that service consolidation arrangements occurred most often in those services furthest away from the classroom (Arsen, 2011; Eggers, Snell, Wavra, & Moore, 2005; Metcalf, 2009).

Examining the overall state-level means and standard deviations of district staffing levels, consolidated service districts had 0.07 FTE more staff than non-consolidated districts. Since the overall staffing variable included both employees and contractors, this indicated consolidated service districts enjoyed more overall workers than their non-consolidated peers. However, the results at the individual service level was varied and warranted examination. In Business

Services, districts with service consolidation arrangements had on average 0.58 fewer FTE, while Operations and Maintenance services reported an average 0.24 more FTE, than did non-consolidated districts. For Transportation Services and Central Support Services, there were almost no differences in the average FTE between consolidated and non-consolidated districts. This suggested that districts would need to look at other factors than staffing level changes to see if service consolidation resulted in scale economies for these areas. The reasons for these variations within the different areas were not clear.

A review of the overall state-level financial factors showed that consolidated service districts reported an average of $120 per pupil lower wages and $74 per pupil lower benefit costs than districts without such arrangements. Consolidated districts received an average of $277 more revenue per pupil but spent only $123 more per pupil than non-consolidated districts. This resulted in a $154 gap between the mean revenues and mean expenses of consolidated service districts versus non-consolidated districts. The spending gap indicated that consolidated districts were able to meet their constituents' service expectations more efficiently than their non-consolidated peers. This broad analysis offered support that service consolidation might offer the cost efficiencies necessary for districts that were looking for economies of scale (Eggers et al., 2005; Holzer & Fry, 2011; Maher, 2015; Menzel, 2016; Stenberg, 2011).

Pearson correlation analysis. Using Pearson correlations, the researcher first looked at the associations between service consolidation and staffing levels, which had mixed results across the four service areas. Business Services reported that service consolidation was associated with smaller staffing levels, while Operations and Maintenance Services showed that consolidation was associated with higher staffing levels. For the other two areas, Transportation Services and Central Support Services, there was no association between consolidation and staffing levels. The reasons behind these mixed results were not clear.

The next major observation was that district enrollment consistently correlated with expenditures and staffing levels across all four service areas, though whether the correlation was positive or negative varied by service area. The researcher expected that student enrollment would correlate to expenditures because Michigan's school funding formula included pupil enrollment as a multiplier (Metcalf, 2009). Since higher enrollment meant increased revenue, it followed that total expenditures would increase across all district operations due to more funding being available. Finally, the researcher noted the correlations between district enrollment and staffing levels, as more students would require additional staff if the district wished to maintain its service levels.

The last major observation was that at least one of the cost related variables of expenditures, wages, or benefits were statistically significant in each service area. Having a cost variable report as significant became a consistent theme throughout the study. All four service areas showed consolidation was associated with lower wage and benefit expenses but was not associated with changes in overall departmental costs. Lacking an association between consolidation and overall costs raised the question about whether economies of scale existed in these environments. There were two conditions under which scale economies occurred: 1) when costs were reduced and service levels stayed the same; or 2) when costs remained the same, but service levels improved (DeLuca, 2013; Dollery & Fleming, 2006; Rasmussen, 2011). If there was no association between consolidation and overall costs, a link between consolidation and service levels would have to be identified in order potentially to achieve economies of scale. However, one limitation of this study was it did not have a mechanism to measure quality factors. With no way to measure consolidation's relationship with quality, these results were insufficient to conclude that consolidation offered economies of scale, though the possibility still remained once a mechanism for measuring quality levels was found.

***T*-test analysis.** The *t*-test results found that across all four support areas, consolidated service districts had significant differences from non-consolidated service districts when examining the cost related variables of wages and benefits. In all cases, the mean staffing costs were lower for consolidated service districts, which suggested that cost savings occurred in these situations. In only two service areas, Business Services and Operations and Maintenance Services, did a significant difference exist in staffing levels between the two groups.

Districts that consolidated their Business Services (M = -0.01, SD = 0.49) reported significantly different staffing levels, with lower mean scores, than non-consolidated districts (M = 0.58, SD = 0.33), $t(411) = 6.85$, $p < 0.01$, $d = 1.70$. There were also significant differences in the cost related variables, with the wages from consolidated districts (M = 8.62, SD = 19.27) reporting as lower than for non-consolidated districts (M = 88.75, SD = 78.07), $t(411) = 4.22$, $p < 0.01$, $d = 1.41$. Additionally, average benefit costs were lower for consolidated districts (M = 6.23, SD = 14.17) than for non-consolidated districts (M = 60.45, SD = 54.08), $t(411) = 4.12$, $p < 0.01$, $d = 1.37$. These results indicated that consolidated service arrangements were linked to lower staffing levels, along with smaller wage and benefit costs, than districts without such arrangements. These results provided evidence that service consolidation may offer the cost aspect necessary to achieve economies of scale.

Districts that consolidated their Operations and Maintenance Services (M = 1.18, SD = 0.54) reported statistically significant differences in staffing levels, with higher mean scores, than non-consolidated service districts (M = 0.94, SD = 0.59), $t(465) = -3.05$, $p < 0.01$, $d = 0.42$. The cost related variables also had significant differences between the two groups.

Consolidated districts (*M* = 102.55, *SD* = 79.29) reporting lower average wage costs than non-consolidated districts (*M* = 221.83, *SD* = 170.26), *t*(174) = 9.14, $p < 0.01$, *d* = 0.90. In addition, benefit expenses for consolidated districts (*M* = 74.97, *SD* = 60.44) also reported lower averages than non-consolidated districts (*M* = 157.25, *SD* = 115.90), *t*(150) = 8.65, $p < 0.01$, *d* = 0.89. Overall, service consolidation in Operations and Maintenance Services was associated with higher staffing levels and lower costs when compared to non-consolidated districts. The savings identified in this test indicated a level of efficiencies could be found through service consolidation in this area.

Rounding out this phase of testing, the results from both Transportation Services, which accounted for the staffing and costs of student bussing, and Central Support Services, which accounted for district Information Technology (IT) staffing and costs, mirrored one another. In Transportation Services, the *t*-tests reported that the payroll costs of consolidated service districts (*M* = 22.61, *SD* = 53.15) was significantly lower than non-consolidated districts (*M* = 209.55, *SD* = 218.40), *t*(427) = 4.52, $p < 0.01$, *d* = 1.18. Similarly, benefit costs were lower and significantly different for consolidated districts (*M* = 18.52, *SD* = 45.34) when compared to non-consolidated districts (*M* = 131.19, *SD* = 136.85), *t*(427) = 4.34, $p < 0.01$, *d* = 1.11.

Central Support Services *t*-tests had similar results, with consolidated district payroll costs (*M* = 31.91, *SD* = 51.69) reporting as statistically different from non-consolidated districts (*M* = 71.58, *SD* = 48.90), *t*(377) = 3.52, $p < 0.01$, *d* = 0.79. At the same time, benefit costs were also significantly different between consolidated (*M* = 20.65, *SD* = 33.47) and non-consolidated districts (*M* = 47.29, *SD* = 33.21), *t*(377) = 3.49, $p < 0.01$, *d* = 0.80.

Neither area reported statistically significant differences in either the staffing levels or total departmental costs. This was not unexpected, especially with student bussing, where districts would find it difficult to reduce the number of workers without negatively affecting service levels. In these two areas, the smaller mean scores of payroll and benefit cost variables indicated that consolidated districts achieved some efficiencies not found by non-consolidated districts. The researcher was unable to identify the reasons why these efficiencies occurred.

Cross-section regression analysis. Research question two used cross-sectional regression analyses to identify whether there were associations between staffing levels and the model variables, with the focus on consolidation. Consolidation was consistently associated with staffing levels for all four support areas. Similar to the study's earlier test results, consolidation of Business Services, Transportation Services, and Central Support Services resulted in 0.07 to 0.13 standard deviations lower staffing levels. In a like manner, consolidation of Operations and Maintenance Services was associated with 0.10 standard deviations higher staffing levels.

The cross-section regression analyses reinforced the important association between pupil enrollment and staffing, along with their impact on the variability of the staffing levels. The analyses found that as enrollment increased, districts responded by hiring more workers in each of the four service areas. Furthermore, every service area reported an association between staffing levels and at least two of the cost related variables. As expected, higher benefit and wage expenditures were related to increased staffing levels. This was in keeping with the relationship between staffing levels and costs noted throughout the study.

In Business Services, the cross section regression analysis showed that consolidation (β= -0.13, p<.01) was associated with fewer staff, likely due to the elimination of underutilized personnel, with the remaining work of the eliminated positions shared across all the entities in the arrangement. Additionally, reductions in benefit costs (β= 1.03, p<.05) was a contributor towards lower staffing levels in this area. These findings about the influence that service consolidation and benefits costs had on staffing levels reinforced the study's descriptive statistical and t-test findings. These results were consistent with studies by Metcalf (2009), DeLuca (2014), and Augenblick-Palaich-and-Associates (2018), which all observed potential efficiencies when districts offered to share their under-utilized staff capacity with others.

In Operations and Maintenance Services, the cross-section regression analysis showed that both consolidation (β= 0.10, p<.01) and increasing benefit costs (β= 0.83, p<.05) were associated with increased staffing levels. The relationship between benefits costs and staffing levels was anticipated, as one would expect to see more staff as the staffing-related costs increased. On the other hand, the data also showed that an increase in overall departmental costs (β= -0.46, p<.05) resulted in less staff in this service area.

The negative relationship between total departmental costs and staffing levels was intriguing and warranted further investigation. An examination of department cost components offered some insights. While salaries and fringe benefits typically made up 80.48% of total district costs, these same costs only made up 33.61% of overall Operations and Maintenance expenses. This disparity showed that the departmental cost structure was much different than the district's overall cost structure. A review of the expense data revealed that this department was responsible for much of the districts' fixed costs, which accounted for a sizeable percentage of the remaining 66.39% of departmental total costs (Michigan Department of Education, 2018). Non-negotiable items like utility expenses, technical mechanical repair services, and capital equipment replacement costs were examples of fixed costs included in this department. Given this information, one could begin to see how negative changes in these unavoidable costs, such as a utility expense increase or a school building roof replacement, could necessitate departmental staffing reductions in order to free up resources to pay for the higher fixed costs.

The cross-section regression analyses showed that consolidation was associated with an increase in staffing levels in both Transportation Services (β= 0.12, p<.05) and Central Support Services (β= 0.07, p<.05). Additionally, higher overall departmental costs (β= 0.74, p<.05) and increased wage costs (β= 2.56, p<.05) were associated with increased staffing levels for Central Support Services. Meanwhile, Transportation Services reported that only increased wage costs (β= 1.16, p<.05) were associated with higher staffing levels. These cross-section regression results were unlike the results from the t-test, which reported no association between staffing and the other variables. The cross-section regression results were also unlike the descriptive statistics results, where the staffing level differences between the consolidated and non-consolidated service districts were small. However, after controlling other factors in the cross-section regression analyses, service consolidation was associated with between 0.07 and 0.12 standard deviations more staff in these two areas.

In Transportation and in Central Support Services, a review of several consolidated service districts showed that their staffing distributions consisted of a small number of employees and a large number of contracted staff. An examination of the job codes within the data revealed that districts often kept their supervisors and key specialists as district employees, while the lower-level workers became contracted workers who were employed through the consolidation entity. By retaining these key positions, the district kept control over critical services and skillsets, while letting the partner entity worry about the day-to-day staffing of the less critical jobs such as bus drivers or IT help desk technicians (Thompson, 2010). If things like higher demand or service quality issues created a need to increase the number of lower-level workers, the local district may have added supervisors and key specialists to help with the increased workload. Unfortunately, identifying the rationale behind which positions districts elected to keep was beyond the scope of this study. As a result, this test was unable to offer evidence that service consolidation resulted in economies of scale for these two service areas.

Fixed effects regression analysis. Research question three used fixed effects regression analyses to see if consolidation played a significant role in estimating FTE and further examined the relationship between the model variables and staffing levels. Unlike earlier testing, where the presence of a consolidated service arrangement was associated with changes in staffing levels across all four service areas, this time only two of the four areas reported the same association. When districts shared their Business Services, overall staffing levels decreased by 0.32 standard deviations over districts that kept their Business Services internal. In a corresponding manner, sharing of Operations and Maintenance Services between districts translated into a staffing increase of 0.34 standard deviations. The significance and direction of influence that consolidation had on both areas were similar to the results from research question two. For the Transportation Services and Central Support Services, once the researcher held the effects of time and the other model variables constant, consolidation was not a significant factor. This was a departure from the cross-section regression results, but similar to the Pearson correlation and *t*-test results, suggesting that service consolidation may not be influential on departmental staffing levels for these two areas.

A further analysis of the fixed effects regression results across the four service areas found that a one standard deviation increase in student enrollment was associated with between 0.64 and 0.98 standard deviations increase in staffing. This reinforced earlier *t*-test and cross-section regression findings that districts hired more staff in the service support areas whenever there were more students. In the four examined areas, a one standard deviation increase in departmental total expenditures was associated with a reduction in staffing of between 0.05 and

0.14 standard deviations. In summary, as overall expenditures in each service area increased, staffing levels tended to go down. Once again and as seen in earlier *t*-test, correlation, and cross-section regression testing, a cost related variable was significant when examining the influence expenditures had on staffing levels for the non-instructional support services.

During the preparation of the panel data, the researcher examined the distribution of services subject to consolidation from 2014 through 2017. Part of the fixed effects regression analyses required identification of those districts that were part of service consolidation arrangements during the entire period covered by the panel data. The researcher identified districts that were not in a consolidation arrangement in each year 2014 through 2017 as non-consolidated districts. This examination revealed that most districts that became part of a consolidated service arrangement remained in them during subsequent years. The researcher did not observe appreciable numbers of districts moving into or out of service consolidation arrangements during the timeframe of this study.

The fixed effects regression analysis indicated that across the four service areas, enrollment was the driving factor behind staffing levels, followed by overall expenditures. Consolidation played a significant role in only two of the service areas, that of Business Services and Operations and Maintenance Services. These results further strengthened the importance of knowing district enrollment and expenditures when a field practitioner was examining staffing levels in a non-instructional support service area.

Research question four used the fixed effects regression equation from research question three, examining only districts with consolidated service arrangements in Business Services or Operations and Maintenance Services. The researcher chose these two areas because each reported an association between staffing levels and consolidation in research question three.

Enrollment was the only variable that reported an association in both service areas. This suggested that when trying to estimate staffing levels for consolidated service districts, knowing the district's pupil enrollment was crucial. The scarcity of other statistically significant variables, especially one of the cost variables, was notable. The researcher found that between 2014 and 2017, 16 districts had consolidated their Business Services, while Maintenance and Operations Services had 48 districts in similar arrangements during this period. The researcher believed that the small *n*-sizes of consolidated districts may have contributed to the results and identified this as a limitation of the study.

Research question five used the same regression equation from research question three to examine the model variables for districts that lacked a consolidation arrangement in Business Services or Operations and Maintenance Services. With much higher *n*-sizes, the results were more consistent with those experienced with research question three. In both areas, a one standard deviation increase in student enrollment was associated with a 0.61 to 0.88 standard deviation increase in FTE. As overall expenditures increased by one standard deviation, staffing decreased by 0.15 standard deviations for Business Services, and 0.07 standard deviations for Operations and Maintenance Services. The results followed the study's theme of staffing levels being significantly associated with enrollment and at least one cost related variable. These findings reinforced the importance of knowing student enrollment, along with one or more of the cost variables, when examining staffing levels of support service areas.

Table 5.3

Key Findings Related to the Productive Theory of Scale Economies

Test	All Services	Business Service	Operations & Maintenance	Transportation Services	Central Support Services
Descriptive Statistics	Consolidated districts had an average 0.07 FTE more staff and used $154 pp less net resources than non-consolidated districts	Consolidated districts had an average 0.58 FTE less staff than non-consolidated districts.	Consolidated districts had an average 0.24 FTE more staff than consolidated districts.	Little variation in the average staffing levels between consolidated and non-consolidated districts.	Little variation in the average staffing levels between consolidated and non-consolidated districts.
Pearson Correlation	Consolidation was associated with lowering at least one of the cost variables.	Consolidation was associated with less wage costs, less benefits costs, and less staff.	Consolidation was associated with less wage costs, less benefit costs, and more staff.	Consolidation was associated with less wage costs and less benefit costs, and no association with staffing.	Consolidation was associated with less wage costs and less benefit costs, and no association with staffing.
T-test Analysis	Consolidated districts had less staffing-related costs than non-consolidated districts.	Consolidated districts had less wage costs, less benefit costs, and less staff than non-consolidated districts.	Consolidated districts had less wage costs, less benefit costs, and more staff, than non-consolidated districts.	Consolidated districts had less wage costs, less benefit costs, and no staffing differences, than non-consolidated districts.	Consolidated districts had less wage costs, less benefit costs, and no staffing differences, than non-consolidated districts.
Cross-section Regression Analysis	Staffing levels associated with consolidation and one or more of the cost variables	Consolidation = 0.13 *SD* less staff. 1.00 *SD* less benefit costs = 1.03 *SD* less staff.	Consolidation = 0.10 *SD* more staff. 1.00 *SD* less benefit costs = 0.83 *SD* less staff. 1.00 *SD* less total costs = 0.46 *SD* more staff.	Consolidation = 0.12 *SD* more staff. 1.00 *SD* less wage costs = 1.16 *SD* less staff.	Consolidation = 0.07 *SD* more staff. 1.00 *SD* less wage costs = 2.56 *SD* less staff. 1.00 less total costs = 0.74 less staff.
Fixed Effects Regression Analysis #1	1.00 *SD* increase in total costs equals between 0.05 and 0.14 *SD* less staff.	Consolidation = 0.32 *SD* less staff. 1.00 *SD* more total costs = 0.12 *SD* less staff.	Consolidation = 0.34 *SD* more staff. 1.00 *SD* more total costs = 0.05 *SD* less staff.	Consolidation = no impact on staffing. 1.00 *SD* more total costs = 0.06 *SD* less staff. 1.00 *SD* more wage costs = 0.15 more staff.	Consolidation = no impact on staffing. 1.00 *SD* more total costs = 0.14 *SD* less staff.
Fixed Effects Regression Analysis #2:		No cost variables were significant.	No cost variables were significant.	Not tested.	Not tested.
Fixed Effects Regression Analysis #3		1.00 *SD* increase in total costs = 0.15 *SD* less staff.	1.00 *SD* increase in total costs = 0.07 *SD* less staff.	Not tested.	Not tested.

Overall implications. The researcher was confident that the study's results answered the five research questions. Each question built upon the findings of the previous question in a manner designed to further illuminate the overall research study's focus. Through each successive research question, the study explored deeper details about the impact consolidation of support services had on staffing levels, staffing costs, and economies of scale.

The combined research results from the *t*-tests, Pearson correlations, cross-section regression analyses, and fixed effects regression analyses showed that consolidation of non-instructional support services had a statistically significant influence on staffing levels for Business Services and Operations and Maintenance Services, but was not statistically associated with staffing levels for Transportation Services and Central Support Services. Even when consolidation was significant, other factors exerted greater influence, including student enrollment and one or more of the cost related variables of wages, benefits, and overall expenditures. For Business Services and Operations and Maintenance Services, the descriptive statistics, *t*-tests, cross-section regression, and fixed effects regression evidence suggested that service consolidation arrangements often resulted in better staffing levels, decreased costs, or both. The results for Transportation Services and Central Support Services were not as clear, with mixed results across these various tests.

The descriptive statistics showed that Michigan's districts were highly concentrated by enrollment size, with 68% having 2,500 students or less. Work by Duncombe and Yinger (2010) reported that when two or more districts merged, the most efficient district size was between 2,500 and 4,000 students. This suggested there should be efficiencies available in Michigan through district mergers. Other studies indicated multiple factors made further Michigan district mergers impractical and suggested service consolidation was an alternative method that smaller districts could explore when looking for scale economies (Ballard, 2010; Brasington, 2003; Coulson, 2007). Taken together, these studies may offer clues about the range of combined enrollment sizes most likely to offer efficiencies and economies of scale to those districts considering service consolidation. In other words, service consolidation arrangements between districts whose combined student enrollment was between 2,500 and 4,000 students might experience economies of scale, while districts whose joint student population exceeded 4,000 could find that their shared-service partnership resulted in diseconomies of scale. (Dollery & Fleming, 2006; Duncombe & Yinger, 2007; Duncombe & Yinger, 2010; Rasmussen, 2011).

One would expect that if districts failed to meet the financial goals that often drive service consolidation efforts, as may be the case for Transportation Services and Central Support Services, they would dissolve these arrangements. However, in all four service areas, the data indicated that once districts consolidated any of the four examined services, they remained in those arrangements during the subsequent years. This implied that the service level and cost expectations for service consolidation arrangements fell within acceptable parameters. However, the study did not include a quality measurement metric, and the rationale behind why districts remained in these arrangements were beyond the scope of this study.

At the conclusion of the study, the researcher intended to offer field practitioners a model that might answer questions about staffing levels in each of the support service areas. However, the amount of manipulation required for the data to meet statistical standards for regression analysis made such a tool impractical. While this study was able to identify variables of importance, such as consolidation status, enrollment, and costs, a different approach might be more practical when creating a staffing model. A review of the individual support areas and their test results offered additional insight.

Business Services implications. The evidence from the descriptive statistics, *t*-tests, and cross-section regression analyses showed that districts with consolidation arrangements for their Business Services tended to report smaller staffing levels, with some evidence supporting the presence of lower overall costs. This was consistent with the premise of service consolidation, where districts shared their excess staff capacity with one another, thereby improving service levels while offsetting costs. The study did not examine the effect service consolidation had on quality levels, which was a limitation of the study. However, one might anticipate that poor payroll and accounting results following the consolidation of Business Services would have a major and negative impact on a district, resulting in quick abandonment of the consolidation arrangement. In the period covered by this study, districts that consolidated their Business Services tended to remain that way during subsequent years. With evidence supporting that service consolidation of Business Services was associated with cost and staffing reductions, along with indications that districts in these arrangements remained in them for an extended number of years, the researcher recommended this area as a candidate for possible successful service consolidation.

Operations and Maintenance Services implications. The evidence from the descriptive statistics, *t*-tests, and cross-section regression analyses indicated that districts consolidating their Operations and Maintenance Services reported higher staffing levels and lower departmental costs. The unusual cost structure and the inclusion of district fixed costs in this department helped explain these results. Other scenarios existed that could account for the outcomes and help explain the popularity of this area among the districts using service consolidation.

One possibility was that districts had understaffed their custodial and maintenance department in the years prior to service consolidation in reaction to budgetary challenges. The implementation of a consolidated service arrangement brought heightened awareness of the consequences of understaffing the custodial and maintenance workforce. Using some of the cost savings from service consolidation, the district may have increased its staffing levels to improve facility cleanliness and offset constituent concerns.

A second possibility was that the cost of the consolidated service was lower than pre-consolidation levels, allowing for the hiring of additional staff without an increase in cost. Districts that had privatized custodial services reported moderate degrees of success in achieving fiscal savings goals, but chose to stay with the privatized service model due to equal or better services enjoyed post-privatization (Angelo, 1999; May, 1998). It may be that the consolidation of this department had a similar effect as that found under the privatization model.

A third explanation may be that service consolidation offered an opportunity for districts to renegotiate or escape from costly labor contracts, resulting in savings that the district partially reinvested in hiring more custodial staff. During the study, the researcher noted that school employees in the maintenance and custodial area were highly unionized. However, a recent amendment to Michigan's Public Employment Relations Act (2012) significantly reduced district bargaining requirements for these non-instructional services. As a result, the number of districts turning to privatization and service consolidation had skyrocketed (Hohman & Cammenga, 2016). It was likely that as districts shed union contracts through the service consolidation process, they were able to reduce costs. The cost reduction may have been large enough for districts to justify hiring additional custodial staff and still find savings.

Overall, the presence of service consolidation resulted in more workers cleaning the buildings and overall departmental cost savings in the Operations and Maintenance Service area.

Districts that entered service consolidation arrangements tended to remain in them over a number of years, which offered some assurance on the satisfaction level of those employing this technique. Based on these findings, the researcher recommended Operations and Maintenance Services as a possible candidate for successful service consolidation.

Transportation Services implications. The effect consolidation had on staffing levels varied across the tests for Transportation Services. The descriptive statistics and *t*-tests reported minimal staffing changes in the presence of consolidation. The cross-section regression results showed staffing increases were related to consolidation, while the fixed effects regression results found no relationship between consolidation and staffing. In trying to find possible explanations, an examination of how a district determined its bus routes was informative. The staffing of any transportation department was a function of the number of bus routes, the miles of each route, and the amount of time students spend riding a bus (D. Johnson, personal communication, July 23, 2017; Thompson, 2010). To reduce the number of bus drivers, a district must reduce the number of routes by providing bussing to fewer students, increasing student ride times, or both. Most constituents would see any of these options as a reduction in a highly prized service (Thompson, 2010). It may be that the number of drivers needed to run the routes expected by parents remained relatively unchanged regardless of how the services were provided.

Just as in the other support service areas, the panel data evidence showed that once a district consolidated its bussing services, they remained consolidated over a number of years. The reasons behind why this occurred were beyond the scope of the study. One possible explanation may be found in a study by Duncombe and Yinger (2007) that reported on the effect district mergers had on transportation costs. The study found that district mergers often resulted in immediate increases in transportation costs due to high staff turnover and unanticipated up-front costs. However, the subsequent annual savings in the transportation department were large enough that the cumulative cost declines offset the early cost increases within four to seven years (Duncombe and Yinger, 2007). It is possible a similar phenomenon might have occurred in Transportation Services under a consolidated services arrangement.

One of the biggest risks identified with bussing alliance failures was the high costs incurred when districts resurrected their bussing department. In most cases, districts disposed of their bus fleet upon embarking on a consolidation or merger arrangement. When the arrangement ended, the district suddenly found itself looking to re-purchase a bus fleet, which required extraordinary efforts due to the high cost of the equipment (Duncombe and Yinger, 2007; Thompson, 2010). The researcher did not recommend Transportation Services as a candidate for successful service consolidation due to the study's mixed staffing and financial results and the re-entry risks involved should the alliance fail. For those districts that decide to pursue this technique, the researcher recommended that districts conduct a thorough analysis of baseline costs, identify constituent service level expectations, and accurately estimate the resources needed to meet service level demands.

Central Support Services Implications. Like Transportation Services, the results from the descriptive statistics, correlations, *t*-tests, cross-section regression analyses, and fixed effects regression analysis were mixed when examining the effect consolidation had on Central Support Services. The descriptive statistics and *t*-tests showed minimal staffing changes in the presence of consolidation. Meanwhile, the cross-section regression analyses reported staffing increases, and the fixed effects regression analyses showed no relationship existed between consolidation and staffing levels. Like the other three support service areas, it appeared that once a district consolidated its Central Support Services, they remained consolidated in subsequent years for reasons that were beyond the scope of the study.

Once again, an examination of the makeup of this non-instructional support service area offered clues about the test results. A major component of Central Support Services was the IT department, which managed the districts' technology infrastructure, provided technical support to teachers, and handled the computerized and high-stakes standardized testing of students. Districts often staffed their IT departments using a small number of technicians that provided support to a much larger number of employees and students. The loss of a single IT technician would result in longer response times, increased network downtime, and other undesirable results (Burch, 2006). Due to the serious impact any reductions might have on staff and constituent service level expectations, changes in staffing levels in Central Support Services would probably be as much a policy decision as a fiscal one.

The researcher did not recommend Central Support Services as a candidate for successful service consolidation due to the study's mixed staffing and financial results, along with the risks involved should the alliance fail. For those districts that decide to explore this area for possible consolidation, they should clearly calculate baseline costs, identify district and constituent service level expectations, and identify critical processes and applications.

Social Justice Implications. This study contributed to social justice in a couple of ways. First, the study attempted to identify stark inter-school funding and staffing differences within non-instructional support services, along with finding practices districts used to offset these differences. The study examined how several key variables – being markers for socio-economic stratification - had an impact on staffing levels and related costs. The researcher noted that Foundation Allowance, which represented the funding for basic educational services, had only a $12 per pupil difference between consolidated and non-consolidated service districts. However, there was a $277 per pupil difference in overall revenue between these same two groups. This overall revenue gap represented the amount of supplemental funding that consolidated service districts received for things like Vocational Education, Special Education, and federal grants for underserved populations (DeLuca, 2012; Michigan Department of Education, 2018). In short, consolidated service districts received higher supplemental funding for underserved populations than non-consolidated service districts. The reasons for this were not immediately clear, so the researcher looked for additional patterns in the study's results.

Looking at other characteristics examined in the study, districts that used service consolidation tended to be more rural, had students with higher socio-economic needs, and received more supplemental funding for their underserved student populations. This suggested that districts struggling with the high costs associated with educating underserved populations turned to service consolidation more frequently than districts that did not face these same challenges. For the field practitioner attempting to address the challenges associated with educating students with high needs or students who come from impoverished homes, non-instructional service consolidation could offer an avenue for freeing up resources that might be re-directed towards meeting those needs.

Second, the researcher designed the study to identify whether consolidation of services offered potential efficiencies, thereby freeing up resources that districts could redistribute into promoting better educational outcomes for all students. This study did not examine the probable uses of any generated savings, focusing instead on whether this method offered an avenue for finding additional resources. The study found evidence that service consolidation offered cost savings, and it is possible that some districts used the savings to address underserved populations or other social justice issues. However, the study could not verify this was the case, as such decisions would be district-specific and dependent on their budget priorities and overall financial situation. The study was able to conclude that the consolidation of support services offered budgetary savings that districts could access when attempting to solve social justice issues.

Limitations

The researcher identified several key limitations to this study: accuracy and coherency of the data; timeframe covered in the study; *n*-size of service consolidation districts; non-financial factors of service consolidation; and focus. The first limitation involved the accuracy and coherency of the data. The researcher collected the data from multiple sources and compiled it together to create a working data set. The financial, socio-economic, and enrollment information were well organized and retrieved from mature data sources with verifiable audit processes. However, the researcher could not say the same for the staffing data, which included the crucial "contracted" versus "employee" field. The staffing information came from a relatively new database that underwent multiple changes and definition adjustments during the period covered by this study. The training provided to district data-entry personnel was rudimentary and voluntary. State audits of the data did not demand that districts supply documentation supporting the information reported. Lacking a solid audit process and relying on voluntary training, in several instances district data errors went undetected or uncorrected. Consequently, the researcher removed those districts from the study. For future studies, the researcher cautioned that the staffing data might not be as dependable as the other data sources used in this study until the state implements rigorous data audits and provides training for district personnel.

The second limitation was the 2012 through 2017 period covered in this study, which may not have been indicative of the norm. The economic conditions in 2012 were significantly different in Michigan's school finance environment than they were in 2017. It was not irrational to assume that staffing patterns could be vastly different during periods of economic challenges versus staffing during times of relative financial sufficiency. Additionally, the study may not have captured the full long-term impact of service consolidation arrangements that occurred prior to the study's timeframe, which may have influenced the longitudinal aspects of this study.

A third limitation was the problem encountered with the *n*-sizes of districts with consolidated service arrangements. The lack of a sufficient number of these arrangements resulted in the elimination of three non-instructional support service areas from the study. Even in the service areas tested, the small *n*-sizes in most of them made reaching broad conclusions more difficult. In Business Services and in Operations and Maintenance Services, with consolidated district *n*-sizes of 16 and 48 respectively, the test results did not line up as expected, with only one or two variables reporting as significant. On the other hand, when both departments had sizeable *n*-sizes for research question five, results more closely aligned with earlier testing results that reported multiple variables as significant.

A fourth limitation was that of scope, as the study did not examine any of the qualitative factors behind district decisions to enter or remain in consolidation arrangements. Achieving economies of scale required positive changes in cost factors, quality factors, or both (DeLuca, 2013; Dollery & Fleming, 2006; Rasmussen, 2011). The study was able to identify and quantify the cost factors in each area; however, there was no mechanism in the study that specifically measured quality. The literature review revealed several non-cost factors that influenced district decisions to enter or remain in service consolidation arrangements that included things like the savings of management time and improved service levels (May, 1998; Angelo, 1999; DeLuca, 2013; DeLuca, 2014; Metcalf, 2009). Measuring and quantifying these non-financial effects of service consolidation were beyond the study's scope; therefore, the researcher cannot definitively conclude that each service area met the parameters for economies of scale.

The final limitation of the study was that the researcher's focus was that of a local school administrator. District officials typically viewed cost allocation, staffing, and similar factors with an eye towards providing maximum services with the resources provided. However, taxpayers and legislators often saw schools from a different point of view. District constituents often focused on the return for tax dollars, graduation rates, test scores, and other non-financial metrics. The impact of such non-financial factors was beyond the scope of this study.

Recommendations

The researcher recommended that an explanatory mixed methods study, using surveys to verify key district data elements, would improve the accuracy of the study. Such as study could collect and analyze quantitative data, followed by subsequent qualitative data review, in a manner designed to further confirm and enrich the quantitative findings. Such a study could also include survey questions, featuring several open-ended inquiries, on non-financial factors influencing the existence or departure from service consolidation arrangements. This information would provide a better understanding of the non-financial factors involved in the service consolidation decision-making process, along with better indicators about whether districts had achieved true economies of scale.

Another recommendation for future research was to explore service consolidation in other states, or across multiple states, using a similar methodology. Researchers could also expand such explorations within Michigan to cover the other non-instructional activities that this study did not address, such as food service programs. Studies using a similar methodology offer an opportunity to build up the collective body of knowledge. Conducting a similar study in multiple states might provide better *n*-sizes for consolidated service districts, thereby offsetting one of the identified limitations.

The researcher recommended further investigation into why certain non-instructional support services appeared as more likely candidates for district service consolidation. Some studies suggested those services furthest away from the classroom were more prone to consolidation, but the literature review did not indicate why (Arsen, 2011; Eggers, Snell, Wavra, & Moore, 2005; Metcalf, 2009). The almost non-existent occurrences of service consolidation in Instructional Support Services and School Administration resulted in the researcher pulling those areas from the study. It appeared that while economies of scale played a role in district decisions to consolidate services, there must have been other rationale behind why some services were less prevalent for selection than others. The use of a qualitative research design, such as a grounded theory study, could ferret out the rationale behind why the services remained largely ignored could provide added insight and context. A grounded theory study could use interviews and existing documentation, coming from the real-world experiences of field practitioners, to build a theory behind why certain support areas were more likely candidates for consolidation.

Finally, further investigation was needed into the impact on staffing created by the other common methods districts used to find efficiencies, such as the merging of entire school districts and the privatizing of school support services. A researcher could conduct these studies within Michigan, potentially making the results comparable to this study. Alternatively, new studies could reach into other states with similar policies and district organization, thereby providing new or updated information to the general body of knowledge. Such studies would further inform the discussion surrounding effectiveness of policies aimed at economies of scale.

Chapter Summary

This chapter summarized the processes and key findings of this study. The chapter included a review of the findings from descriptive statistical techniques, including Pearson correlation, with results summarized and analyzed. The researcher provided results from the *t*-tests critical to answering research question one, along with the information necessary to support the findings. The chapter summarized the associations between the dependent variable and the independent variables based upon cross-sectional regression analyses.

The researcher summarized, analyzed, and discussed the fixed effects regression analyses used to determine the variables that played a significant role when examining staffing levels. The study next summarized, analyzed, and discussed the results of fixed effects analyses used to determine the model variables that exerted significant influence on staffing levels when examining only districts with service consolidation arrangements. Using the same equation and variables, the study summarized, analyzed, and discussed the results of additional fixed effects analyses used to determine the model variables that exerted significant influence on staffing levels when examining non-consolidated districts. The researcher included an overall analysis of the study's key points and findings, discussed possible explanations for the patterns noted, and offered insight into ways to improve the study's results. The researcher discussed the limitations of the study, including a review of the data challenges, the timeframe covered, the scope of the study, and the focus of the researcher as a current school administrator. Finally, the researcher identified several opportunities for further research and made suggestions designed to advance the field of study.

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Appendix A

Institutional Review Board Approval Letter

UNIVERSITY OF MICHIGAN
eResearch.umich.edu

Flint Institutional Review Board • 4204 William S. White Building, Flint Michigan 48502-1950 • phone (810) 762-3383 • fax (810) 766-6791 • research@umflint.edu

To: Kent Cartwright

From:

Kazuko Hiramatsu

Cc:

Kent Cartwright
Tyrone Bynoe

Subject: Notice of Determination of "Not Regulated" Status for [HUM00160195]

SUBMISSION INFORMATION:
Title: Searching for efficiencies Michigan K-12 public schools
Full Study Title (if applicable): Searcing for efficiencies in the consolidation of non-instructional services in Michigan K-12 public schools
Study eResearch ID: HUM00160195
Date of this Notification from IRB: 2/27/2019
Date of IRB Not Regulated Determination: 2/27/2019

IRB NOT REGULATED STATUS:

Category	Outcome Letter Text
Research on Organizations	Based on the information provided, IRB approval is not required for this project, as it does not include identifiable private information about individual members, employees or staff of the organization that is the subject of the research.

Kazuko Hiramatsu
Chair, IRB Flint

Appendix B

CEPI Research Approval Letter

MICHIGAN DEPARTMENT OF EDUCATION
BRIAN J. WHISTON
SUPERINTENDENT OF PUBLIC INSTRUCTION

STATE OF MICHIGAN
RICK SNYDER, GOVERNOR

CENTER FOR EDUCATIONAL PERFORMANCE AND INFORMATION
THOMAS E. HOWELL
DIRECTOR

March 27, 2018

Kent Cartwright, CPA, ED.S.
Public Schools of Petoskey
1130 Howard St.
Petoskey, MI 49770

RE:	Searching for Michigan K-12 Non-Instructional Services Efficiencies
Application ID:	CartwK012918UM
Approval Dates:	03/27/2018 through 7/1/2019

Dear Mr. Cartwright:

This letter is to notify you that your Confidential Data Request Application has been received and reviewed by the Michigan Department of Education (MDE)-Center for Educational Performance and Information (CEPI) Research Collaborative Internal Review Board (IRB). Your request for the research project, "Searching for Michigan K-12 Non-Instructional Services Efficiencies" has been approved.

Staff members from MDE and/or CEPI are in the process of adding your approved data request to the schedule and produce data files in accordance with your approved study. You will receive the data and password when the data files are ready.

Please be sure to provide all investigators with copies of your approved Confidential Data Request Application and letters, as all investigators are expected to adhere to all policies, procedures and dates outlined in the application and letters. It is the responsibility of all investigators to ensure the parameters of the approved research study are followed, including data collection and security, dissemination rules and other procedures.

Methodology and preliminary result check-points will be completed throughout your project for our review. We anticipate your final results, as well as copies of any papers or other publications generated from this study, at least 30 days prior to public dissemination (e.g., conference presentations, seminar workshops, submission to journals) and/or publication. This includes a summary of dissertation findings if this work is to be used in a dissertation study. Your research results must include the following disclaimer:

> "This research result used data collected and maintained by the Michigan Department of Education (MDE) and/or Michigan's Center for Educational Performance and Information (CEPI). Results, information and opinions solely represent the analysis, information and opinions of the author(s) and are not endorsed by, or reflect the views or positions of, grantors, MDE and CEPI or any employee thereof."

Please remember that data obtained under your request are considered a loan and may not be sold or rented. Commercial use of data obtained under your request is prohibited. As a recipient, you **do not** retain ownership of the data. Such data may not be shared or distributed, and all copies must be destroyed when the analysis or report is completed. We remind you that a certificate of data destruction must be supplied on or before the data loan expiration date. These data, copies of it, and all reports must be maintained in a secure environment to prevent unauthorized access. A secure environment includes any electronic media, personal computer, server, or network on which the data reside as described in the National Institute of Standards and Technology (NIST) *Federal Information Technology Security Assessment Framework* (November 29, 2000). Please understand that deliberate or accidental misuse of information may result in one or more of the following: loss of access, disciplinary action, and any additional needed actions under the scope of all applicable federal and state laws.

If you have questions or changes to your data request, please send an email message to MDE-research@michigan.gov and include your application ID number along with your message. Thank you.

Sincerely,

David Judd, Director
Office of P-20 Data, Information, and Research Management
Michigan Department of Education

Thomas E. Howell, Director
Center for Educational Performance and Information
Michigan Department of Technology, Management & Budget

Appendix C

Tables

Table C.1

Summary of District Numbers, Staffing and Enrollment

Year	Intermediate School Districts	Local Education Agencies	Public School Academies	Total Districts	Number of Teachers	Pupil Enrollment
1836		55		55	98	2,377
1840		1,560		1,560	1,870	48,817
1850		3,097		3,097	4,087	132,234
1860		4,087		4,087	7,921	246,802
1870		5,108		5,108	11,014	384,554
1880		6,352		6,352	13,949	506,221
1890		7,168		7,168	15,990	654,502
1894		7,160		7,160	16,190	696,234
1895		7,159		7,159	16,013	699,828
1896		7,167		7,167	15,896	700,069
1897		7,151		7,151	15,601	701,244
1898		7,157		7,157	15,673	703,730
1899		7,161		7,161	15,564	713,690
1900		7,163		7,163	15,924	721,698
1901		7,171		7,171	16,054	730,101
1902		7,204		7,204	16,252	738,182
1903		7,229		7,229	16,664	744,603
1904		7,255		7,255	16,765	745,010
1905		7,267		7,267	16,823	743,184
1906		7,294		7,294	16,924	747,887
1907		7,302		7,302	17,286	743,030
1908		7,310		7,310	17,407	747,276
1909		7,330		7,330	17,763	755,935
1910		7,333		7,333	17,987	771,471
1911		7,361		7,361	18,207	783,770
1912		7,362		7,362	18,824	795,423
1913		7,327		7,327	19,500	815,840
1914		7,335		7,335	19,734	826,400
1915		7,337		7,337	20,161	845,754
1916		7,339		7,339	20,979	866,570
1917		7,333		7,333	21,992	892,787
1918		7,329		7,329	23,051	919,666
1919		7,312		7,312	23,388	937,330
1920		7,273		7,273	24,302	978,412
1921		7,189		7,189	24,938	1,020,699

Year	Intermediate School Districts	Local Education Agencies	Public School Academies	Total Districts	Number of Teachers	Pupil Enrollment
1922		6,984		6,984	25,755	1,038,897
1923		6,953		6,953	27,008	1,075,890
1924		6,925		6,925	27,918	1,124,551
1925		6,890		6,890	29,390	1,160,435
1926		6,863		6,863	30,327	1,199,260
1927		6,873		6,873	31,184	1,247,932
1928		6,878		6,878	33,119	1,274,478
1929		6,842		6,842	33,724	1,337,018
1930		6,822		6,822	34,552	1,365,007
1931		6,779		6,779	34,806	1,373,585
1932		6,746		6,746	34,049	1,383,124
1933		6,709		6,709	32,007	1,389,417
1934		6,710		6,710	31,830	1,392,822
1935		6,692		6,692	31,340	1,398,348
1936		6,642		6,642	32,583	1,397,679
1937		6,604		6,604	31,816	1,402,672
1938		6,558		6,558	32,583	1,399,769
1939		6,466		6,466	32,702	1,389,347
1940		6,386		6,386	32,447	1,385,576
1941		6,318		6,318	32,017	1,382,979
1942		6,274		6,274	32,119	1,384,446
1943		6,239		6,239	32,567	1,400,170
1944		6,152		6,152	31,569	1,410,623
1945		6,029		6,029	31,966	1,403,493
1946		5,823		5,823	32,508	1,398,112
1947		5,434		5,434	32,574	1,414,196
1948		5,186		5,186	33,811	1,439,750
1949		5,031		5,031	35,200	1,466,972
1950	83	4,918		5,001	37,157	1,489,351
1951	83	4,841		4,924	38,688	1,518,759
1952	83	4,736		4,819	40,460	1,589,923
1953	83	4,532		4,615	45,528	1,664,726
1954	83	4,246		4,329	43,957	1,746,789
1955	83	3,855		3,938	47,040	1,823,080
1956	83	3,495		3,578	49,663	1,910,552
1957	83	2,854		2,937	53,171	1,988,293
1958	83	2,499		2,582	55,794	2,058,028
1959	83	2,301		2,384	58,251	2,124,139
1960	83	2,149		2,232	60,394	2,199,545
1961	83	1,989		2,072	63,271	2,272,279
1962	83	1,794		1,877	66,024	2,339,079
1963	83	1,580		1,663	68,099	2,415,696
1964	83	1,436		1,509	69,380	2,466,676

Year	Intermediate School Districts	Local Education Agencies	Public School Academies	Total Districts	Number of Teachers	Pupil Enrollment
1965	58	1,227		1,285	72,935	2,539,032
1966	58	993		1,051	76,047	2,620,663
1967	58	866		924	80,637	3,448,802
1968	58	712		770	85,346	3,434,754
1969	58	648		706	87,487	2,122,915
1970	58	638		696	88,959	2,164,386
1971	58	624		682	90,672	2,178,745
1972	58	608		666	91,190	2,212,205
1973	58	602		660	93,852	2,193,270
1974	58	597		655	94,221	2,159,966
1975	58	590		648	93,580	2,139,720
1976	58	587		645	92,677	2,127,917
1977	58	581		639	90,780	2,081,936
1978	57	579		636	90,312	2,023,944
1979	57	576		633	88,652	1,965,685
1980	57	575		632	87,487	1,910,385
1981	57	574		631	84,041	1,859,934
1982	57	574		631	78,447	1,792,331
1983	57	573		630	74,814	1,742,831
1984	57	570		627	74,312	1,712,103
1985	57	567		624	75,193	1,678,458
1986	57	566		623	76,166	1,666,281
1987	57	564		621	76,791	1,657,423
1988	57	563		620	77,779	1,657,844
1989	57	562		619	77,861	1,640,294
1990	57	562		619	77,737	1,637,592
1991	57	561		618	79,660	1,651,502
1992	57	559		616	81,079	1,673,020
1993	57	559		616	66,247	1,675,465
1994	57	557	1	615	81,024	1,602,622
1995	57	557	14	628	85,349	1,653,949
1996	57	555	44	656	86,446	1,673,879
1997	57	555	78	690	89,667	1,680,693
1998	57	555	108	720	91,823	1,694,320
1999	57	555	138	750	75,564[1]	1,710,365
2000	57	555	171	783	77,720	1,714,815
2001	57	554	184	795	76,970	1,720,335
2002	57	554	189	800	77,818	1,731,092
2003	57	553	188	798	78,734	1,750,631
2004	57	553	199	809	78,148	1,734,019
2005	57	552	216	825	76,319	1,723,087
2006	57	552	225	834	74,544	1,712,133
2007	57	552	229	838	74,256	1,693,436

Year	Intermediate School Districts	Local Education Agencies	Public School Academies	Total Districts	Number of Teachers	Pupil Enrollment
2008	57	552	230	839	72,961	1,661,461
2009	57	551	232	840	72,021	1,628,628
2010	57	551	240	848	69,996	1,605,951
2011	57	551	247	855	67,950	1,577,606
2012	57	549	256	862	61,775	1,559,847
2013	56	549	278	883	60,580	1,542,691
2014	56	545	299	900	59,957	1,530,457
2015	56	541	303	900	59,237	1,520,074
2016	56	540	303	899	58,233	1,507,743
2017	56	538	301	897		1,485,893

(Michigan Depart of Education, 2018; Michigan Legislative Council, 2017; Citizens Research Council, 1990)

Table C.2

Reorganization of Michigan Districts – 1982 through 2017

Year	LEAs	Type	Eliminated District	Receiving District(s)
82-83	573	Annex	Marquette Twp SD	Marquette Area SD
83-14	570	Annex	Springfield Twp SD	Battle Creek
		Annex	Bessemer Twp SD	Bessemer Area
		Dissolved	Bloomfield Twp SD #4	Bloomfield SD #1, Bloomfield SD #7, Harbor Beach CS, Siegel SD #3
84-85	567	Annex	Cherry Hill SD	Wayne-Westland CS,
		Annex	N. Dearborn Heights PS	Crestwood SD
		Annex	Bergland Twp SD	Ewen-Trout Creek SD
85-86	566	Annex	St. Ignace Twp SD	St. Ignace PS
86-87	564	Consolidated	Mathiasa SD & Rock River Limestone SD	Superior Central SD
		Annex	Fredonia Twp SD	Marshall PS
87-88	563	Annex	Sheridan Twp SD #5	Bad Axe PS
88-89	562	Annex	Covington Twp SD	L'anse PS
90-91	561	Annex	Berlin Twp SD #5	Ionia PS
91-92	559	Annex	Cross Village Twp SD	Harbor Springs PS
		Annex	Orleans Twp SD	Ionia PS
93-94	557	Annex	Ionia Twp SD #5	Ionia PS
		Annex	Falmouth Twp SD	McBain
95-96	555	Annex	Pineview Twp SD	Big Rapids PS
		Annex	Ferry Twp SD	Shelby PS
00-01	554	Dissolve	Bloomfield Twp SD #1 (aka Red School)	Harbor Beach PS, Port Hope PS, Bloomfield SD #7, Siegel SD #3
02-03	553	Dissolve	Roxand Loucks CS	Charlotte PS & Grand Ledge PS
04-05	552	Consol	Wakefield PS & Marenisco PS	Wakefield-Marenisco PS
08-09	551	Annex	White Pine Twp SD	Ontonagon PS
11-12	549	Annex	Bloomfield Twp SD #7 Rapson	Sigel Twp SD #3
		Consol	Deerfield PS & Britton-Macon PS	Britton Deerfield SD
13-14	545	Annex	Freesoil PS	Mason County Eastern PS
		Dissolve	Buena Vista PS	Saginaw PS, Bridgeport-Spaulding CS & Frankenmuth SD
		Dissolve	Inkster PS	Romulus PS, Taylor PS, Wayne-Westland PS, & Westwood CS
		Consol	Willow Run PS & Ypsilanti PS	Ypsilanti CS
14-15	541	Annex	Palo CS	Carson City-Crystal Schools
		Annex	Redford Union PS	South Redford PS
		Dissolve	Galien Twp SD	Buchanan CS

Year	LEAs	Type	Eliminated District	Receiving District(s)
		PSA	Highland Park PS	Highland Park Academy
15-16	540	Annex	Port Hope SD	North Huron SD
16-17	538	Annex	Albion PS	Marshall PS
		Annex	Sigel Twp SD #6	Harbor Beach CS

CS = Community Schools, SD = School District, PS = Public Schools, Twp = Township
("How school districts", 2012; Peapples, 1986; P. Boone, personal communication, September 28, 2016)

Appendix D

Descriptive Statistics SPSS Output

Table D. 1

Descriptive Statistics Function 220: Total FTE

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	455	455	455	455	455	455
	Missing	0	0	0	0	0	0
Mean		13.47	.07	13.54	.8912	.0160	.7758
Median		6.32	.00	6.46	.8645	.0000	.8102
Mode		2	0	2	.48	.00	.30
Std. Deviation		25.387	.379	25.396	.45419	.08434	.58553
Variance		644.476	.144	644.946	.206	.007	.343
Skewness		7.152	6.667	7.140	.441	5.618	-.471
Std. Error of Skewness		.114	.114	.114	.114	.114	.114
Kurtosis		71.629	49.196	71.450	-.091	32.099	1.527
Std. Error of Kurtosis		.228	.228	.228	.228	.228	.228
Range		306	4	306	2.49	.70	4.49
Minimum		0	0	0	.00	.00	-2.00
Maximum		306	4	306	2.49	.70	2.49
Sum		6131	30	6161	405.47	7.28	353.00

a. Function Code = 220

Table D. 2

Descriptive Statistics Function 220: Consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	2	2	2	2	2	2
	Missing	0	0	0	0	0	0
Mean		.00	1.61	1.61	.0000	.4137	.1999
Median		.00	1.61	1.61	.0000	.4137	.1999
Mode		0	1[b]	1[b]	.00	.37[b]	.13[b]
Std. Deviation		.000	.361	.361	.00000	.06031	.09841
Variance		.000	.130	.130	.000	.004	.010
Range		0	1	1	.00	.09	.14
Minimum		0	1	1	.00	.37	.13
Maximum		0	2	2	.00	.46	.27
Sum		0	3	3	.00	.83	.40

a. Function Code = 220

b. Multiple modes exist. The smallest value was shown

Table D. 3

Descriptive Statistics Function 220: Non-consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	453	453	453	453	453	453
	Missing	0	0	0	0	0	0
Mean		13.53	.06	13.59	.8951	.0143	.7784
Median		6.35	.00	6.48	.8663	.0000	.8116
Mode		2	0	2	.48	.00	.30
Std. Deviation		25.427	.365	25.439	.45130	.08021	.58555
Variance		646.520	.133	647.166	.204	.006	.343
Skewness		7.144	7.173	7.130	.460	6.066	-.482
Std. Error of Skewness		.115	.115	.115	.115	.115	.115
Kurtosis		71.422	56.621	71.212	-.087	37.738	1.551
Std. Error of Kurtosis		.229	.229	.229	.229	.229	.229
Range		306	4	306	2.48	.70	4.49
Minimum		0	0	0	.00	.00	-2.00
Maximum		306	4	306	2.49	.70	2.49
Sum		6131	27	6158	405.47	6.46	352.60

a. Function Code = 220

Table D. 4

Descriptive Statistics Function 230: Total FTE

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	517	517	517	517	517	517
	Missing	0	0	0	0	0	0
Mean		3.56	.03	3.59	.6143	.0068	.4665
Median		3.00	.00	3.10	.6021	.0000	.4914
Mode		2	0	2	.48	.00	.30
Std. Deviation		2.267	.216	2.264	.19656	.05254	.32421
Variance		5.139	.046	5.128	.039	.003	.105
Skewness		2.283	8.967	2.281	-.102	8.351	-2.238
Std. Error of Skewness		.107	.107	.107	.107	.107	.107
Kurtosis		9.549	82.561	9.504	1.179	71.194	10.712
Std. Error of Kurtosis		.214	.214	.214	.214	.214	.214
Range		19	2	19	1.30	.53	2.68
Minimum		0	0	0	.00	.00	-1.40
Maximum		19	2	19	1.30	.53	1.28
Sum		1840	14	1854	317.61	3.50	241.20

a. Function Code = 230

Table D. 5

Descriptive Statistics Function 230: Consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	3	3	3	3	3	3
	Missing	0	0	0	0	0	0
Mean		.53	1.58	2.12	.1383	.3796	.1602
Median		.00	2.00	2.40	.0000	.4771	.3802
Mode		0	0[b]	0[b]	.00	.13[b]	-.46[b]
Std. Deviation		.924	1.087	1.643	.23958	.21761	.54080
Variance		.853	1.181	2.701	.057	.047	.292
Skewness		1.732	-1.472	-.753	1.732	-1.611	-1.528
Std. Error of Skewness		1.225	1.225	1.225	1.225	1.225	1.225
Range		2	2	3	.41	.40	1.01
Minimum		0	0	0	.00	.13	-.46
Maximum		2	2	4	.41	.53	.56
Sum		2	5	6	.41	1.14	.48

a. Function Code = 230

b. Multiple modes exist. The smallest value was shown

Table D. 6

Descriptive Statistics Function 230: Non-consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	514	514	514	514	514	514
	Missing	0	0	0	0	0	0
Mean		3.58	.02	3.59	.6171	.0046	.4683
Median		3.01	.00	3.10	.6031	.0000	.4914
Mode		2	0	2	.48	.00	.30
Std. Deviation		2.261	.167	2.266	.19314	.04212	.32255
Variance		5.112	.028	5.134	.037	.002	.104
Skewness		2.308	10.708	2.285	-.023	9.901	-2.257
Std. Error of Skewness		.108	.108	.108	.108	.108	.108
Kurtosis		9.659	119.450	9.502	1.105	101.448	10.999
Std. Error of Kurtosis		.215	.215	.215	.215	.215	.215
Range		19	2	19	1.29	.48	2.68
Minimum		0	0	0	.02	.00	-1.40
Maximum		19	2	19	1.30	.48	1.28
Sum		1839	9	1847	317.19	2.37	240.72

a. Function Code = 230

Table D. 7

Descriptive Statistics Function 240: Total FTE

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	503	503	503	503	503	503
	Missing	0	0	0	0	0	0
Mean		23.10	.08	23.19	1.2097	.0182	1.1665
Median		15.00	.00	15.00	1.2041	.0000	1.1761
Mode		6	0	6	.85	.00	.78
Std. Deviation		26.312	.485	26.327	.38425	.09543	.43521
Variance		692.334	.235	693.126	.148	.009	.189
Skewness		3.333	7.015	3.325	.048	5.740	-.527
Std. Error of Skewness		.109	.109	.109	.109	.109	.109
Kurtosis		15.533	53.574	15.461	.117	33.867	2.013
Std. Error of Kurtosis		.217	.217	.217	.217	.217	.217
Range		227	5	227	2.33	.78	3.58
Minimum		0	0	0	.03	.00	-1.22
Maximum		227	5	227	2.36	.78	2.36
Sum		11620	42	11662	608.48	9.15	586.75

Table D. 8

Descriptive Statistics Function 240: Consolidated

No consolidated services in Function 240 therefore there are no SPSS statistics.

Table D. 9

Descriptive Statistics Function 240: Non-consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	503	503	503	503	503	503
	Missing	0	0	0	0	0	0
Mean		23.10	.08	23.19	1.2097	.0182	1.1665
Median		15.00	.00	15.00	1.2041	.0000	1.1761
Mode		6	0	6	.85	.00	.78
Std. Deviation		26.312	.485	26.327	.38425	.09543	.43521
Variance		692.334	.235	693.126	.148	.009	.189
Skewness		3.333	7.015	3.325	.048	5.740	-.527
Std. Error of Skewness		.109	.109	.109	.109	.109	.109
Kurtosis		15.533	53.574	15.461	.117	33.867	2.013
Std. Error of Kurtosis		.217	.217	.217	.217	.217	.217
Range		227	5	227	2.33	.78	3.58
Minimum		0	0	0	.03	.00	-1.22
Maximum		227	5	227	2.36	.78	2.36
Sum		11620	42	11662	608.48	9.15	586.75

a. Function Code = 240

Table D. 10

Descriptive Statistics Function 250: Total FTE

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	413	413	413	413	413	413
	Missing	0	0	0	0	0	0
Mean		4.79	.12	4.92	.6665	.0284	.5528
Median		3.62	.00	3.80	.6646	.0000	.5798
Mode		2	0	2	.48	.00	.30
Std. Deviation		4.420	.556	4.369	.28655	.11051	.35871
Variance		19.534	.309	19.091	.082	.012	.129
Skewness		2.384	7.124	2.423	.091	4.400	-.354
Std. Error of Skewness		.120	.120	.120	.120	.120	.120
Kurtosis		7.747	67.455	7.943	.217	20.904	1.043
Std. Error of Kurtosis		.240	.240	.240	.240	.240	.240
Range		30	7	30	1.49	.90	2.40
Minimum		0	0	0	.00	.00	-.92
Maximum		30	7	30	1.49	.90	1.48
Sum		1980	50	2030	275.25	11.74	228.31

a. Function Code = 250

Table D. 11

Descriptive Statistics Function 250: Consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	17	17	17	17	17	17
	Missing	0	0	0	0	0	0
Mean		.05	1.56	1.61	.0150	.3459	-.0005
Median		.00	1.00	1.00	.0000	.3010	.0000
Mode		0	2	2	.00	.48	.30
Std. Deviation		.194	1.704	1.698	.06191	.22560	.46814
Variance		.038	2.903	2.884	.004	.051	.219
Skewness		4.123	2.341	2.273	4.123	.939	-.353
Std. Error of Skewness		.550	.550	.550	.550	.550	.550
Kurtosis		17.000	6.318	6.117	17.000	.991	-.143
Std. Error of Kurtosis		1.063	1.063	1.063	1.063	1.063	1.063
Range		1	7	7	.26	.85	1.77
Minimum		0	0	0	.00	.05	-.92
Maximum		1	7	7	.26	.90	.85
Sum		1	27	27	.26	5.88	-.01

a. Function Code = 250

Table D. 12

Descriptive Statistics Function 250: Non-consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	396	396	396	396	396	396
	Missing	0	0	0	0	0	0
Mean		5.00	.06	5.06	.6944	.0148	.5766
Median		3.92	.00	4.00	.6919	.0000	.6021
Mode		2	0	2	.48	.00	.30
Std. Deviation		4.400	.333	4.394	.25776	.07844	.33405
Variance		19.361	.111	19.306	.066	.006	.112
Skewness		2.436	6.435	2.415	.517	5.606	-.043
Std. Error of Skewness		.123	.123	.123	.123	.123	.123
Kurtosis		7.889	44.363	7.820	-.012	31.848	.325
Std. Error of Kurtosis		.245	.245	.245	.245	.245	.245
Range		30	3	30	1.39	.60	2.08
Minimum		0	0	0	.10	.00	-.60
Maximum		30	3	30	1.49	.60	1.48
Sum		1979	23	2003	274.99	5.86	228.32

a. Function Code = 250

Table D. 13

Descriptive Statistics Function 260: Total FTE

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	468	468	468	468	468	468
	Missing	0	0	0	0	0	0
Mean		17.53	3.85	21.39	.9660	.2381	.9717
Median		8.00	.00	10.00	.9542	.0000	1.0000
Mode		2	0	2	.48	.00	.30
Std. Deviation		28.471	17.998	36.128	.49742	.46490	.59099
Variance		810.597	323.912	1305.233	.247	.216	.349
Skewness		3.847	14.446	5.882	.339	1.942	-.253
Std. Error of Skewness		.113	.113	.113	.113	.113	.113
Kurtosis		19.799	257.767	55.124	-.430	2.887	.012
Std. Error of Kurtosis		.225	.225	.225	.225	.225	.225
Range		259	338	465	2.41	2.53	3.76
Minimum		0	0	0	.00	.00	-1.10
Maximum		259	338	465	2.41	2.53	2.67
Sum		8205	1804	10009	452.07	111.45	454.78

a. Function Code = 260

Table D. 14

Descriptive Statistics Function 260: Consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	64	64	64	64	64	64
	Missing	0	0	0	0	0	0
Mean		7.38	22.76	30.14	.6477	1.1338	1.1801
Median		2.81	13.63	19.35	.5804	1.1651	1.2866
Mode		2	9[b]	0[b]	.48	1.00[b]	-.60[b]
Std. Deviation		17.099	43.569	60.114	.42963	.43689	.53665
Variance		292.366	1898.241	3613.639	.185	.191	.288
Skewness		5.908	6.318	6.356	.746	.063	-.783
Std. Error of Skewness		.299	.299	.299	.299	.299	.299
Kurtosis		39.574	44.999	45.102	1.215	1.042	2.382
Std. Error of Kurtosis		.590	.590	.590	.590	.590	.590
Range		127	338	465	2.11	2.43	3.27
Minimum		0	0	0	.00	.10	-.60
Maximum		127	338	465	2.11	2.53	2.67
Sum		472	1457	1929	41.45	72.56	75.52

a. Function Code = 260

b. Multiple modes exist. The smallest value was shown

Table D. 15

Descriptive Statistics Function 260: Non-consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	404	404	404	404	404	404
	Missing	0	0	0	0	0	0
Mean		19.14	.86	20.00	1.0164	.0962	.9387
Median		8.98	.00	9.03	.9989	.0000	.9557
Mode		2	0	2	.48	.00	.30
Std. Deviation		29.575	3.586	30.554	.48911	.27023	.59306
Variance		874.658	12.863	933.517	.239	.073	.352
Skewness		3.703	6.036	3.519	.305	3.260	-.176
Std. Error of Skewness		.121	.121	.121	.121	.121	.121
Kurtosis		18.416	40.239	16.470	-.511	10.747	-.119
Std. Error of Kurtosis		.242	.242	.242	.242	.242	.242
Range		259	32	259	2.38	1.52	3.51
Minimum		0	0	0	.03	.00	-1.10
Maximum		259	32	259	2.41	1.52	2.41
Sum		7732	347	8080	410.62	38.88	379.25

a. Function Code = 260

Table D. 16

Descriptive Statistics Function 270: Total FTE

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	430	430	430	430	430	430
	Missing	0	0	0	0	0	0
Mean		17.53	1.83	19.36	.9627	.1115	.9269
Median		8.36	.00	9.96	.9712	.0000	.9983
Mode		2	0	2	.48	.00	.30
Std. Deviation		30.144	11.955	31.825	.50609	.33105	.59738
Variance		908.687	142.927	1012.832	.256	.110	.357
Skewness		4.623	13.584	4.352	.205	3.502	-.360
Std. Error of Skewness		.118	.118	.118	.118	.118	.118
Kurtosis		27.934	220.721	24.235	-.392	12.907	.458
Std. Error of Kurtosis		.235	.235	.235	.235	.235	.235
Range		279	210	279	2.45	2.32	4.14
Minimum		0	0	0	.00	.00	-1.70
Maximum		279	210	279	2.45	2.32	2.45
Sum		7536	788	8324	413.97	47.96	398.59

a. Function Code = 270

Table D. 17

Descriptive Statistics Function 270: Consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	28	28	28	28	28	28
	Missing	0	0	0	0	0	0
Mean		2.06	23.43	25.50	.3070	1.0511	.9755
Median		.50	10.42	12.09	.1761	1.0574	1.0822
Mode		0	2	2	.00	.48	.30
Std. Deviation		3.515	41.310	41.920	.36499	.54268	.71477
Variance		12.359	1706.490	1757.282	.133	.295	.511
Skewness		2.347	3.753	3.495	1.040	.156	-.639
Std. Error of Skewness		.441	.441	.441	.441	.441	.441
Kurtosis		5.555	16.101	14.279	-.020	.029	.409
Std. Error of Kurtosis		.858	.858	.858	.858	.858	.858
Range		14	210	210	1.19	2.23	2.96
Minimum		0	0	0	.00	.09	-.64
Maximum		14	210	210	1.19	2.32	2.32
Sum		58	656	714	8.60	29.43	27.31

a. Function Code = 270

Table D. 18

Descriptive Statistics Function 270: Non-consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	402	402	402	402	402	402
	Missing	0	0	0	0	0	0
Mean		18.60	.33	18.93	1.0084	.0461	.9236
Median		9.45	.00	9.73	1.0189	.0000	.9881
Mode		2	0	2	.48	.00	.30
Std. Deviation		30.878	1.777	31.023	.48263	.17742	.58924
Variance		953.449	3.159	962.419	.233	.031	.347
Skewness		4.508	7.895	4.454	.272	4.750	-.338
Std. Error of Skewness		.122	.122	.122	.122	.122	.122
Kurtosis		26.439	70.757	25.869	-.356	24.348	.477
Std. Error of Kurtosis		.243	.243	.243	.243	.243	.243
Range		279	20	279	2.44	1.33	4.14
Minimum		0	0	0	.01	.00	-1.70
Maximum		279	20	279	2.45	1.33	2.45
Sum		7478	132	7610	405.37	18.52	371.27

a. Function Code = 270

Table D. 19

Descriptive Statistics Function 280: Total FTE

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	379	379	379	379	379	379
	Missing	0	0	0	0	0	0
Mean		6.27	.65	6.93	.6840	.0761	.5649
Median		3.76	.00	4.00	.6776	.0000	.6021
Mode		2	0	2	.48	.00	.30
Std. Deviation		8.201	4.528	9.465	.37415	.22642	.50297
Variance		67.253	20.499	89.593	.140	.051	.253
Skewness		2.732	15.324	3.336	.454	3.856	-.172
Std. Error of Skewness		.125	.125	.125	.125	.125	.125
Kurtosis		8.308	263.582	15.735	-.088	18.379	.367
Std. Error of Kurtosis		.250	.250	.250	.250	.250	.250
Range		49	81	84	1.70	1.91	3.15
Minimum		0	0	0	.00	.00	-1.22
Maximum		49	81	84	1.70	1.91	1.93
Sum		2377	248	2625	259.23	28.84	214.11

a. Function Code = 280

Table D. 20

Descriptive Statistics Function 280: Consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	20	20	20	20	20	20
	Missing	0	0	0	0	0	0
Mean		1.35	7.85	9.20	.2182	.6275	.4942
Median		.00	2.14	3.44	.0000	.4959	.5360
Mode		0	1[b]	1[b]	.00	.30[b]	.00[b]
Std. Deviation		2.453	18.075	19.313	.33529	.43370	.60211
Variance		6.017	326.688	372.987	.112	.188	.363
Skewness		1.991	3.870	3.525	1.258	1.651	.662
Std. Error of Skewness		.512	.512	.512	.512	.512	.512
Kurtosis		3.188	15.702	13.203	.174	3.292	.498
Std. Error of Kurtosis		.992	.992	.992	.992	.992	.992
Range		8	80	84	.96	1.78	2.38
Minimum		0	0	0	.00	.13	-.46
Maximum		8	81	84	.96	1.91	1.93
Sum		27	157	184	4.36	12.55	9.88

a. Function Code = 280

b. Multiple modes exist. The smallest value was shown

Table D. 21

Descriptive Statistics Function 280: Non-consolidated

		FTE Employees by Function	FTE Contractors by Function	FTE Total by Function	FTE Employees by Function Log_{10}	FTE Contractors by Function Log_{10}	FTE Total by Function Log_{10}
N	Valid	359	359	359	359	359	359
	Missing	0	0	0	0	0	0
Mean		6.55	.25	6.80	.7099	.0454	.5689
Median		4.00	.00	4.00	.6990	.0000	.6021
Mode		2	0	2	.48	.00	.30
Std. Deviation		8.322	1.118	8.631	.35923	.16192	.49757
Variance		69.259	1.251	74.499	.129	.026	.248
Skewness		2.679	6.129	2.583	.578	4.062	-.234
Std. Error of Skewness		.129	.129	.129	.129	.129	.129
Kurtosis		7.890	43.003	7.168	-.063	16.973	.406
Std. Error of Kurtosis		.257	.257	.257	.257	.257	.257
Range		49	11	49	1.67	1.07	2.91
Minimum		0	0	0	.03	.00	-1.22
Maximum		49	11	49	1.70	1.07	1.69
Sum		2350	91	2441	254.87	16.29	204.23

a. Function Code = 280

Appendix E

t-test SPSS Output

Table E. 1

Independent Samples t-test by Function (2017)

	250 Business Svcs	260 Opns & Maint	270 Trans	280 Central Support
FTE by function				
t-score (*p*) **	6.85 (0.00) **	-3.05 (.00) **	-0.44 (6.58)	0.65 (0.52)
Con. *M* (*SD*)	0.00 (0.47)	1.18 (0.54)	0.98 (0.72)	0.49 (0.60)
Non-Con. *M* (*SD*)	0.58 (0.33)	0.94 (0.59)	0.92 (0.59)	0.57 (0.50)
df	411	465	427	377
Foundation Allowance				
t-score (*p*)	1.01 (0.31)	0.12 (0.91)	0.125 (0.90)	-0.44 (0.66)
Con. *M* (*SD*)	7560 (146)	7706 (601)	7678 (657)	7765 (662)
Non-Con. *M* (*SD*)	7696 (552)	7715 (608)	7692 (597)	7709 (560)
df	411	465	427	377
Enrollment				
t-score (*p*)	1.73 (0.08)	-1.41 (0.16)	-0.82 (0.42)	1.59 (0.11)
Con. *M* (*SD*)	1553 (1576)	2862 (3423)	2732 (3242)	1892 (2422)
Non-Con. *M* (*SD*)	2686 (2675)	2376 (2410)	2318 (2546)	2879 (2717)
df	411	465	427	377
PP Expenditures by function				
t-score (*p*)	0.70 (0.48)	1.84 (0.07)	0.11 (0.91)	1.90 (0.06)
Con. *M* (*SD*)	192.81 (112.13)	881.03 (274.50)	551.14 (430.55)	190.83 (121.28)
Non-Con. *M* (*SD*)	221.54 (166.46)	1027.29 (624.44)	562.03 (494.79)	243.87 (121.82)
df	411	465	427	377
PP Wages by function				
t-score (*p*)	4.22 (0.00) **	9.14 (0.00) **	4.52 (0.00) **	3.52 (0.00) **
Con. *M* (*SD*)	8.62 (19.27)	102.55 (79.29)	22.61 (53.15)	31.91 (51.69)
Non-Con. *M* (*SD*)	88.75 (78.07)	221.83 (170.26)	209.55 (218.40)	71.58 (48.90)
df	411	174	427	377
PP Benefits by function				
t-score	4.12 (0.00) **	8.65 (0.00) **	4.34 (0.00) **	3.49 (0.00) **
Con. *M* (*SD*)	6.23 (14.17)	74.97 (60.44)	18.52 (45.34)	20.65 (33.47)
Non-Con. *M* (*SD*)	60.45 (54.08)	157.25 (115.90)	131.19 (136.85)	47.29 (33.21)
df	411	150	427	377

**. $p<.01$, *$p<.05$, Con = Consolidated, Non-Con = Non-Consolidated

Table E. 2

Independent Samples t-test by Function (2016)

	250 Business Svcs	260 Opns & Maint	270 Trans	280 Central Support
FTE by function				
t-score (*p*) **	4.59 (0.00) **	-4.66 (0.00) **	-0.44 (6.58)	2.09 (0.04) *
Con. *M* (*SD*)	-0.07 (0.41)	1.06 (0.50)	0.70 (0.82)	0.09 (0.55)
Non-Con. *M* (*SD*)	0.32 (0.33)	0.70 (0.60)	0.69 (0.60)	0.32 (0.50)
df	401	64	427	371
Foundation Allowance				
t-score (*p*)	0.95 (0.34)	-0.76 (0.45)	0.125 (0.90)	0.48 (0.63)
Con. *M* (*SD*)	7447 (158)	7665 (709)	7564 (694)	7547 (354)
Non-Con. *M* (*SD*)	7584 (578)	7592 (619)	7582 (618)	7610 (608)
df	401	463	427	371
Enrollment				
t-score (*p*)	1.53 (0.13)	-0.146 (0.88)	-0.82 (0.42)	5.11 (0.00) **
Con. *M* (*SD*)	1718 (1426)	2473 (2584)	3002 (3520)	1393 (1247)
Non-Con. *M* (*SD*)	2743 (2696)	2416 (2591)	2289 (2516)	2949 (2789)
df	401	463	427	371
PP Expenditures by function				
t-score (*p*)	0.68 (0.50)	-0.345 (0.73)	0.11 (0.91)	2.57 (0.01) *
Con. *M* (*SD*)	196.70 (122.01)	1099.27 (1571.99)	607.81 (738.06)	175.24 (122.24)
Non-Con. *M* (*SD*)	228.87 (188.82)	1020.42 (515.81)	584.79 (590.29)	248.62 (130.28)
df	401	48	427	371
PP Wages by function				
t-score (*p*)	3.45 (0.00) **	11.23 (0.00) **	4.52 (0.00) **	4.35 (0.00) **
Con. *M* (*SD*)	10.87 (15.01)	86.95 (67.16)	22.31 (53.12)	24.36 (39.42)
Non-Con. *M* (*SD*)	89.54 (91.07)	227.28 (161.03)	214.76 (241.45)	71.95 (50.37)
df	401	124	427	371
PP Benefits by function				
t-score	3.53 (0.00) **	10.18 (0.00) **	4.34 (0.00) **	4.50 (0.00) **
Con. *M* (*SD*)	6.81 (10.62)	65.15 (52.68)	18.33 (48.60)	13.89 (21.18)
Non-Con. *M* (*SD*)	60.15 (60.32)	159.61 (108.66)	131.57 (122.73)	47.09 (34.14)
df	401	102	427	371

Con = Consolidated, Non-Con = Non-Consolidated

*$p < .10$. **$p < .05$. ***$p < .01$.

Table E. 3

Independent Samples t-test by Function (2015)

	250 Business Svcs	260 Opns & Maint	270 Trans	280 Central Support
FTE by function				
t-score (*p*) **	3.14 (0.01) **	-3.27 (0.00) **	-0.28 (0.78)	1.29 (0.20)
Con. *M* (*SD*)	-0.02 (0.47)	1.04 (0.54)	0.83 (0.64)	0.15 (0.64)
Non-Con. *M* (*SD*)	0.34 (0.32)	0.80 (0.54)	0.80 (0.55)	0.32 (0.50)
df	17	482	450	375
Foundation Allowance				
t-score (*p*)	1.09 (0.28)	-0.96 (0.34)	-0.38 (0.70)	-0.44 (0.66)
Con. *M* (*SD*)	7187 (184)	7466 (705)	7399 (690)	7461 (823)
Non-Con. *M* (*SD*)	7350 (615)	7375 (696)	7353 (662)	7387 (641)
df	410	482	450	375
Enrollment				
t-score (*p*)	1.79 (0.08)	-1.28 (0.20)	-1.46 (0.15)	4.37 (0.00) **
Con. *M* (*SD*)	1566 (1389)	2818 (3200)	2976 (3267)	1600 (1092)
Non-Con. *M* (*SD*)	2762 (2745)	2369 (2491)	2287 (2550)	2960 (2836)
df	410	482	450	25
PP Expenditures by function				
t-score (*p*)	0.27 (0.78)	-0.55 (0.58)	-0.81 (0.42)	3.98 (0.00) **
Con. *M* (*SD*)	625.37 (1204.57)	3288.04 (3436.45)	1706.68 (1891.43)	847.47 (723.38)
Non-Con. *M* (*SD*)	671.95 (656.22)	3033.63 (3385.44)	1455.40 (1694.23)	1641.25 (1601.05)
df	410	482	450	22
PP Wages by function				
t-score (*p*)	7.37 (0.00) **	1.91 (0.06)	8.21 (0.00) **	1.89 (0.06)
Con. *M* (*SD*)	67.55 (98.95)	455.08 (859.82)	84.17 (257.95)	291.26 (376.18)
Non-Con. *M* (*SD*)	263.75 (229.17)	721.15 (1044.27)	544.63 (688.37)	615.28 (681.27)
df	24	482	76	375
PP Benefits by function				
t-score	3.33 (0.00) **	1.75 (0.08)	6.82 (0.00) **	1.89 (0.06)
Con. *M* (*SD*)	43.40 (67.33)	325.57 (646.60)	61.73 (189.31)	149.93 (193.75)
Non-Con. *M* (*SD*)	173.14 (159.72)	496.77 (729.18)	339.24 (488.67)	341.37 (403.63)
df	410	482	73	375

**. *p*<.01, **p*<.05, Con = Consolidated, Non-Con = Non-Consolidated

Table E. 4

Independent Samples t-test by Function (2014)

	250 Business Svcs	260 Opns & Maint	270 Trans	280 Central Support
FTE by function				
t-score (*p*) **	6.11 (0.00) **	-3.84 (0.00) **	-1.13 (0.26)	3.20 (0.00) **
Con. *M* (*SD*)	0.15 (0.26)	1.40 (0.41)	1.27 (0.51)	0.18 (0.56)
Non-Con. *M* (*SD*)	0.65 (0.35)	1.16 (0.54)	1.16 (0.52)	0.63 (0.54)
df	433	73	467	392
Foundation Allowance				
t-score (*p*)	-0.21 (0.83)	0.21 (0.84)	-1.09 (0.28)	-0.32 (0.75)
Con. *M* (*SD*)	7291 (588)	2420 (2653)	7412 (850)	7352 (828)
Non-Con. *M* (*SD*)	7260 (621)	7279 (465)	7271 (664)	7296 (659)
df	433	493	467	392
Enrollment				
t-score (*p*)	1.97 (0.05)	-0.61 (0.54)	-2.46 (0.01) *	8.40 (0.00) **
Con. *M* (*SD*)	1471 (1464)	2656 (2374)	3555 (3735)	971 (710)
Non-Con. *M* (*SD*)	2746 (2729)	2420 (2653)	2311 (2545)	2930 (2807)
df	433	493	467	36
PP Expenditures by function				
t-score (*p*)	1.55 (0.12)	1.56 (0.12)	0.60 (0.55)	-0.52 (0.61)
Con. *M* (*SD*)	156.83 (81.30)	889.15 (226.87)	514.80 (312.47)	274.50 (409.12)
Non-Con. *M* (*SD*)	217.33 (164.18)	1034.99 (670.95)	563.90 (434.72)	219.40 (123.94)
df	433	493	467	14
PP Wages by function				
t-score (*p*)	3.44 (0.00) **	13.12 (0.00) **	5.05 (0.00) **	4.21 (0.00) **
Con. *M* (*SD*)	15.92 (23.47)	76.39 (69.95)	38.16 (58.96)	17.49 (40.77)
Non-Con. *M* (*SD*)	85.83 (86.06)	233.38 (147.61)	204.20 (176.39)	66.47 (44.31)
df	433	115	467	392
PP Benefits by function				
t-score	3.42 (0.00) **	12.00 (0.00) **	3.68 (0.00) **	4.11 (0.00) **
Con. *M* (*SD*)	10.89 (13.67)	51.70 (50.75)	27.49 (48.06)	9.05 (19.07)
Non-Con. *M* (*SD*)	53.17 (52.36)	151.13 (92.16)	117.13 (130.55)	38.87 (27.84)
df	433	97	467	392

**. $p<.01$, *$p<.05$, Con = Consolidated, Non-Con = Non-Consolidated

Table E. 5

Independent Samples t-test by Function (2013)

	250 Business Svcs	260 Opns & Maint	270 Trans	280 Central Support
FTE by function				
t-score (*p*) **	6.39 (0.00) **	-2.95 (0.00) **	-0.64 (0.53)	3.34 (0.00) **
Con. *M* (*SD*)	0.04 (0.52)	1.48 (0.40)	1.36 (0.62)	0.24 (0.36)
Non-Con. *M* (*SD*)	0.70 (0.35)	1.26 (0.53)	1.28 (0.48)	0.70 (0.53)
df	440	506	26	395
Foundation Allowance				
t-score (*p*)	-0.73 (0.47)	0.55 (0.58)	0.51 (0.61)	4.65 (0.00) **
Con. *M* (*SD*)	7350 (1107)	7190 (462)	7153 (484)	7005 (151)
Non-Con. *M* (*SD*)	7212 (632)	7246 (730)	7223 (682)	7247 (680)
df	440	506	485	44
Enrollment				
t-score (*p*)	11.23 (0.00) **	-0.12 (0.90)	-2.15 (0.03) *	9.13 (0.00) **
Con. *M* (*SD*)	748 (423)	2479 (2330)	3515 (3967)	977 (627)
Non-Con. *M* (*SD*)	2765 (2733)	2432 (2669)	2351 (2551)	2961 (2832)
df	50	506	485	44
PP Expenditures by function				
t-score (*p*)	0.84 (0.40)	1.66 (0.10)	0.57 (0.57)	1.65 (0.10)
Con. *M* (*SD*)	188.98 (164.87)	829.42 (200.14)	506.02 (201.31)	154.03 (94.36)
Non-Con. *M* (*SD*)	232.81 (178.33)	1020.36 (841.81)	567.06 (534.36)	207.54 (123.86)
df	440	506	485	395
PP Wages by function				
t-score (*p*)	2.99 (0.00) **	13.97 (0.00) **	4.53 (0.00) **	13.82 (0.00) **
Con. *M* (*SD*)	14.67 (37.42)	72.99 (65.74)	29.34 (50.12)	8.65 (13.36)
Non-Con. *M* (*SD*)	82.95 (78.93)	245.94 (182.30)	207.71 (196.53)	65.17 (42.93)
df	440	177	485	27
PP Benefits by function				
t-score	3.22 (0.00) **	11.66 (0.00) **	2.72 (0.01) **	19.29 (0.00) **
Con. *M* (*SD*)	7.30 (15.86)	54.97 (53.16)	23.75 (42.14)	2.84 (4.52)
Non-Con. *M* (*SD*)	49.49 (45.24)	156.42 (103.00)	118.29 (173.21)	37.19 (26.29)
df	440	108	485	71

**. $p<.01$, *$p<.05$, Con = Consolidated, Non-Con = Non-Consolidated

Table E. 6

Independent Samples t-test by Function (2012)

	250 Business Svcs	260 Opns & Maint	270 Trans	280 Central Support
FTE by function				
t-score (*p*) **	5.37 (0.00) **	-2.22 (0.03) *	-0.72 (0.47)	3.36 (0.00) **
Con. *M* (*SD*)	-0.27 (0.54)	1.17 (0.54)	1.07 (0.55)	-0.02 (0.60)
Non-Con. *M* (*SD*)	0.41 (0.33)	0.98 (0.52)	0.99 (0.48)	0.41 (0.52)
df	441	508	490	389
Foundation Allowance				
t-score (*p*)	-0.73 (0.49)	0.08 (0.93)	0.36 (0.72)	4.77 (0.00) **
Con. *M* (*SD*)	7542 (1471)	7153 (557)	7087 (563)	6915 (173)
Non-Con. *M* (*SD*)	7134 (662)	7162 (753)	7144 (709)	7178 (718)
df	6	508	490	55
Enrollment				
t-score (*p*)	1.91 (0.06)	0.13 (0.90)	-1.47 (0.14)	7.97 (0.00) **
Con. *M* (*SD*)	776 (524)	2430 (2229)	3306 (2647)	1178 (766)
Non-Con. *M* (*SD*)	2786 (2784)	2485 (2725)	2424 (2695)	3053 (2912)
df	441	508	490	48
PP Expenditures by function				
t-score (*p*)	0.23 (0.82)	1.90 (0.06)	0.54 (0.59)	1.94 (0.05)
Con. *M* (*SD*)	224.04 (257.38)	851.53 (214.42)	502.13 (184.79)	148.90 (88.30)
Non-Con. *M* (*SD*)	249.22 (287.16)	984.80 (461.09)	573.21 (603.53)	201.62 (113.79)
df	441	508	490	389
PP Wages by function				
t-score (*p*)	2.29 (0.02) *	13.98 (0.00) **	5.07 (0.00) **	10.45 (0.00) **
Con. *M* (*SD*)	17.71 (42.50)	78.89 (72.53)	29.63 (46.94)	10.08 (21.10)
Non-Con. *M* (*SD*)	86.54 (79.30)	264.15 (161.68)	212.65 (165.13)	66.92 (42.60)
df	441	91	490	24
PP Benefits by function				
t-score	2.27 (0.02) *	10.65 (0.00) **	2.76 (0.01) **	11.76 (0.00) **
Con. *M* (*SD*)	11.42 (23.16)	58.06 (63.74)	24.61 (39.08)	4.67 (10.86)
Non-Con. *M* (*SD*)	53.20 (48.56)	170.93 (96.74)	124.10 (164.66)	39.70 (29.45)
df	441	64	490	31

**. *p*<.01, **p*<.05, Con = Consolidated, Non-Con = Non-Consolidated