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Analysis of Capital Distribution Among Ohio's Publicly Funded Higher Education Institutions

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ANALYSIS OF CAPITAL DISTRIBUTION

AMONG OHIO'S PUBLICLY FUNDED HIGHER EDUCATION INSTITUTIONS

by

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ABSTRACT

ANALYSIS OF CAPITAL DISTRIBUTION
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Old Dominion University, 2020
Director: Dr. Dennis E. Gregory, Chair

In 2012, Governor Kasich instituted a call-to-action, "Campus leaders throughout Ohio must work together to rethink how the state allocates its investment in our public higher educational facilities." (Ohio Higher Education Capital Funding Commission, 2016). The intent of Governor Kasich was to drive more equitable outcomes and opportunities in higher education, including capital allocation (2016). However, despite the changes in processes over time, there continues to be disproportion in allocation of capital funding (Maiden & Stearns, 2007; Manns, 2004; Tandberg 2010).

A deeper understanding of the historical and current trends of capital allocation to post-secondary public institutions in Ohio is needed to increase awareness of both the favorable and unfavorable aspects of the State's funding processes. The findings of this study will inform policy makers, university administrators, and community stakeholders of the past and current status of capital allocation to public post-secondary education and may allow enhancement of the decision making processes and choice of viable metrics for computing allocation of funds. Additionally, the results of this proposed study may be utilized by higher education administrators and community stakeholders to assist in predicting a particular higher education institutions future capital allocations that may assist them with long term capital planning.

The purpose of this quantitative, cross-sectional, historical study is to determine the basis of capital allocation among Ohio higher education institutions per FTE (as per the reporting

precedent set in historical Board of Regents reports and research by Johnson (2012)) as it relates to (1) campus condition, (2) school type (2 year vs. 4 year), (3) county population, (4) party of the governor, and (5) party of the legislative majority. A 30-year period from 1988 through 2018 will be analyzed. The research questions will be investigated with an ordinary least squares (OLS) fixed-effects regression model for cross-sectional panel data. STATA v.14 software will be used with the "XT" command for analysis of the model. A .05 level of significance will be set for the analysis.

This dissertation is dedicated to my wife Jacqueline, and my three daughters Colleen, Caroline and Charlotte. Writing a dissertation is analogous to life. A well defined purpose statement guides a dissertation. Discovering and defining your purpose in life, similarly, will guide you in your decisions. Anxiety is a forgotten word.

A purposeful life is as challenging as it is rewarding. Overcoming challenges strengthens your resolve, and it deepens your appreciation for the people who support you. My family has been a constant source of support, in both words and action. Without my family, I would have no purpose.

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I would like to acknowledge Elaine Eisenbeisz, a practicing statistician who lives and breathes statistics during her waking hours and quite possibly when she is also asleep. Elaine contributed to this project as a friend, coach, mentor and statistician. Other acknowledgements include Helena Travka, Cleveland Public Library Social Science Department Librarian, The entire Ohio Legislative Service Commission Public Records Team, and Jill Dannemiller, Director, Data Management and Analysis, Ohio Department of Higher Education, who helped locate archive data necessary to complete this project. Last but not least, I would like to acknowledge the support from all of my classmates from Cohort 14. Final acknowledgement goes to James Moore, close friend from Cohort 14, whom we continue to communicate for support and much needed comic relief.

NOMENCLATURE

B_0	The overall intercept that corresponds the mean value of the response for the group when all independent variables equal zero.
$B_1,\ldots,B_p$	Fixed effects coefficients
i	Let $i = 1,\ldots,k$ = School
j	Let $j = 1,\ldots,n_i$ = Year of measurement
p	Probability value (p-value)
$X_{ij}1,\ldots,X_{ij}p$	The values of the variables for the ith school on the jth repetition.
Y_{ij}	Response for the ith school and the jth repetition (year)
α	Alpha (Probability of Type I Error)
β	Beta (Probability of Type II Error)
δ	School effects
ε	Pure residual
τ	Year effects

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CHAPTER 1

INTRODUCTION

Nationwide, state funding for public higher education grew by just 1.3 percent from 2017 to 2018, the lowest increase in state support in the past five years ("Grapevine Study", 2019). Nearly one third of states reported decreases in higher education funding in fiscal year 2018, including Ohio, with the smallest reported decrease of 0.1 percent. Decreases can be attributable to many causes, including increases in medical funding, K-12 education, infrastructure needs, subdued state and federal appropriations, and are effects of the Great Recession (Smola, 2018). The decreases in funding for post-secondary public education and the competition for available capital necessitate a greater need for prudent and fair allocation of available funds.

Ohio's public colleges, universities, and adult education programs serve over 500,000 students (Ohio Department of Higher Education, 2017). The allocation of funding for post-secondary education in Ohio is directly tied to policy and policymakers. According to a report by Policy Matters Ohio ("Post 2018-2019 Budget Bite," 2019), policy makers increased funding for Ohio's 14 public universities, 24 regional branch campuses, and 23 community colleges by 2 percent from the 2016-2017 budget to the 2018-2019 budget with an incremental 0.11 percent increase from 2017 to 2018. No increase was reported from 2018 to 2019. The Policy Matters Ohio website also shows that from 2008 to 2017, Ohio spent $1,073 (15.2%) less per college student, an artifact from funding decreases due to the Great Recession. The budget freezes of undergraduate tuition at the 2017 levels for years 2018 and 2019, kept costs low for students but caused public universities to "do more with less" ("Policy Matters Ohio", 2019). However, studies and reporting are scarce as it relates to allocation of funds for capital expenditures for post-secondary institutions in the U.S., and no empirical studies found by this researcher exist

related to the investigation of the allocation of funds for capital expenditures for post-secondary education in the State of Ohio.

The Higher Education Capital Fund is a single line item within Ohio's Biennium Budget intended for dispersement among Ohio's publicly funded four-year universities and two-year colleges for the purpose of deferred maintenance, renovation, restoration or new construction of campus facilities and utility infrastructure. These funds many also be used for furniture, fixtures and equipment including information technology equipment. The Ohio Office of Budget and Management (OBM) has developed a policy entitled Allowable Capital Expenditure Guidelines, which defines allowable capital expenses and are strictly enforced among Ohio institutions receiving capital funds from the State of Ohio. The Allowable Capital Expenditure Guidelines further defines non-allowable equipment, such as vehicles and consumable supplies, and exclusion of maintenance contracts, such as lawn maintenance or HVAC maintenance, which should be allocated to operating expenses. See Appendix A for further description.

Background of the Study

Previous studies have indicated that the process of appropriating dollars to higher education institutions is a distinctly political process (McLendon, Hearns & Mokher, 2009; Tandberg, 2010; Tandberg & Ness, 2009). McLendon, et al. (2009) cited five core explanations that were associated with variation in state expenditures on higher education, namely, (1) political-system characteristics, (2) economic condition of the state, (3) state demography, (4) certain higher education policy conditions within states, and (5) post-secondary governance arrangements. The authors found statistically significant relationships between state appropriations for post-secondary education and (1) legislative professionalism, (2) the number

and size of higher education interest groups, (3) partisanship, (4) term limits, and (5) gubernatorial power influence.

A case study by Tandberg (2006) indicated that alliances between state-level higher education interest groups and policymakers affected allocation of capital. Statistical correlations between partisanship and state appropriations for post-secondary public education have been empirically shown in many studies (Archibald & Feldman, 2006; McLendon, Deaton & Hearn, 2007; McLendon & Hearn, 2006; McLendon, Hearn & Deaton, 2006; Nicholson-Crotty & Meier, 2003; Tandberg, 2006; 2007). However, a majority of the literature relating to political policy and school funding is focused on per-student spending related to instruction and general fund spending, and not on spending related solely to capital improvement projects.

The available research related to state budgeting practices and capital funding in higher education shows that allocation of funds for capital projects differs from spending models for other types of higher educational funding. A national study by Delaney and Doyle (2007) supported the findings by Hovey (1999) that higher education serves as a "balance wheel" for state budgets. Hovey observed that during good economic times, higher education was funded at a higher rate than other categories in state budgets. But in bad times, higher education is one of the first categories to have funding cut. However, in a later national study by Delaney and Doyle (2014) the balance wheel model was not supported as it relates to capital expenditures on higher education. Delaney and Doyle (2014) utilized linear, quadratic and balance wheel (cubic) regression models of higher education capital outlays as a function of total state capital expenditures for testing. The authors hypothesized that the balance wheel regression, which posited that higher education funding would be provided at a higher rate than other state budget categories in "good times", would best model the relationship between total state capital

expenditures and capital outlays for higher education. However, the authors found that the relationship between state capital budgets and money allocated to higher education fit the quadratic model better, i.e., that state spending on *capital outlays* for higher education rose or fell in the opposite direction of total state expenditures.

In a national study of capital expenditures for higher education, Tandberg and Ness (2011) modeled state capital expenditures on variables related to (a) economic and demographic characteristics, (b) higher education variables, and (c) political variables. The authors concluded that state capital spending was greatly influenced by the political variables.

Another quantitative study by Ness and Tandberg (2013) compared two models, one model for general fund appropriations and the second model for capital spending. The authors found that political variables significantly influenced both capital fund and general fund spending for higher education. However, the authors did not find "overwhelming evidence" to support their hypothesis that political factors matter more for capital spending than for general fund appropriations for higher education.

Geography may also have an association with the allocation of capital funds for higher education. Maiden and Steans (2007) investigated the equitability of educational expenditures and capital outlay expenditures between rural and non-rural K-12 public schools in Oklahoma. The researchers found a higher degree of equity between rural and non-rural districts for total current expenditures per pupil than for total capital expenditures per pupil.

Problem Statement

The decreases in funding for Ohio's post-secondary public education and the competition for available capital necessitate a greater need for prudent and fair allocation of available funds.

Although some research has been performed on capital funding for higher education at the national and some state levels, a study focused on Ohio's budgeting system and capital expenditures is needed. Currently, Ohio uses a bi-annual budgeting cycle. One line item in the Ohio Budget is the Higher Education Capital Fund which is to be distributed among Ohio's public post-secondary education institutions. In 1963, the Ohio Board of Regents was established as a centralized agency and capital distribution decisions were made exclusively by the Board of Regents until 1995. In 1995, the state of Ohio moved to a formula based distribution, based on the size and condition of campus buildings. Institutions were given the power to make decisions on how best to spend allocations (Ohio Board of Regents, 2007). In 2012, Governor Kasich instituted a call-to-action, "Campus leaders throughout Ohio must work together to rethink how the state allocates its investment in our public higher educational facilities" (Ohio Higher Education Capital Funding Commission, 2016). The intent of Governor Kasich was to drive more equitable outcomes and opportunities in higher education, including capital allocation (Ohio Higher Education Capital Funding Commission, 2016). However, despite the changes in processes over time, there continues to be disproportion in allocation of capital funding per Full Time Equivalent (FTE) student among Ohio's publicly funded member institution.

A deeper understanding of the historical and current trends of capital allocation to post-secondary public institutions in Ohio is needed to increase awareness of both the favorable and unfavorable aspects of the State's funding processes. The findings of this study will inform policymakers, university administrators, and community stakeholders of the past and current status of capital allocation to public post-secondary education and may allow enhancement of the decision making processes and choice of viable metrics for computing allocation of funds. Additionally, the results of this proposed study may be utilized by higher education

administrators and community stakeholders to assist in predicting a particular higher education institutions future capital allocations that may assist them with long term capital planning.

Purpose Statement

The purpose of this quantitative, cross-sectional, historical study is to determine the basis of capital allocation among Ohio higher education institutions per FTE (as per the reporting precedent set in historical Board of Regents reports and research by Johnson (2012)) as it relates to (1) campus condition, (2) school type (2 year vs. 4 year), (3) county population, (4) party of the governor, and (5) party of the legislative majority. The thirty-year period was selected because it allows review of capital distribution practice in each of the three capital distribution era's described above (1963-1995; Centralized BOR, 1995 – 2012; Formula Driven and 2012 to Present; Performance Driven). The era between 1963 and 1985 will have skewed numbers due to initial start up costs of community colleges and four-year branch campuses that were constructed during this period.

Research Questions

A series of bi-variate correlational analyses and multiple regression model will be tested to address the six research questions of this study. The research questions and associated statistical hypotheses are as follows:

Research Question 1. Is campus condition (satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, physically obsolete) measured in square footage, correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 1. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Alternative Hypothesis 1. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Research Question 2. Is school type (2 year vs. 4 year) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 2. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Alternative Hypothesis 2. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Research Question 3. Is the population of the county in which the campus resides (measured in thousands) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 3. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Alternative Hypothesis 3. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Research Question 4. Is the party of the governor correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 4. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Alternative Hypothesis 4. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Research Question 5. Is the party of the legislative majority correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 5. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Alternative Hypothesis 5. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Research Question 6. Which predictor contributes the most to with the amount of institution capital distribution per FTE?

Null Hypothesis 6. None of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Alternative Hypothesis 6. At least one of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Professional Significance

Previous research includes models which examined state spending for higher education and have included economic, demographic, and political factors (Hossler, Lund, Ramin, Westfall & Irish, 1997; Kane, Orszag, & Gunter, 2003; Lowry, 2001, Peterson, 1976; Archibald & Feldman, 2006; McLendon, Hearn & Mokher, 2009; Tandberg, 2010). However, these studies investigated overall measures of state spending on higher education and not on capital allocation among publicly funded institutions separately. Tandberg and Ness (2011) noted that, "Little empirical attention has been paid to state capital expenditures for higher education." Models similar to the OLS fixed regression model proposed for this study have been used in previous research on capital allocation at the national level (Ness, 2013; Tandberg & Ness, 2011), but this research will focus on the distribution of Ohio's Biannual Higher Education Capital Fund appropriation among the State of Ohio's publicly funded institutions. Thus, this research will fill a current gap in the literature by focusing on higher education capital allocation among the State of Ohio publicly funded institutions. The results of this proposed study can be compared with the literature to see if political, population, and condition of facilities contribute differently to capital allocation vs. overall spending or SSI funding for post-secondary education.

The "balance wheel" theory by Hovey (1999) and later supported by Delaney and Doyle (2007) suggested that during good economic times, higher education is funded at a higher rate than other categories in state budgets. But in bad times, higher education is one of the first categories to have funding cut. The Hovey (1999) and Delaney and Doyle (2007) studies were performed on higher education funding at the national level and thus a study at the state level for post-secondary capital expenditures in Ohio would further inform the literature base on the relationship between economic factors and capital allocation.

The practice of long term capital planning is a challenge for Ohio higher education institutions because the higher education capital fund budget may be effected as a result of either good, or bad economic times. Furthermore, once the higher education capital fund budget is established, predicting the distribution of the fund among institutions can be difficult. The results of this proposed study may be utilized by higher education administrators and community stakeholders to assist in predicting capital allocations among the higher education institution to enable them to develop better long term capital plans.

Overview of the Methodology

This quantitative, cross-sectional, longitudinal study will further the research on historical and current trends of capital allocation to post-secondary public institutions in the state of Ohio. Thirty years of quantitative data (1988 – 2018) will be collected and analyzed in order to assess the relationship of population for the county in which a school is located, type of school, (2 vs. 4-year), the physical condition of a school, and the political climate as relates to the annual capital allocation per FTE student at publically funded higher education institutions in the state of Ohio. An ordinary least squares (OLS) fixed regression model for cross-sectional panel data will be used to test the null hypothesis of the research question according to the data analysis section that follows. A similar OLS fixed regression model has been used in previous research on capital allocation at the national level (Ness, 2013; Tandberg & Ness, 2011), but this research will focus on the State of Ohio. Thus, this research will fill a current gap in the literature base by focusing on higher education capital allocation in the State of Ohio.

Data Collection.

Data will be collected from sources on line. U.S Census Bureau data will be collected for the party of the governor, party of the state legislature, and county population in thousands. Data

from the Ohio Department of Higher Education will be collected for amount of capital allocated to each member institution, the number of full time equivalent students and school type. For square footage of school condition, data will be collected from the Ohio Department of Higher Education for the years 1988-2004 and the Ohio legislative Service Commission Archives for the years 2004 – 2018.

The variable, school condition measured in square footage, is a facility tracking measure recorded within the Higher Education Inventory (HEI) data management system, developed by the Ohio Department of Higher Education. The HEI database was developed to catalog and manage Ohio's inventory of public higher education facility investments. The term *Physical Condition Status* is intended to track the physical condition of the overall institution facility inventory, reported in square feet. The sum total of all square foot categories equals total square feet of the institution. Physical Condition categories (Satisfactory, Minor Rehabilitation, Rehabilitation, Major Rehabilitation or Physically Obsolete) are defined by HEI. School condition data is self reported and uploaded by the higher education institution into the HEI database, which reflects a qualitative judgment of the physical (or structural) condition of the structures. Evaluation considers age of structure along with their associated systems (HVAC, electrical, plumbing, technology, safety etc.) (ODHE, 2017). Considering the independent qualitative judgment used by each institution, the difference in judgment will be noted in the limitations of this report.

Data Analysis.

The research question will be investigated with an ordinary least squares (OLS) fixed-effects regression model for cross-sectional panel data. STATA v.14 software will be used with

the "XT" command for analysis of the model. A .05 level of significance will be set for the analysis.

Delimitations

Delimitations are research characteristics that are controlled by the researcher, such as the selected participant population, participant criteria, geographic regions, and industries involved (Simon, 2011). This study will be delimited to the state of Ohio. The study will include 30 years of data from 1988 to 2018. An additional delimitation of the study will be the focus on capital allocation for post-secondary education. Only public institutions will be included in the study and include Ohio's 14 public universities, 24 regional branch campuses, and 23 community colleges. Setting the study in the State of Ohio for the years 1988 to 2018 and using a cross-sectional design rather than an experimental design will not allow for generalizability of findings to other states or years.

Definitions of Key Terms

Biennium Budget: The Ohio General Assembly is required to pass the state budget every two years by July 1. The biennium budget includes funding for higher education (Johnson, 2012).

Higher Education Capital Fund: A single line item within the State of Ohio Biennium Budget intended for dispersement among Ohio's publicly funded four-year universities and two-year colleges for the purpose of deferred maintenance, renovation, restoration or new construction of campus facilities and utility infrastructure. Funds may also be used for furniture, fixtures and equipment including information technology equipment.

Higher Education Capital Appropriation: The Higher Education Capital Fund is dispersed among Ohio's 14 public universities, 24 regional branch campuses, and 23 community colleges. The amount received by an individual college or university is defined as an appropriation.

Community College: A community college is a type of higher education institution that primarily provides two-year associate‘s degrees. The Ohio Revised Code, Section 3354, defines a community college as a public institution of education beyond the high school organized for the principal purpose of providing the people of the community college district wherein such college is situated the instructional programs defined in this section as ‗arts and sciences‘ and ‗technical,‘ or either, and may include the ‗adult education‘ program as defined in this section, not exceeding two-years‘ duration (Johnson, 2012).

State Community Colleges: The Ohio Revised Code, Section 3358, defines ―state community colleges‖ as a state community college district operates institutions that offer a -baccalaureate-oriented program, technical education program, or an adult continuing education program and that (Johnson, 2012).

Technical Colleges: The Ohio Revised Code, Section 3357, defines ―technical colleges‖ as institutions ―of education beyond the high school, including an institution of higher education, organized for the principal purpose of providing for the residents of the technical college district, wherein such college is situated, any one or more of the instructional programs defined in this section as ‗technical college,‘ or ‗adult education technical program,‘ normally not exceeding two-years duration and not leading to a baccalaureate degree (Johnson, 2012).

Ohio Two Year Colleges (OTYC): This term collectively refers to all 23 public community colleges, state community colleges, and technical colleges in the state of Ohio.

Ohio Four Year Universities (FYU): This term collectively refers to all 14 public main campus universities and their 24 branch campuses.

The Inter-University Council (IUC): The IUC of Ohio was established in 1939 as a voluntary educational association of Ohio's public universities. Today the association represents Ohio's 14 public universities. Together, these institutions offer a broad range of associate, baccalaureate, graduate, and professional programs. The association's purpose is to facilitate the development of common interest and concern of its members and to assist in sustaining and improving the quality of public higher education. IUC also engages in public relations, research and government liaison work on behalf of its members.

Ohio Association of Community Colleges (OACC): The OACC is an association that focuses on issues impacting Ohio community and technical colleges and, through dialogue with trustees and presidents, adapts solutions to fit the social, educational, and political landscape within the state.

Ohio Board of Regents (BOR): The Board of Regents is the coordinating board for higher education in Ohio. The board was created in 1963 by the Ohio General Assembly to: provide higher education policy advice to the Governor of Ohio and the Ohio General Assembly; develop a strategy involving Ohio's public and independent colleges and universities; advocate for and manage state funds for public colleges; and coordinate and implement state higher education policies (Johnson, 2012).

Ohio Board of Regents (BOR): A Cabinet-level agency for the Governor of the State of Ohio that oversees higher education for the state. The Governor appoints the chancellor who leads a professional staff in service of higher education. The agency's main responsibilities include authorizing and approving new degree programs, managing state-funded financial aid programs and developing and advocating policies to maximize higher education's contributions to the state and its citizens (Johnson, 2012). The chancellor, after consulting with the state

colleges and universities and with the office of budget and management, shall adopt rules in accordance with Chapter 119 of the Revised Code to govern the allocation of state capital appropriations to state colleges and universities. Governor Kasich renamed the Ohio Board of Regents to the Ohio Department of Higher Education in 2015.

Ohio Department of Higher Education (OHDE): Formerly known as the Ohio Regents until name change in 2015. No change in mission.

Higher Education Inventory (HEI): A database developed and managed by the ODHE used to catalog and manage their inventory of higher education facility investments throughout Ohio.

Physical Condition Status: A measurement within the HEI database that tracks the physical condition of the overall institution facility inventory, reported in square feet. Physical Condition categories (Satisfactory, Minor Rehabilitation, Rehabilitation, Major Rehabilitation or Physically Obsolete) are defined by HEI. Facility status reports are submitted by the higher education institution and reflect a qualitative judgment of the physical (or structural) condition of the structure. Evaluation considers age of structure along with their associated systems (HVAC, electrical, plumbing, technology, safety, etc.) (ODHE, 2017).

> *Satisfactory (S):* Suitable for continued use with normal maintenance (ODHE, 2017).
>
> *Minor Rehabilitation (MR):* Needs minor physical rehabilitation or repair. The approximate cost of physical rehabilitation is less than 25 percent of the replacement value of the structure (ODHE, 2017).
>
> *Rehabilitation (R):* Needs physical rehabilitation or repair. The approximate cost of physical rehabilitation is at least 25 percent, but less than 50 percent of the replacement value of the structure (ODHE, 2017).
>
> *Major Rehabilitation (MR):* Needs a major physical rehabilitation. The approximate cost of rehabilitation is 50 percent or more of the replacement value of the structure (ODHE, 2017).
>
> *Physically Obsolete (PO):* Physically inadequate and not feasible to renovate. The

structure should be evaluated for demolition (ODHE, 2017).

Ohio Revised Code (O.R.C.): The ORC refers to the codified laws of the State of Ohio, which were enacted and are enforced by the Ohio legislature (Johnson, 2012).

Public Policy: Public policy refers to statewide reports and legislative laws that provide background information and historical context that reflect the processes and forces that led to the establishment of two-year colleges in the state and their continued evolution (Johnson, 2012).

State Share of Instruction (SSI): In Ohio, SSI refers to the funding provided by the state to subsidize the cost of tuition for Ohio's public institution of higher education based on the formula used by the State of Ohio (Johnson, 2012)

Summary and Organization of the Remainder of the Study

This proposal is structured into 3 chapters. Chapter 1 includes an introduction to the proposed topic followed by the study plan. Chapter 2 includes the literature review followed by Chapter 3 which covers the methodology of the study plan. Chapter 1 began with the introduction of the problem. The decreases in funding for Ohio's post-secondary education and the competition for available capital necessitate a greater need for prudent and fair allocation of available funds. A deeper understanding of the historical and current trends of capital allocation to post-secondary public institutions in Ohio is needed to increase awareness of both the favorable and unfavorable aspects of the State's funding processes. The findings of this study will inform policymakers, university administrators, and community stakeholders of the past and current status of capital allocation to public post-secondary education and may allow enhancement of the decision making processes and choice of viable metrics for computing allocation of funds. Additionally, the results of this proposed study may be utilized by higher education administrators and community stakeholders to assist in predicting a particular higher education institutions future capital allocations that may assist them with long term capital planning.

The chapter 2 literature review will include a rationale for conducting this quantitative, cross-sectional, historical study to determine the basis of capital allocation among Ohio Higher Education institutions per FTE as relates to (1) campus condition, (2) school type (2 year vs. 4 year), (3) county population, (4) party of the governor, and (5) party of the legislative majority. A review of the available literature pertaining to the variables of interest will be presented.

Chapter 3 will include a detailed description of the methodology, research design, and procedures for this investigation. This section will describe the design of the study and

methodology, define how the data will be collected, the system used for analysis, reliability, ethical considerations, and any limitations the study may possess.

Chapters 4 and 5 will be included in the final dissertation. Chapter 4 will detail how the data was analyzed and provide both a written and graphic summary of the results. Chapter 5 will include an interpretation and discussion of the results, as it relates to the existing body of research related to the dissertation topic.

CHAPTER 2

LITERATURE REVIEW

Introduction to the Chapter and Background to the Problem

Chapter 2 contains the rationale for conducting a quantitative, cross-sectional, longitudinal study to determine the basis of capital allocation among Ohio Higher Education Institutions per FTE as it relates to 1) Condition of Facilities (satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, physically obsolete; all measured in physical square footage), 2) School Type (2/4 year), 3) Population of County in which the campus resides (measured in thousands, 4) Party of Governor, 5) Party of Legislative Majority. The study will be conducted to perform a quantitative 30-year review of annual capital allocation per FTE student at publically funded higher education institutions in the state of Ohio (as per the reporting precedent set in the Board of Regents reports and research by Johnson (2012)).

Previous studies have indicated that the process of appropriating dollars to higher education institutions is a distinctly political process (McLendon, Hearns, & Mokher, 2009; Tandberg, 2010; Tandberg & Ness, 2009). McLendon, Hearns, and Mokher (2009) cited five core explanations that were associated with variation in state expenditures on higher education, namely, (1) political-system characteristics, (2) economic condition of the state, (3) state demography, (4) certain higher education policy conditions within states, and (5) post-secondary governance arrangements. The authors found statistically significant relationships between state appropriations for post-secondary education and (1) legislative professionalism, (2) the number and size of higher education interest groups, (3) partisanship, (4) term limits, and (5) gubernatorial power influence.

A case study by Tandberg (2006) indicated that alliances between state-level higher education interest groups and policy makers affected allocation of capital. Statistical connections between partisanship and state appropriations for post-secondary public education have been empirically shown in many studies (Archibald & Feldman, 2006; McLendon & Hearn, 2006; McLendon, Hearn & Deaton, 2006; McLendon, Deaton, and Hearn, 2007; Nicholson-Crotty & Meier, 2003, Tandberg 2006, 2007). However, a majority of the literature relating to political policy and school funding is focused on per-student spending related to instruction and general fund spending, and not on spending related solely to capital improvement projects.

The available research related to state budgeting practices and capital funding in higher education shows that allocation of funds for capital projects differs from spending models for other types of higher educational funding (White & Musser, 1978; Poterba, 1995; Tandberg & Ness, 2011). Very little has been published, however, on predictors of state capital spending in higher education, with no available studies found by this researcher for capital spending in higher education for the State of Ohio.

Identification of the Gap

Previous research includes models that examine state spending for higher education and have included economic, demographic, and political factors (Archibald & Feldman, 2006; Hossler, Lund, Ramin, Westfall & Irish, 1997; Kane, Orszag, & Gunter, 2003; Lowry, 2001, Peterson, 1976; McLendon, Hearn & Mokher, 2009; Tandberg, 2010). However, these authors investigated overall measures of state spending on higher education and not on capital allocation separately. Tandberg and Ness (2011) noted that, "Little empirical attention has been paid to state capital expenditures for higher education" (p. 394). Models similar to the OLS fixed regression model proposed for this study have been used in previous research on capital

allocation at the national level (Ness, 2013; Tandberg & Ness, 2011), but this research will focus on the State of Ohio. Thus, this research will fill a current gap in the literature base by focusing on higher education capital allocation in the State of Ohio. The results of this proposed study can be compared with the existing literature to see if campus conditions per square footage, school type (two-year vs. four-year), population of county, party of governor and/or party of legislative majority, contribute differently to capital allocation vs. overall spending or SSI funding for post-secondary education. Hovey (1999) and Delaney and Doyle (2007) performed studies on higher education funding at the national level and thus a study at the state level for post-secondary capital expenditures in Ohio would further inform the literature base on the relationship between economic factors and capital allocation.

Theoretical Framework

According to Ness and Tandberg (2013) gross higher education capital spending at the national level totaled $10.3 billion in 2009, which was 13% of state general fund appropriations equating to approximately $700 per student. Scholarly works have included research on need based and merit based scholarship (College Board, 2011; Heller 2002) and general appropriations, but little research is offered in the areas of state construction and capital expenditures for higher education (Delaney & Doyle, 2013).

Higher education has been described as the “balance wheel” of state budgets: state appropriations for higher education tend to rise and fall in relation to the overall economy. The balance wheel model is also disproportionate. In good economic times, states tend to fund higher education at a greater rate than other budget categories. In bad economic times, higher education is one of the first state budget categories to be cut. The cuts in higher education in slow economic times are greater than in other budget categories because higher education institutions

can make up the difference by increasing tuition, and seeking additional funding from private sources (Delaney & Doyle, 2011).

The available research related to state budgeting practices and capital funding in higher education shows that allocation of funds for capital projects differs from spending models for other types of higher educational funding. As noted above, a national study by Delaney and Doyle (2007) supported the findings by Hovey (1999) that higher education serves as a "balance wheel" for state budgets. True to the balance wheel theory, Hovey observed that during good economic times, higher education was funded at a higher rate than other categories in state budgets. But in bad times, higher education is one of the first categories to have funding cut.

However, in a later national study by Delaney and Doyle (2014) the balance wheel model was not supported as relates to *capital expenditures* on higher education. In the 2014 study, linear, quadratic and balance wheel (cubic) regression models of higher education capital outlays as a function of total state capital expenditures were tested. The authors hypothesized that the balance wheel regression, which posited that higher education funding would be provided at a higher rate than other state budget categories in "good times", would best model the relationship between total state capital expenditures and capital outlays for higher education. However, the authors found that the relationship between state capital budgets and money allocated to higher education fit the quadratic model better, i.e., that state spending on *capital outlays* for higher education rose or fell in the opposite direction of total state expenditures.

In a national study of capital expenditures for higher education, Tandberg and Ness (2011) modeled state capital expenditures on variables related to (a) economic and demographic characteristics, (b) higher education variables, and (c) political variables. The authors concluded that state capital spending was greatly influenced by the political variables.

Another study by Ness and Tandberg (2013) compared two models, one model for general fund appropriations and the second model for capital spending. The authors found that political variables significantly influenced both capital fund and general fund spending for higher education. However, the authors did not find "overwhelming evidence" to support their hypothesis that political factors matter more for capital spending than for general fund appropriations for higher education.

The nature of capital funding for higher education in the State of Ohio may allow for political factors to influence the balance wheel. Currently, capital funding for higher education in the State of Ohio is a de-centralized process with capital requests made by individual institutions and capital decisions made by the Chancellor of the Ohio Department of Education (ODHE), or a designee of the Chancellor, and eight people appointed by the Governor.

According to Tandberg and Ness (2011) the discretionary nature for capital projects make them vulnerable to political influence. According to a personal correspondence (as cited in Tandberg & Ness, 2011) an appropriations committee chair in one large state was quoted as saying, "General appropriations for higher education is for the bean counters. Capital support is where the real politics happens" (pg. 396). Years with more economic prosperity will include more funding of capital projects, but legislators tend to use the funding to meet the interests of constituents and specific projects in the legislators' districts (Diaz-Cayeros et al., 2003).

Review of the Literature

Tandberg and Ness (2011) noted that, "Little empirical attention has been paid to state capital expenditures for higher education" (pg. 394). Much of the existing research on funding in higher education at the national and state levels has focused on the appropriation of general operating funds for tuition, fees, and instruction, as well as student retention. However, research

is scarce as relates to the allocation of funds for capital expenditures in post-secondary educational institutions in the United States. This author has found no research available related to capital expenditures for higher education in the State of Ohio.

The literature review is presented to examine the historical and current research as relates to methods, trends and differences in capital allocation of funds per FTE student at between publicly funded 2-year colleges and 4-year university in Ohio, and also to investigate the association of covariates of the condition and square footage of facilities, political factors, and county population with the allocation of funds per FTE student at publically funded higher education institutions in the state of Ohio. Since the literature relating to capital fund allocation is scarce. Much of the literature review involves older studies and many studies which were researched at the national rather than state levels.

This review was garnered from on-line research libraries of Old Dominion University, EBSCO*host*, Google Scholar, and the Educational Resources Information Center (ERIC). The literature search involved the use of many terms including but not limited to: capital allocation in higher education in Ohio, Ohio Board of Regents, higher education lobbying, state level interest groups, Ohio legislature, capital budget higher education, higher education funding, higher education policy, politics of education, state policies, educational policy, state politics, higher education finance, higher education appropriations, balance wheel, capital outlays, and higher education facility construction. The keywords and reference sections of the documents obtained were inspected for leads to additional studies and reference resources. The structure of the literature review includes the following headings:

- State Share of Instruction (SSI) vs. Capital Allocation
- Aging of Facilities and Block Obsolescence

- Campus Condition as Relates to Student Recruitment and Retention
- Lobbying, Specials Interests, and Capital Allocation.
- Historical Political Factors And Capital Appropriations
- Population and Capital Allocation
- Summary

As noted previously, the literature base is scarce as relates to allocation of monies for capital expenses in higher education, and not available as relates to capital allocation for higher education in the State of Ohio. Therefore, much of the literature is greater than five years old. However, this situation is a good reason for performing the current study, as the research will be informative to stakeholders in the State of Ohio and perhaps nationwide.

State Share of Instruction (SSI) vs. Capital Allocation.

Funding for higher education in the State of Ohio is appropriated each fiscal year by the Ohio General Assembly. The staff of the Ohio Department of Education (ODHE), formerly the Ohio Board of Regents (BOR), works with the Ohio Office of Budget and Management, the Ohio General Assembly, and the State's higher education institutions to develop the biennial budget for higher education. The two main budget items include Ohio's State Share of Instruction (SSI) and Capital Allocation.

Ohio's State Share of Instruction (SSI). SSI is one line item in the Ohio State budget. SSI is a term used exclusively by the Ohio BOR to identify state subsidies provided by the State of Ohio which are distributed to higher education institutions for the purposes of instruction ("Ohio department of higher education budget and financial," n.d.).

SSI is synonymous with the commonly used terms of "General Fund" or "Operating Fund". The literature base includes many studies on general/operating fund allocation as the allocation of instructional funds has been extensively studied.

Capital Allocation. Funding for capital projects in the State of Ohio is also one line item in the Ohio State budget. The capital fund is distinctly separate from SSI. The intended uses of the capital fund include investment in land, facilities renovation and new construction, infrastructure, equipment, and technology (such as laboratory equipment and wiring of facilities to accommodate information technology needs). The capital fund also includes investment in workforce development and career opportunities (Ohio department of higher education capital planning, n.d.).

The state of Ohio provides funding for capital projects in higher education via the issuance of Higher Education Facilities Bonds. The debt and associated interest expense for the bonds are recorded on the financial records of the State of Ohio and do not appear on the records of the individual higher education institutions ("Ohio department of higher education budget and financial," n.d.).

The distribution decision making policy of capital funds in Ohio has changed three times since the creation of the Ohio Board of Regents (BOR) in 1963:

- 1963-1995: Decision making on capital budgets and allocation was centralized and decisions were made exclusively by the BOR (Ohio Board of Regents, 2007).
- 1995-2012: Decentralized decision making. Capital allocation and expenditure decisions were made by the individual institutions and allocated according to a formula based on the age of an institution's facilities, enrollment numbers, and the amount of infrastructure that must be maintained. The formula ensured that the

distribution of capital funds was fair and predictable, but the process was viewed as being "less responsive to the needs of the state" (Ohio Department of Higher Education, 2016; pg. 1).

- 2012-Present: Competitive proposal distribution decision making. The Ohio Higher Education Capital Funding Commission (HECFC) was formed with a group of 8 representatives from 2-year college and 4-year university presidents. The OHECFC works with the institutions of higher education to align the institutions' needs with a set of guiding principles, and reports its final recommendations to the Governor on behalf of the state's higher education community. The current process is also fair and equitable, but also "more flexible, more accommodating and presents a more strategic vision for the State of Ohio's investment" (Ohio Department of Higher Education, 2016; pg. 1).

The guiding principles of the current process include seven items and the guiding principles were sent to campus leaders in December, 2015. The campus leaders and the HECFC staff worked together in January, 2016 to determine which projects best aligned with the guiding principles. In the process, "…institutions prioritized projects that met the goals and, in many cases, altered their requests to meet the standards being set" (Ohio Department of Higher Education, 2016; pg. 3). The following are the seven guiding principles (Ohio Department of Higher Education, 2016):

1. Help build world-class programs.
2. Focus on maintaining the investment the state has already made in existing campus facilities.

3. Stimulate creativity by advancing strategic collaborations through partnerships, both on campus and with others in the public and private sector.
4. Reflect the needs of today's student by strengthening their learning environments, ensuring their safety and encouraging new degree and certificate completion opportunities.
5. Increase Ohio's competitive advantage by capitalizing on our existing strengths.
6. Strengthen our ability to respond to new or increased workforce development opportunities in the state.
7. Encourage joint efforts to reduce construction costs and generate ongoing efficiencies.

Despite the changes in processes of capital allocation over time to a more collaborative and mission minded context, there continues to be a disproportion in allocation of capital funding per Full Time Equivalent (FTE) student among Ohio's publicly funded member institutions, especially among 2-year institutions (Mullin, Baime, & Honeyman, 2015, Kindle Location, pg. 93). Community colleges continue to struggle to receive a reasonable share of public funding for infrastructure (Mullin et al., Kindle Location, pg. 93). This research is needed to assess the historical and current processes of capital allocation for higher educational needs in Ohio as relates to community colleges when compared to 4-year institutions.

Capital allocation in higher education is a large expense. According to Tandberg and Ness (2011) higher education is the second largest single capital expenditure category in state budgets (the first is transportation). Okunade (2004) found that higher education may be competing more fiercely than ever before for scarce funds with other large public sector programs including health care (e.g., Medicaid) and prisons. This current research will be

performed to investigate allocation and expenditures related to capital projects in the State of Ohio. A total of $428,240,000 was recommended for capital allocation in the State of Ohio in 2016 (the most recent available year of reported data; Ohio Department of Higher Education, 2016).

Aging of Facilities and Block Obsolescence

Higher education has seen two major waves of building construction over the last century, one from 1950-1975, and once from 2000 to the present day (Sightlines, 2018). Nationwide, many campuses have core buildings constructed before 1975 (Sightlines, 2016). According to the "Ohio department of higher education statewide capital master plan for public colleges and universities" (n.d.), a large percentage of campus facilities, representing 43% of the current square footage, were built to accommodate the surge in students from the baby boom generation of the 1960's. In addition to the aging of facilities, enrollments at U.S. colleges and universities have grown from 2.3 million students in the 1950's to 14.2 million students in 1995 (Manns, 2001). The total number of institutions more than doubled nationwide from 1,800 in 1950 to 3,768 in 1995 (2001). During the 1970's new institutions, made up mostly of 2-year institutions, opened at a rate of one every two weeks (2001).

As of 2017, 18.4 million students were attending post-secondary institutions ("More than 76 million students enrolled," 2018; pg. 1). Women are the majority on college campuses at 54.9 percent of undergraduate students and 59.8 percent of graduate students. Approximately 29 percent of undergraduate students attend 2-year institutions ("More than 76 million students enrolled,"). According to the 2018 State of Facilities in Higher Education 6th Annual Report (Sightlines, 2019), "The largest demand for capital investment that higher education has ever seen is bearing down on us" (pg. 5).

The aging of the facilities at the same time, called “Block Obsolescence”, as well as the decrease in the State’s capital support over the past decade, has strained the ability of Ohio to address the renewal needs of facilities. A 2004 inventory of all public higher education facilities in Ohio included approximately 2,400 buildings with an estimated replacement value of 23 billion dollars. (“Ohio Department of Higher Education Statewide Capital Master Plan for Public Colleges and Universities,” n.d.).

Manns (2004) stated that needs are increasing for not only improved facilities, but also for high-tech educational functions and research equipment. Children of baby boomers create a large influx of students at a time when both state and federal levels of educational support are decreasing, while at the same time costs of maintenance and renovation are increasing (Windham, Perkins, & Rogers; 2001).

Campus Condition as Relates to Student Recruitment and Retention

The condition of campus facilities and infrastructure play a part in the recruitment and retention of students. Cain and Reynolds (2016) performed a series of comparative analyses on gender, race, and transfer vs. non-transfer students as relates to their rankings of (a) the relative importance of an institution’s physical assets on a student’s choice of college or university, and (b) the relative importance of various facilities in the decision process. The study included 13,782 students from across the U.S. Findings indicated that students were most concerned about academic issues rather than condition of facilities. However, in some cases campuses were rejected for missing, inadequate, or poorly maintained facilities. The rejection of a campus for poorly maintained facilities was greater for women and students attending private institutions. Differences were also noted between transfer and non-transfer students. Non-transfer students

(Students who did not transfer from a 2-year school to a 4-year school) were interested in a range of facilities that supported academic, living, and social life. Transfer students were more interested in facilities that directly supported their educational goals. The authors determined that the evidence obtained in the study suggested that as students move from under-classmen to upper-classmen, they become more critical overall of an institution and the institution's facilities (Cain & Reynolds).

According to Gronberg, Jansen and Taylor (2001), the cost of education increases as the capital stock increases, suggesting either that universities are grossly overcapitalized or that nicer facilities reflect an important, unmeasured dimension of school quality. Mullin, Baime and Honeyman (2015) noted that modern architecture, renovated and modernized older buildings, outstanding athletic complexes, beautiful landscaping, and modern signage are most frequently seen and remembered by students, patrons, visitors, neighbors, and individuals passing by (2015). Thus, the need for facilities upkeep and updating is thus no small need or expense as properly maintained and updated facilities are related not only to student safety and academic achievement, but also to student recruitment and retention.

Lobbying, Specials Interests, and Capital Allocation

Given the discretionary nature of capital projects and the appeal of such projects in flush budget years, higher education capital expenditures are especially prone to political influence (Tandberg & Ness, 2010). In a qualitative study, Abney (1998) conducted in-depth interviews with state administrators and conducted a survey of state legislators in the state of Georgia. The author compared the behavior of lobbyists for public agencies with the activities of lobbyists for private sector groups. He found that significant policy decisions are often made long before they are announced to the public or known to private groups. One lobbyist made this point in

describing the budget process. The lobbyist noted that most appropriations decisions are made by the leadership in the legislature, the governor, and staff prior to the opening of the legislative session (Abney, 1998).

Public lobbyists are seen as insiders, and have greater access to decision making and decision makers. One public lobbyist in the Abney study noted the ease with which he now gets information from the State Office of Planning and Budgeting. As a representative of a public agency, he was considered a "member of the team" (Abney, 1998).

Historically, the nature of lobbying for educational dollars has not changed much. According to Murray (1976) there is no one higher education lobby. Instead there are a multitude of different types of lobbies including official lobbies registered under the Lobby Act, unofficial lobbies, exclusive lobbies with only political goals, and partial lobbies with mixed objectives.

Higher education lobbyists can be found at all levels of government: in Washington D.C. at the federal level, at the state level in all 50 state capitols, in cities and other localities. Some lobbies are established, permanent, and highly organized. Others are new, ad hoc, or organized around singular issues (Murray, 1976). According to Murray (1976), despite the vigor of national lobbying organizations, the educational lobby is at best a "loose confederation rather than a strong union" (Murray, 1976). Thus there is not one single spokesman or organization for higher education policy making of coalition formation. Murray (1976) noted over 40 years ago that some state systems were modeled after the office of the State University of New York (SUNY) and had their own Washington operations. Today, schools such as Ohio State hire full-time representatives to staff a Washington office.

The nature of lobbying appears to not have changed over the past 40 years. In 2019, there are 908 registered lobbyists in higher education including 508 revolvers, personnel who move

between roles as legislators and regulators. The lobbyists currently serve 540 clients (OpenSecrets.org, 2019). In 2018, the education lobbies spent approximately $77.4 million dollars through the 3rd quarter (OpenSecrets.org). The biggest spender on lobbying from the education industry was the Association of American Medical Colleges, which spent approximately $3.4 million through the first three quarters of 2018.

Democrats appear to be favored by the educational lobby. Democrats have not received less than 70% of education industry donations in a cycle since 2002 (OpenSecrets.org, 2019). In 2018, the education industry gave more than $64.5 million to Democrats and only $7.8 million to Republicans. The top recipient of education industry money in 2018 was former Rep. Beto O'Rourke (D-Texas), who was given almost $3 million from people in the field for his unsuccessful bid for a U.S. Senate seat. Former Sen. Claire McCaskill (D-Mo.), Sen. Sherrod Brown (D-Ohio), Sen. Doug Jones (D-Ala.), Sen. Bob Casey (D-Pa.), former Sen. Heidi Heitkamp (D-N.D.) and Sen. Jacky Rosen (D-Nev.) all received over $1 million each (OpenSecrets.org, 2019).

Historical Political Factors and Capital Appropriations

Politics has played a large role in the development of budgeting and allocation for Ohio's institutions of higher learning. In 1939, the presidents of the five institutions in existence at that time (Bowling Green State University, Kent State University, Ohio University, Miami University, and Ohio State University), developed the Inter-University Council (IUC) to mutually protect the institutions' long-term interests against the potential of Governor Martin L. Davey (1935-1939) advancing the interests of the state university located in his home community of Kent. The IUC initially focused on three areas, (a) to recognize the exclusive mission of Ohio State to award the doctoral degree in graduate study, (b) to present to the

administration and legislature an agreed upon position of operating and capital need of all five institutions and to defend these in concert, and (c) to cooperate in all legislation and other public interests concerning the state universities ("History of IUC," 2019).

The council convened to discuss their respective needs and ways of increasing appropriations over current levels. Once agreement was reached within the IUC, the chair of the ICU would begin negotiations with the Governor's office via the State Director of Finance on behalf of the institutions. Typically the negotiations would involve the chair of the IUC insisting that the state universities required an increase in appropriations while the state budget director would respond that the state revenues were limited and increases would be difficult to manage.

Once appropriation amounts were agreed upon, the IUC members met to allocate the funding. In general, the distribution corresponded to enrollments, with Ohio State receiving extra funds for the doctoral programs and medical school and Central State receiving more in proportion of funding due to its smaller size. Ohio State separately negotiated appropriations for its agricultural extension service and experiment station and for the teaching hospitals.

The IUC and legislature worked together to appropriate funding from 1939 through 1963. During this time, it was observed that state representatives in the legislature were divided such that Ohio State, despite its much larger size, could not obtain a fair allocation of funding because legislators from Cincinnati, Dayton, Toledo, Akron, Canton, Youngstown, and Cleveland were not amiable towards Columbus. Involving the IUC in the appropriations process allowed the Governor and legislature to "…avoid bitter political battles that would be precipitated if they [the Governor and legislature] determined the relative entitlement of needs of each state university." ("History of IUC," 2019; pg. 1).

By the early 1960's tuition increases were becoming a political issue in Ohio and policymakers were criticizing campuses for excessive tuition fees and taxpayer expenses. The IUC generally responded that the universities would not have to constantly increase tuition if the state would properly increase appropriations ("History of IUC," 2019). During these years, the IUC presidents outsourced much of the meaningful planning initiatives with government to outside agencies and ad hoc bodies.

In 1959, Governor Michael V. DiSalle (1959-1963) and the General Assembly created an interim Commission on Education Beyond High School. Among the tasks for the commission was to recommend who should take the leadership in directing the future higher education needs of Ohio ("History of IUC"). The DiSalle administration drafted a bill to establish the IUC as a legally authorized agency to advise the Governor and the General Assembly on the governmental matters affecting higher education appropriations. When the bill was presented to the IUC, the majority of the IUC voted not to endorse the legislation because it was believed by IUC members that such a law would make the IUC a function of the state government rather than a representative body in the interest of the universities. The state finance director warned the IUC that in the future the IUC would not be consulted on matters of appropriations.

In November of 1962, James Rhodes (1963-1971, 1975-1983) was elected Governor. And in 1963, the 105th Ohio General Assembly passed HB 214 creating the Ohio Board of Regents (BOR) as the state's higher education planning and coordinating board Ohio ("History of IUC"; Katsinas, 1999). The mission of the BOR was to create a "Master Plan for Higher Education" ("The Ohio Board of Regents: 40 Years of Service", 2004, para. 5). The BOR, now part of the Ohio Department of Higher Education (ODHE), is a cabinet level agency that currently consists of nine members with a purpose to advise the governor and state legislature on

higher education issues. The BOR does not have direct control over the institutions of higher learning in Ohio, but is involved in issues related to funding through its advice to the state governmental bodies. The BOR also manages state financial aid programs for students and approves new degree programs ("Ohio Board of Regents," n.d.).

The state of Ohio currently provides funding for capital projects in higher education by issuing Higher Education Facilities Bonds. The debt and interest expense of the bonds do not appear on the records of individual institutions, but instead are recorded on the financial records of the State of Ohio ("Ohio Department of Higher Education Budget," n.d.). According to section 369.410 of Am. Sub. H.B. 64 of the 131st General Assembly, public institutions of higher education must assess the financial viability of proposed projects and seek the Chancellor's approval prior to pledging fees to secure bonds or notes. The process has thus changed over time from a centralized process with capital decisions made by BOR to a de-centralized process with capital requests made by individual institutions and capital decisions made by the Chancellor of the ODHE (or a designee of the Chancellor) and eight people appointed by the Governor. Thus, the traditional process of allocating capital funds has over time turned into a more collaborative than formulaic budgeting process in which the ODHE agrees to a single list of capital projects that is meant to collectively meet the needs of all Ohioans rather than individual institutions. Four focus areas are currently involved in Ohio's allocation of capital funds (Ohio Department of Higher Education, 2016):

- Maintaining the investments the state has already made in existing campus facilities.
- Building world-class programs and stimulating creativity by advancing strategic collaborations.

- Furthering Ohio's competitive advantage by capitalizing on existing strengths and responding to new of increased workforce development and career opportunities.
- Modernizing learning environments and encouraging completion opportunities linked to careers for today's students.

A total of $428,240,000 was recommended for allocation in 2016 (the most recent available year of reported data; Ohio Department of Higher Education, 2016) and included $193,607,423 (45%) for maintaining investments, $95,879,500 (22%) for world-class programs, $78,844500 (19%) for modernizing learning environments, and $59,908,577 (14%) for workforce development/career opportunities.

As stated earlier, previous studies have indicated that the process of appropriating dollars to higher education institutions is a distinctly political process (McLendon, Hearn & Mokher, 2009; Tandberg, 2010; Tandberg & Ness, 2009). McLendon, et al. (2009) cited five core explanations that were associated with variation in state expenditures on higher education, namely, (1) political-system characteristics, (2) economic condition of the state, (3) state demography, (4) certain higher education policy conditions within states, and (5) post-secondary governance arrangements. The authors found statistically significant relationships between state appropriations for post-secondary education and legislative professionalism, the number and size of higher education interest groups, partisanship, term limits, and gubernatorial power influence. A case study by Tandberg (2006) indicated that alliances between state-level higher education interest groups and policymakers affected allocation of capital. Statistical correlations between partisanship and state appropriations for post-secondary public education have been empirically shown in many studies (Archibald & Feldman, 2006; McLendon, Deaton & Hearn, 2007; McLendon & Hearn, 2006; McLendon, Hearn & Deaton, 2006; Nicholson-Crotty & Meier,

2003; Tandberg, 2006; 2007). However, a majority of the literature relating to political policy and school funding is focused on per-student spending related to instruction and general fund spending (spending of funds received from state taxes), and not on spending related solely to capital improvement projects.

There have been studies involving capital expenditures and political factors. In a national study of capital expenditures for higher education, Tandberg and Ness (2011) modeled state capital expenditures on variables related to (a) economic and demographic characteristics, (b) higher education variables, and (c) political variables. The authors concluded that state capital spending was greatly influenced by the political variables. Another study by Ness and Tandberg (2013) compared two models, one model for general fund appropriations and the second model for capital spending. The authors found that political variables significantly influenced both capital fund and general fund spending for higher education. However, the authors did not find "overwhelming evidence" to support their hypothesis that political factors matter more for capital spending than for general fund appropriations for higher education.

Population and Capital Allocation

The population Ohio as of 2019 is estimated at 11.2 million ("World Population Review," 2019). Ohio is the 34th largest state in land size, but the 7th most populous and the 10th most densely populated in the United States. The growth rate, however, is slow, growing at rate of 0.67% per year which ranks 43rd in the country ("World Population Review"). Although Ohio's growth is slow, the population counties and cities are comparatively different. Columbus is growing at a rate of 10% each decade. Cleveland, on the other hand is "losing people at an alarming rate" (pg. 1), with estimates of 23 residents lost each day for 43 years (Larkin, 2014). County-wise, the most populated county in Ohio is Franklin County at approximately 1.29

million residents. The second most populated county is Cuyahoga County with 1.25 million residents. However, Cuyahoga County, in which Cleveland is located, has declined in population at a rate of 2% annually in recent years ("World Population Review").

Ohio's public higher education facilities include 14 public universities, 24 regional branch campuses, and 23 community colleges ("Policy Matters Ohio", 2019). The total headcount enrollment for Fall 2017 community colleges, university main campuses, and university regional campuses of public institutions in Ohio was 518,364 students. Previous research at the national level has included state population numbers as covariates (Delaney & Doyle, 2011; McLendon, Hearn, & Mokher, 2009).

A study by McLendon, Hearn, & Mokher (2009) indicated that the variable of population share was statistically significant, with higher shares of college-aged and elderly populations associated with lower spending in higher education. The study also indicated that greater enrollments in private colleges were associated with decreased appropriations, and greater enrollments in 2-year colleges were associated with increased appropriations. However, the study was not specified solely for capital expenditures.

A national study by Delaney and Doyle (2013) was performed to investigate state capital expenditure outlays and included a variable representing the total population of each stated by each year of study. The population variable was not statistically significant for the Delaney and Doyle (2013) study.

Maiden and Stearns (2007) investigated the association between geography and SSI and capital funds for higher education between rural and non-rural K-12 public schools in Oklahoma. The researchers found a higher degree of equity between rural and non-rural districts for total

SSI expenditures per pupil than for total capital expenditures per pupil. This may also be true for institutions of higher education in Ohio.

Since population variables are mixed in statistical significance and the Ohio population has differing regional characteristics, a variable representing the population will be included in this proposed research. The variable will be county population and will be obtained from the U.S. Census Bureau. The census is completed every 10 years. However, a formula is available at the Census Bureau site to assess the population estimates at the county level for each year. Each new series of data, called a vintage, incorporates the information of the decennial census with the latest administrative record data, geographic boundaries, and methodology to derive an annual estimate of population (United States Census Bureau, 2018).

Summary

Higher education is paramount to the success of individuals, communities, and countries. Horace Mann, the 19th century champion of publically funded universal education, viewed education as the best way for a person to achieve greatness and generate equal footing with others, saying "Education then, beyond all other devices of human origin, is a great equalizer of the conditions of men -- the balance wheel of the social machinery." (Rhode, Cooke, & Ojha, 2012). Facilities of higher education must be maintained, updated, and built to accommodate the safety and comfort as well as the education of students. Studies and reporting are scarce as relates to allocation of funds for capital expenditures for post-secondary institutions in the U.S., and no empirical studies currently exist for the investigation of the allocation of funds for capital expenditures for post-secondary education in the State of Ohio. Additional research on this topic is needed to find possible factors relating to capital allocation and how the factors are associated with the dependent variable of capital expenditure in dollars/number of FTE students. Of interest is campus condition, county population, school type (2 vs. 4 year schools) and political parties of

the governor and legislature. The model may indicate structural differences that are time dependent and therefore the study will include a 30-year time span, from 1988 through 2018.

An overview of the methodology to be used in the process of this study will be presented in Chapter 3. The research design, population, data collection, power analysis for sample size, and data analysis methods will all be discussed within this chapter.

CHAPTER 3

METHODOLOGY

Chapter 3 begins with a restatement of the purpose of the study and presentation of the research question and associated statistical hypotheses. Next, the research design will be presented followed by a description of the population and sample. The proposed data collection methods, procedures, data sources, and validity and reliability will then be presented. A discussion of the data analysis and ethical considerations will close the chapter.

The purpose of this quantitative, cross-sectional, historical study is to determine the basis of capital allocation among Ohio higher education institutions per FTE (as per the reporting precedent set in historical Board of Regents reports and research by Johnson (2012)) as it relates to (1) campus condition, (2) school type (2 year vs. 4 year), (3) county population, (4) party of the governor, and (5) party of the legislative majority? The period of analysis will include the years between 1988 and 2019. This thirty-year period was selected because it allows review of capital distribution practice in each of the three capital distribution era's described above (1963-1995; Centralized BOR, 1995 – 2012; Formula Driven and 2012 to Present; Performance Driven).

A series of bi-variate correlational analyses and multiple regression model will be tested to address the six research questions of this study. The research questions and associated statistical hypotheses are as follows:

Research Question 1. Is campus condition (satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, physically obsolete) measured in square footage, correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 1. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Alternative Hypothesis 1. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Research Question 2. Is school type (2 year vs. 4 year) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 2. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Alternative Hypothesis 2. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Research Question 3. Is the population of the county in which the campus resides (measured in thousands) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 3. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the

predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Alternative Hypothesis 3. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Research Question 4. Is the party of the governor correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 4. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Alternative Hypothesis 4. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Research Question 5. Is the party of the legislative majority correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 5. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Alternative Hypothesis 5. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Research Question 6. Which predictor contributes the most to with the amount of institution capital distribution per FTE?

Null Hypothesis 6. None of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Alternative Hypothesis 6. At least one of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Research Design

This quantitative, cross-sectional, historical study will further the research on historical and current trends of capital allocation to post-secondary public institutions in the state of Ohio. Thirty years of quantitative data (1988 – 2018) will be retrospectively collected in order to assess the relationship of population for the county in which a school is located, type of school, (2 vs. 4-year), the physical condition of a school, and the political climate as relates to the annual capital allocation per FTE student at publically funded higher education institutions in the state of Ohio. An ordinary least squares (OLS) fixed regression model for cross-sectional panel data will be used. All variables will be analyzed with one regression model.

According to Leedy and Ormrod (2005), quantitative research is incorporated to address questions about the relationship among measured variables with the purpose of explaining, predicting, and controlling phenomena. The quantitative approach has several advantages; among them are clearer boundaries with regard to data gathering. While it is an advantage in itself, it does present opportunities for weaknesses. For this approach to yield valid conclusions, the information obtained from the retrospective data collection must be valid and correctly coded for analysis, requiring careful rigor in coding. Another limitation for quantitative methods is the need to use a substantially large sample to garner more valid results. However, for this study, the sample will include measurements of 11 variables over 30 years for Ohio's 14 public universities, 24 regional branch campuses, and 23 community colleges. Therefore the sample size is sufficient for quantitative analysis.

This historical study is also correlational in nature. According to Olsen and St. George (2004), a correlational study involves the description of the degree of relationship that exists between measured variables. A correlational design is of vital importance for this research, as this form of research will enable the retrieval of quantitative data that could help in describing the variables of interest (Creswell, 2014). Similarly, the aforementioned design is essential, as the aim of this study is to provide an accurate description of a particular situation or phenomenon during a cross-section of time (Lindell & Whitney, 2001).

A non-experimental approach to research is a research design wherein the researcher observes a certain phenomenon without manipulating the independent variables (Burns, Grove, & Gray, 2011). Burns, Grove and Gray (2011) list the following as the reasons behind the need for a study to adopt a non-experimental, quantitative approach: (1) there are a number of human characteristics or independent variables that are not subject to experimental manipulation or

randomization; (2) some variables cannot be ethically manipulated; and finally, (3) situations being studied demand the exploration of the phenomenon in question in a more natural manner in order to produce more realistic results. Thus for these reasons the researcher will make use of the non-experimental (correlational) vs. experimental approach to research.

The study will be an ex post facto historical research utilizing secondary data encompassing a thirty year time frame (1988-2018) using data obtained from the archives of National Association of State Budget Officers (NASBO), the Ohio Department of Higher Education, and the U.S. Census Bureau. The ex post facto historical approach using panel data was chosen over a single cross-sectional design in order to obtain the most accurate information possible on the variables relating to capital allocation over repeated measures across time. A single cross-sectional study, which assesses a population at one point in time, would not allow the researcher to see trends or differences over the years of the study.

Population and Sample

The population of the study includes Ohio's 14 public universities, 24 regional branch campuses, and 23 community colleges. The study sample will include data from the years 1988 through 2018 for each of the institutions. Some institutions may not have all available data for all years. However, use of the panel data model will allow the researcher to accommodate missing data during analysis.

Power analysis and sample size. The study sample includes 30 years of data from a population of Ohio's 14 public universities, 24 regional branch campuses, and 23 community colleges, resulting in a total of 30 * 61 = 1,830 records. Methods for power analysis calculations of longitudinal panel models are currently not as developed as power analysis methods for other types of regression models (Hedeker, Gibbons, & Waternaux, 1999; Jung & Ahn, 2003).

However, a simple rule of thumb calculation based on a continuous variable outcome will be used to assist in the sample size determination. The formula of $N \approx (4/\delta)2$, where δ= effect size. According to Cohen (1992) effect size (f^2) classifications for regression are small: $f^2 = .02$, medium: $f^2 = .15$, and large: $f^2 = .35$, in order to detect statistical significance at the 95% level, with a power of 80%. Using the rule of thumb criteria and the small sample size, a sample of 400 records would be required. The planned sample of 1,830 records exceeds the 400 record requirement by a substantial amount. Additionally, the records for this study are correlated over years of study, and this correlational effect from repeated measures may help in increasing power in the study (Tabachnick & Fidell, 2013, p. 44).

To compare numbers with the rule of thumb calculations, G*POWER statistical software will be used to define the minimum required sample size for a multiple regression model with 9 predictors. Parameters used in the power analysis were an alpha of .05, power of .80, and a small effect size of .02. The total sample size required using GPOWER software is a minimum of 791 subjects for a 9 predictor multiple regression model. Therefore, the sample size is sufficient for the analyses planned in this study.

Data Collection

Thirty years of quantitative data will be collected in order to assess the relationship of population for the county in which a school is located, type of school, (2 vs. 4-year), the physical condition of a school, and the political climate as relates to the annual capital allocation per FTE student at publically funded higher education institutions in the state of Ohio. Data will be compiled from various sources available online. U.S Census Bureau data will be collected for the party of the governor, party of the state legislature, and county population in thousands. Data from the Ohio Department of Higher Education will be collected to quantify the number of full

time equivalent students and school type. Data from the Ohio Department of Legislative Services will be collected to quantity amount of Capital Appropriations to each member institution.

Validity and Reliability

Validity is evidence and assurance that the prescribed measurement instrument or data source accurately measures what it purports to measure. Validity speaks to the relevance of measurement or the soundness of inference about the question being answered (Field, 2017; Vogt, 2007; Vogt, 2005). Reliability means that repeated applications of a procedure will produce similar results (Vogt, 2007). Field (2009) wrote that reliability should "consistently reflect the construct of measurement" (p.673). In other words, reliability of a database or instrument shows consistency in measurement or design being applied and the study can be replicated to obtain the same results. Reliability and replicability are helped by stating clear operational definitions of the variables or constructs under study (Vogt, 2007). However, reliability alone is insufficient without validity (Tabachnick & Fidell, 2013). The data sources used in this study have been used in previous research and are assumed to be both valid and reliable. Some error in measurement or data entry may still be present in the data sources. However, it is assumed that the error is minimal.

Data Analysis

The research questions will be investigated with an ordinary least squares (OLS) fixed-effects regression model for cross-sectional panel data. STATA v.14 software will be used with the "XT" command for analysis of the model. A .05 level of significance will be set for the analysis. The specifications for the model are as follows:

$Y_{ij} = B_0 + B_1X_{ij}1$(School type: 2-year = 1, 4-year = 0) + $B_2X_{ij}2$ (County population, in thousands, where campus resides (U.S. Census Bureau, 2010, 2018)

) + $B_3X_{ij}3$ (Square footage of school condition = satisfactory) + $B_4X_{ij}4$ (Square footage of school condition = minor rehabilitation) + $B_5X_{ij}5$ (Square footage of school condition = rehabilitation) + $B_6X_{ij}6$ (Square footage of school condition = major rehabilitation) + $B_7X_{ij}7$ (Square footage of school condition = physically obsolete) + $B_8X_{ij}8$ (party of governor at time t: 1 = Democrat, 0 = Republican) + $B_9X_{ij}9$ (majority party of State legislature at time t: 1 = Democrat, 0 = Republican) + $\tau_j + \delta_i + \varepsilon_{ij}$

Where:

Let $i = 1,\ldots,k$ = School

Let $j = 1,\ldots,n_i$ = Year of measurement

Y_{ij} = response for the ith school and the jth repetition (year)

B_0 = the overall intercept that corresponds the mean value of the response for the group when all independent variables equal zero.

$B_1,\ldots,B_p$ = fixed effects coefficients

$X_{ij}1,\ldots,x_{ij}p$ = the values of the variables for the ith school on the jth repetition.

τ = year effects

δ = school effects

ε = pure residual

Variables will be coded for analysis according to the specifications in Table 1. First, the data will be visually inspected for missing values or values outside the accepted range of values for each variable. The number of missing data will be investigated and reported. The population of the study includes Ohio's 14 public universities, 24 regional branch campuses, and 23 community colleges. The study sample will include data from the years 1988 through 2018 for each of the institutions. Some institutions may not have all available data for all years. However,

use of the panel data model will allow the researcher to accommodate missing data during analysis.

The analysis of the data will involve both descriptive and inferential statistics. Descriptive statistics of the mean, median, standard deviation and possible score ranges will be calculated for the continuous variables and measures of frequency and percentages will be computed for the dichotomous variables.

The Pearson product moment correlation is a common measure of the correlation between two variables and is very widely used as a measure of the strength of linear dependence between two variables (Pallant, 2013). A table of results reflecting the correlations between the criterion and predictor variables will be produced. Additional analyses will use OLS regression for panel data to examine the relationship between each of the nine predictors and the criterion of institution capital distribution per FTE. A 95% level of confidence ($p < 05$) will be used to infer statistical significance.

The OLS panel regression will allow the researcher to go beyond the information derived from the Pearson's correlation coefficients in understanding not just bi-variate associations between variables, but also to understand how nine of the variables, used as predictors, are associated with the amount of institution capital distribution per FTE (criterion variable). The variables of the regression model will be coded such that variable groups with a value of zero will be the baseline model (see Table 1). The variables of (a) county population, (b) SQFT satisfactory, (c) SQFT minor rehabilitation, (d) SQFT rehabilitation, (e) SQFT major rehabilitation, and (f) SQFT physically obsolete, will be mean centered prior to regression analysis. Thus, the baseline regression model will be representative of a 4-yeasr school, with average overall county population, and SQFT variables, during the time of a Republican governor and a Republican

majority of State legislature. The effects of the nine predictor variables will either increase or decrease the value of the criterion variable, institution capital distribution per FTE. Statistically significant effects of the nine predictors on the criterion will be analyzed and reported. A table of the findings of the correlation analyses and a table of the findings of the regression model will be presented in the Results chapter.

Table 1

Coding of Variables for Correlation Analysis and OLS Regression Model

Study Variable Type/Name/ (Level of Measurement)	**Study Variable Coding**	**Notes**
Criterion		
Institution capital distribution per FTE (continuous)	Continuous Variable	A continuous variable measured as a ratio of: $\frac{Institution Capital\ Distribution\ in\ Dollars}{Number\ of\ Full\ Time\ Equivalent\ Students}$
Predictors		
School type (dichotomous)	0 = 4-year 1 = 2-year	Coded study variable so that "4-year" will be the reference group in the model.
County population (continuous)	Continuous Variable	A continuous variable measured as the population of the county, in thousands, of the school's location
SQFT Satisfactory	Continuous Variable	A continuous variable measured as the number of square footage classified as "satisfactory"
SQFT Minor rehabilitation	Continuous Variable	A continuous variable measured as the number of square footage classified as "minor rehabilitation"
SQFT Rehabilitation	Continuous Variable	A continuous variable measured as the number of square footage classified as "rehabilitation"
SQFT Major Rehabilitation	Continuous Variable	A continuous variable measured as the number of square footage classified as "major rehabilitation"
SQFT Physically Obsolete	Continuous Variable	A continuous variable measured as the number of square footage classified as "physically obsolete"

(cont'd)

Table 1 (cont'd)

Study Variable Type/Name/ (Level of Measurement)	Study Variable Coding	Notes
Party of Governor (dichotomous)	0 = Republican 1 = Democrat	Coded study variable so that "Republican" will be the reference group in the model.
Majority party of State legislature (Nominal)	0 = Republican 1 = Democrat 2 = Split	Coded study variable so that "Republican" will be the reference group in the model.

Ethical Considerations

The sample for this study is derived from archival databases. No human interaction with participants of the study is anticipated. Respect, beneficence, and justice guide the research process enabling the researcher to honor participants, gain permission before entering sites, and reporting research fully and honestly (Cooper & Schindler, 2011; Creswell, 2014). Since the data being collected are public archival data from secondary sources, the level of risk is minimal. The level of data integrity from the sources providing information and the level of correctness from those recording the information were the main challenges to the validity, creditability, and reliability of the archival databases.

Limitations of Study

Limitations of this study include lack of information regarding city population which limits geographical variation. The study will not include information on how capital allocations were distributed within each campus. Measurement and data entry of information into the databases for the variables included in the study are subject to varying potential errors, such as

data entry errors, unbeknownst to the researcher. The data for school condition measured in square footage is self reported by the institution and requires a qualitative judgment based upon categorical school condition definitions. Since categorical judgment is used, we need to acknowledge judgment may vary among institutions. The data for the county population will be the population in thousands and will not include information on clusters of city populations inside of each county.

Summary

Chapter 3 presented the methodologies used for this quantitative, cross-sectional, historical study. The discussions presented in this chapter provide insight on the direction of the study and the choice of methodology. The chapter also contained discussions on population, sample, operationalization of variables for analysis, data collection and data analysis, and possible limitations to the study. Chapter 4 will present the results of analyses as relates to the methods presented in this chapter.

CHAPTER 4

RESULTS

The purpose of this quantitative, cross-sectional, historical study was to determine the basis of capital allocation among Ohio higher education institutions per FTE (as per the reporting precedent set in historical Board of Regents reports and research by Johnson (2012)) as it relates to (1) campus condition, (2) school type (2 year vs. 4 year), (3) county population, (4) party of the governor, and (5) party of the legislative majority. Data were collected for a thirty-year period from 1988 to 2018 because it allowed for review of capital distribution practice in each of the three capital distribution eras described previously (1988-1995; Centralized BOR, 1995 – 2012; Formula Driven and 2012 to 2018; Performance Driven). A series of bi-variate correlational analyses and one multiple regression model were be tested to address the six research questions of this study. The research questions and associated statistical hypotheses are as follows:

Research Question 1. Is campus condition (satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, physically obsolete) measured in square footage, correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 1. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Alternative Hypothesis 1. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the

predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Research Question 2. Is school type (2 year vs. 4 year) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 2. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Alternative Hypothesis 2. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Research Question 3. Is the population of the county in which the campus resides (measured in thousands) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 3. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Alternative Hypothesis 3. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Research Question 4. Is the party of the governor correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 4. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Alternative Hypothesis 4. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Research Question 5. Is the party of the legislative majority correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 5. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Alternative Hypothesis 5. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Research Question 6. Which predictor contributes the most to the amount of institution capital distribution per FTE?

Null Hypothesis 6. None of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Alternative Hypothesis 6. At least one of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Data Collection and Preparation

On January 3, 2019, the Ohio Department of Higher Education decommissioned their Solaris data base servers, containing Higher Education Information (HEI) data in excel format, which was linked to the Student Inventory and Basic Data Series on the ODHE archive website. The investigator had planned to use this online database but was unable after discovering it had been removed. After extensive public record requests, the digital excel format could not be retrieved. Any data not remaining on the ODHE archive as a pdf, ODHE was able to scan hardcopy archive data from printed documents and forward via email to satisfy their public record obligation as a public agency. Dependent and independent variable data sought from ODHE included Full Time Equivalent (FTE) enrollment, School Type and Facility Condition measured in square feet, for each member institution of the ODHE system, from 1988 thru 2018.

Collection of data that were presumed to have been available on the ODHE website in digital excel format became a challenge because, 1) data were difficult to obtain, 2) data arrived in pdf format, and 3) reporting styles and parameters changed over the 30 year period of interest. With absence of some data, which will be described below, minor statistical methodology adjustments are explained to adapt and work within parameters of the available data.

Full Time Equivalent (FTE) Enrollment

Changes in Ohio Department of Higher Education FTE enrollment reporting changed over the thirty-year period of interest. Each four-year university, four-year branch campus and two-year college were identified as independent campuses residing in a single county. Exceptions included two, two-year colleges that maintain multi-site campuses in multiple counties. This is the case for Owens Community College with campuses in Wood and Hancock Counties, and Southern State Community College with campuses in Highland, Fayette, Clinton and Brown counties. Labeling each of these sites independently was important to this study because population of county was one of the independent variables included in the research questions. The above referenced multi-site FTE enrollment was recorded individually for each satellite campus from 1988 thru 2009. However, ODHE FTE enrollment reporting from 2010 thru 2018 was changed to aggregated reporting for community colleges w/ multiple sites. The investigator issued public record request to Southern State Community College and Owens State Community College requesting they provide FTE enrollment for each of their satellite campuses from 2010 thru 2018 to maintain continuity in data collection parameters. Southern State Community College responded they could not provide the data because they no longer tracked FTE by campus, because it was not required by ODHE. Therefore the requested data did not exist, and therefore could not be provided. Therefore, the investigator made the decision to exclude Southern State Community College and Owens State Community College from the data analysis.

Missing FTE Data (1998)

Data for FTE enrollment from 1988 thru 1997 were downloaded from the ODHE archive website in pdf. (Ohio Board of Regents Data Publications, n.d.).. Thereafter, ODHE issued ten-year FTE reports from 2000 thru 2009 and 2009 thru 2018. There were no on-line records for

1998 and 1999 so a public record request was issued to ODHE and the requested data were received in September of 2019. The 1999 data were within the range of the 1997 and 2000 reports, however the1998 data did not make sense and needed to be rejected. A second public records request was submitted to ODHE in February of 2020 for the 1998 data without response. The investigator did not observe extreme or unusual variance in FTE enrollment in years prior to or after 1998, so he will insert the average of 1997 and 1999 as the FTE enrollment for 1998.

FTE Data Scrubbing

After downloading the FTE enrollment spreadsheet as a single pdf., the investigator converted the pdf. into a word document. Conversion was accomplished using PDF to Word with Optical Character Recognition (OCR) software, which is a downloadable application from Enlosoft for Mac computers. The reliability of conversion decreases in relation to quality of the pdf, therefore a scrubbing process was necessary to assure accuracy. The converted word document was then cut and pasted into an excel spreadsheet and then manipulated to mirror the original pdf FTE enrollment spreadsheet. Mathematical checks were performed on the converted excel data to verify the computed excel final total FTE enrollment reflected the same FTE final total enrollment in the pdf. In the event of a difference other than zero, a scrutinizing data comparison was performed until the excel data matched the original FTE enrollment data pdf.

Capital Data Collection

As noted previously, the state of Ohio utilizes a bi-annual budgeting cycle, where the governor approves the two-year state budget at meetings known as general assemblies. General Assemblies are numerically referenced, with the 1st Ohio General Assembly convened in 1803.

The Ohio Legislative Service Commission maintains limited archives of General Assemblies records on their website. General Assembly budget archive was retrieved for years 2003 through 2018 from the 124th thru 131st General Assembly, respectively. The preceding capital appropriations of interest, for the years 1988 thru 2002, were downloaded in 2018 as an historical Ohio Board of Regents document, from the ODHE archive website, prior to being removed in January 2019. This historical capital distribution information obtained from ODHE was cross referenced with General Assembly archives obtained from the Ohio Legislative Service Commission via public records request for the same years. It should be noted that no higher education capital appropriations were awarded in the 128th General Assembly for the 2011-2012 biennium.

Capital Data Scrubbing

After each Biennium Capital Appropriations Bill was retrieved, a systematic process was implemented to assure valid and reliable data was converted from pdf files to electronic excel (xlsx) spreadsheet format. The pdf spreadsheet within the bill identifying the allocation of capital funds was isolated as a single pdf and then converted to a word document. Conversion was accomplished using PDF to Word with Optical Character Recognition (OCR) software, which is a downloadable application from Enlosoft for Mac computers. The reliability of conversion decreases with the quality of the pdf, therefore a scrubbing process was necessary to assure accuracy. The converted word document was then cut and pasted into an excel

spreadsheet and then manipulated to mirror the original pdf spreadsheet in the capital bill. Mathematical checks were performed on the converted excel data to verify the computed excel final total capital allocation reflected the same capital allocation final total amount in the original capital bill pdf. In the event of a difference other than zero, a scrutinizing data comparison was performed until the excel data matched the original capital bill pdf.

Community Projects

The state of Ohio utilizes the higher education capital bill as a vehicle to award funds for community projects throughout the state because higher education institutions are familiar with the capital appropriation process. In many instances, but not all, Joint Use Agreements (JUA) are drafted and approved by the ODHE Chancellor, to agree upon a shared use or access to the community project if beneficial to the institution. Many community project administrators are unaware of the required nuances of working with the Ohio Controlling Board and the Ohio Office of Budget and Management to encumber and release funds for their project. Therefore, the state of Ohio relies on experienced institutions to assist the agency receiving community project funds with the administrative processes.

Because JUA are considered a benefit to the higher education institution, and not critical to their long term capital plan, this investigator decided to remove community projects to capture the actual capital appropriation to the institution that supported their long term capital plan. To isolate the actual amount of capital allocation for each institution, the community projects need to be removed from the total recorded institution capital appropriation. To achieve removal of community projects, the researcher scanned the capital bill for the word “community”, then highlighted all the community projects and their appropriated amounts, described in the narrative section of the bill. After highlighting each community project, the researcher created a

community project column in the capital bill spreadsheet and input the community project amount corresponding with the row of the institution, which received the community project funding. Afterward, a subtraction formula was applied to deduct community project awards from institution award, leaving a true bi-annual capital appropriation for each higher education institution.

After the actual Bi-annual award for all 61 institutions was determined, the bi-annual award was divided by two to establish an annual capital award. Annual capital award was then cut and pasted into the master data collection spreadsheet.

Facility Condition Measured in Square Feet

Facility condition measured in square feet is another ODHE variable where reporting styles and parameters changed over the 30-year period. Recording of facility condition from 1988 thru 1996 was different from 1998 thru 2018. Collection of data varied as well. The investigator was able to locate and download from ODHE website pdf files of Facility Condition for 1992, 1994, 1996, 2009, 2010, and 2016. All remaining even years between 1988 and 1996 were obtained by public record requests from ODHE. Remaining original files from 1998 thru 2018 were never located. ODHE ran a query through their database and re-created the reports based on my data requirements. All files received were in pdf format. Before any manipulation of data could begin, the investigator had to convert the pdf files for all years, regardless of modifications to reporting styles and parameters, into a working excel spreadsheet.

Data Scrubbing

After each Facility Condition report was retrieved, a systematic process was implemented to assure valid and reliable data were converted from pdf files to electronic excel (xlsx)

spreadsheet format. First, the Facility Condition pdf spreadsheets were isolated as a single pdf and then converted to a word document. Conversion was accomplished using PDF to Word with Optical Character Recognition (OCR) software, which is a downloadable application from Enlosoft for Mac computers. The reliability of conversion decreases accordingly with the quality of the pdf, therefore a scrubbing process was necessary to assure accuracy. The converted word document was then cut and pasted into an excel spreadsheet and then manipulated to mirror the original pdf spreadsheet in the capital bill. Math checks were performed on the converted excel data to verify computed excel final total Facility Condition, measured in square feet, reflected the same amount in the original Facility Condition, measured in square feet pdf. In the event of a difference other than zero, a scrutinizing data comparison was performed until the excel data matched the original Facility Condition, measured in square feet pdf.

Old Seven Category vs. New Five Category Reporting

From 1988 thru 1996, ODHE published a Physical Plant Inventory of buildings owned on a bi-annual basis, reporting in even ending years. From 1988 thru 1996, facility condition measured in square feet, was recorded into seven categorical frames of condition (Satisfactory, Functionally Satisfactory, Physically Satisfactory, Minor Rehabilitation, Major Rehabilitation, Physically Obsolete, and Functionally Obsolete), compared to the five categorical frames of condition (Satisfactory, Minor Rehabilitation, Rehabilitation, Major Rehabilitation, and Obsolete) recorded from 1998 thru 2018. Another difference was early facility conditions were recorded as Net Assignable Square Feet (NASF), and latter facility conditions were recorded as Gross Square Feet (GSF). Fortunately, with both total NASF and GSF totals available in the 1988 thru 1996 data, the investigator was able to convert the old NASF categorical frames of condition records to the match the newer GSF records. A pattern exists when comparing the

seven categories of old reporting to the five categories of new reporting. When comparing the most recent, older facility condition recording, 1996, to the least recent, newer facility condition recording, 1998, the addition of "Functionally Satisfactory" and "Physically Satisfactory" from 1996 approximates the value of "Minor Rehabilitation" in 1998. Similarly, the addition of "Physically Obsolete" and "Functionally Obsolete" from 1996 approximates the value of "Obsolete" in 1998. By applying the above described method for converting seven categories of old category reporting to five categories of newer reporting, and converting NASF to GSF, the data can be used.

Co-Located Campuses

Throughout the Ohio Department of Higher Education system, there are seven pairs of schools that are co-located on the same campus. Seven, four-year branch campus universities are co-located with seven, two-year community colleges.

- Belmont Branch: Ohio University and Belmont Tech
- Lima Branch: Ohio State and Lima Tech
- Mansfield Branch: Ohio State and North Central Tech
- Marion Branch: Ohio State and Marion Tech
- Newark Branch: Ohio State and Central Ohio Tech
- Stark Branch: Kent State and Stark Tech
- Zanesville Branch: Ohio University and Muskingum Area Tech

The Facility Condition reporting from 1988 thru 1996 is an anomaly, in that it is the only ODHE report that reports co-located statistics as an aggregated statistic. The Ohio Higher Education system is decentralized. No other report offers aggregated reporting of separate institutions, especially between four year and two-year institutions. The Facility Condition

Report from 1998 thru 2018 separates the four-year campus from the two-year campus. The FTE enrollment report separates four-year campus FTE from two-year campus FTE. Capital appropriation data separates four-year campus capital from two-year campus capital.

In summary, the investigator decided to estimate the facility gross square feet by condition for the co-located facilities for the years 1988 through 1996 by applying the known institutional division percentages from 1997. The results would not be reliable if 14 institutions out of 61 could not be included in the statistical correlation analysis.

Majority Party of State Legislature

Adjustments in the variable coding were required for the variable of majority party of State Legislature. The planned coding (see Chapter 3) was Democrat = 0 and Republican = 1. However, only two categories of (a) Republican (both House and Senate were Republican majority) and (b) Split (House and Senate where one majority was Republican and the other Democrat) were contained in the data set. Therefore the variable of majority party of State Legislature was coded as Republican = 0, and Split = 1.

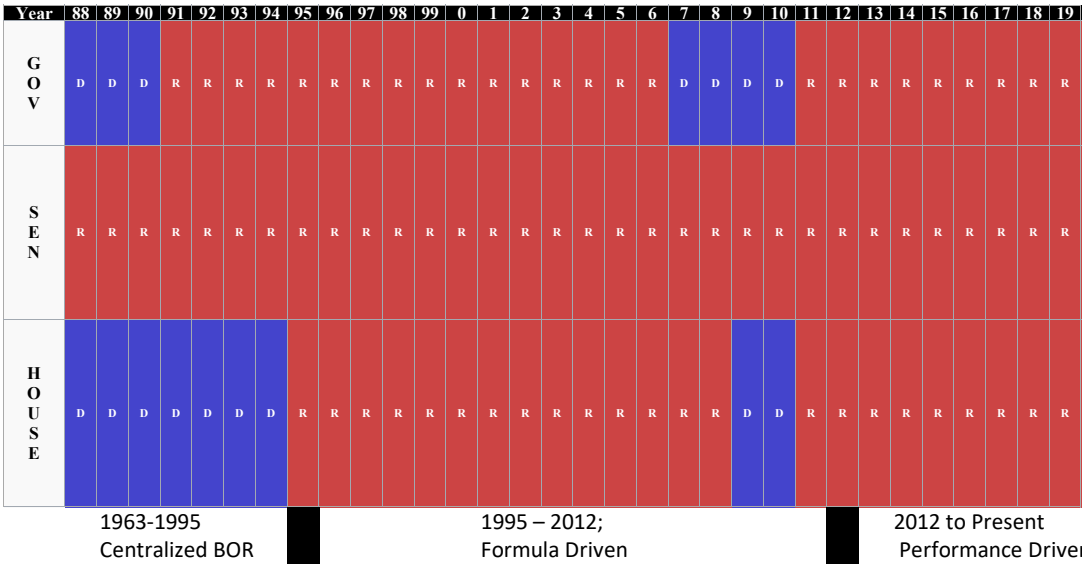

Figure 1.0 Partisan Composition of Ohio State Government—FY 1988-2018 (Created by J. O'Brien, adapted from Ballotpedia data)

The partisan composition of Ohio state government (Party of the Ohio Governor, Party of the Ohio Senate Majority and Party of Ohio House of Representatives Majority) between 1988 and 2018 is shown in Figure 1.0. Ohio republicans have maintained control of the Ohio Senate every year between 1988 and 2018. Republicans maintained control of the Ohio House of Representatives in all years between 1988 and 2018, except between 1988 - 1994, and 2009-2010. Ohio republicans controlled the Governors office in all years between 1988 and 2018

except between 1988 - 1990, and 2007 - 2010. In twenty of the thirty years shown in figure 1.0, Ohio republicans held a trifecta, meaning control of the Governor's office, the Ohio House of Representatives and the Ohio Senate. Between 1988-1990, and 2009-2010, the democrats controlled majority in the Ohio House of Representatives and the Governors Office. The democrats never had the trifecta, meaning control of the Governor's office, the Ohio House of Representatives and the Ohio Senate.

The above thirty-year review of partisan composition highlights an interesting observation with regards to the three capital distribution era's noted prior (1963-1995; Centralized BOR, 1995 – 2012; Formula Driven and 2012 to Present; Performance Driven). Approximately, after an era where both the Ohio gubernatorial and the Ohio House of Representatives were democrat, the newly republican dominated Ohio Gubernatorial and Ohio Senate implemented a change in policy that effected capital distribution. This occurred in 1995 and 2012 after the democratic Ohio Gubernatorial and Ohio House of Representative dominance ended in 1990 and 2010, respectively.

Descriptive Analysis

Measures of central tendency and variability for the continuous variables of the study are presented in Table 2. The numbers in Table 2 were obtained from Stata output for the function of *xtsum*. The *xtsum* function decomposes a variable x*ij* (each individual measurement for the variable) into an overall mean (the mean of all individual observations), a between groups mean, $(\overline{x}_i)$; the mean of measurements for collection of colleges, and a within groups mean ($x_{ij} - \overline{x}_i +$ grand mean of x). In essence, the overall measures are calculated over 1,829 campus-years of data (or the number of records available for a particular variable). The between measure is calculated over 59 campuses, and the within measure is the average number of years a campus

was observed over time. Minimum and maximum values are also reported for each measurement.

As an example, the variable of capital expenditure in dollars/Number of FTE students indicates an overall mean of 614.35 dollars per FTE student, a standard deviation of 900.67 dollars per FTE student, and a range of values between 0 and 13,090.37 dollars per FTE student. The mean capital expenditure in dollars/Number of FTE students for each campus (Between) varied between 289.55 and 3782.18 dollars per FTE student. The within number refers to the deviation from each campus' average, and therefore some of these deviations will be negative. The range of values for the within groups measurements over time for the variable of capital expenditure in dollars/Number of FTE students was -2288.06 to 9922.64.

Frequency counts and percentages of the categorical variables are presented in Table 2. The overall section of Table 2 summarizes results in terms of campus-years. The between section of Table 3 repeats the breakdown, but this time in terms of campuses rather than campus-years. The within percent gives the fraction of the time that a campus has the specified value of the variable. For example, the variable of party of governor there are 413 campus-years (22.6%) when the party was Democrat and 1416 campus-years (77.4%) when the party was Republican. Between repeats the breakdown, this time in terms of campuses rather than campus-years, 59 campuses included a Democrat governor and 59 included a Republican governor, for a grand total of 118 ever having either party. This means that all campuses had some years when the governor was a democrat and other years when the governor was a Republican. The value of 50% in Total within % is the normalized between weighted average of the within percents, that is, ((59 *22.58 + 59*77.42)/118). And 50% is a measure of the overall stability of the party of governor variable.

Table 2

Measures of Central Tendency and Variability of Continuous Study Variables

Variable/Group	*M*	*SD*	Minimum	Maximum	Observations
Capital expenditure in dollars / Number of FTE Students					
Overall	614.35	900.67	0	13090.47	$N = 1709$
Between		510.35	289.55	3782.18	$n = 59$
Within		744.79	-2288.06	9922.64	$\overline{T} = 28.97$
County population (in thousands)					
Overall	272.52	324.93	29.95	1426.97	$N = 1829$
Between		326.34	32.85	1345.94	$n = 59$
Within		28.72	108.22	843.85	$\overline{T} = 31$
School condition: Satisfactory (SQFT)					
Overall	676823.60	1696677.00	0	1.47^{7}	$N = 1805$
Between		161.585.00	527.55	1.12^{7}	$n = 59$
Within		535649.60	-4434638.00	4164505.00	$\overline{T} = 30.59$
School condition: Minor rehabilitation (SQFT)					
Overall	5288888.00	1228079.00	0	9814939.00	$N = 1805$
Between		1126811.00	0	6745267.00	$n = 59$
Within		494423.6	-2107775	4183583.00	$\overline{T} = 30.59$
School condition: Rehabilitation (SQFT)					
Overall	310658.50	908990.90	0	1.10^{7}	$N = 1805$
Between		777160.30	0	4973764.00	$n = 59$
Within		474720.50	-3891621	6363929.00	$\overline{T} = 30.59$
School condition: Major rehabilitation (SQFT)					
Overall	207394.10	542622.20	0	3919828.00	$N = 1805$
Between		480825.30	0	2209138.00	$n = 59$
Within		254025.20	-1464056	2304204.00	$\overline{T} = 30.59$
School condition: Physically obsolete (SQFT)					
	24001.98	92321.86	0	1122529.00	$N = 1805$
		69652.36	0	376351.70	$n = 59$
		60789.30	-352349.7	770179.5	$\overline{T} = 30.59$

Note. *M* = Mean; *SD* = Standard Deviation; Overall = All Records; Between = Between Campuses; Within = Within Years of Study.

Table 3

Frequency and Percentages of Categorical Variables of Study

Variable/Group	Overall (N = 1829) Freq.	%	Between (n = 59) Freq.	%	Within %
School type					
4-year campus	434	23.73	14	23.73	100.00
4-year regional campus	744	40.68	24	40.68	100.00
2-year campus	651	35.59	21	35.59	100.00
Total	1829	100.00	59	100.00	100.00
Party of governor					
Democrat	413	22.58	59	100.00	22.58
Republican	1416	77.42	59	100.00	77.42
Total	1829	100.00	118	200.00	50.00
Majority party of legislature					
Republican	1298	70.97	59	100.00	70.97
Split	531	29.03	59	100.00	29.03
Total	1829	100.00	118	200.00	50.00

Note. Freq. = Frequency in the group classification; % = Percentage in the group classification.

Assumptions for Inferential Analysis

Hypothesis testing involved Pearson's product moment correlations and multiple regression for panel data. A fixed effects regression model for cross sectional data was attempted. However, the variable of school type was omitted from the regression models. Therefore the use of Stata's *xtreg* function was used with the option of "pa" which represented panel data. The Stata function of *xtreg* with the option of "pa" returns the same results as the *xtgee* command for a Generalized Estimating Equation (GEE) for panel data.

The GEE is similar to standard OLS regression. But unlike standard OLS regression, GEE allows for dependence within clusters, such as in the longitudinal data of this study. GEE models make no distributional assumptions for missing data and outliers in data, but require three specifications: (a) a mean function, (b) a variance function, and (c) a working correlation matrix for the clusters, which models the dependence of each observation with other observations in the same cluster. The appeal of a GEE model is that it gives consistent estimates of the parameters, and consistent estimates of the standard errors can be obtained using a robust *sandwich* estimator even if the working correlation matrix is incorrectly specified (Zorn, 2011). This estimator is consistent as the number of case clusters becomes large. GEE models a known function of the marginal expectation of the dependent variable as a linear function of the explanatory variables. The parameters estimated are derived as population-averaged.

GEE in STATA requires a fitting distribution, the default being a Gaussian or Normal distribution. Normal distributions are often assumed for models with continuous outcomes. The model in this study included a dependent variable of capital expenditure in dollars/Number of FTE students, which was a ratio, and therefore continuous. The distribution of the dependent variable was investigated with histograms and normal Q-Q plots and a right skew was present in

the dataset. The GEE model generalizes the OLS regression model and can be used when data are not normally distributed. In addition to allowing for other than normally distributed data, the generalized linear mixed-effects model also differs from the OLS or multiple regression models because it allows for the use of data from more than one source of variation (Peretz et al., 2002). Many types of covariance and correlational structures are available in modeling dependence of variables across time or repeated measurements (Peretz et al., 2002).

In addition to the ability to take into account correlations over campuses and/or years of study, the number of observations per campus does not have to be the same (balanced design), they can be different in number (unbalanced design). Also, the time points do not have to be identical across campuses and the time intervals between repeated observations can vary across repetitions. However, the design plan for this study is balanced with equal time intervals (yearly) between the observations for all 59 campuses. Further assumptions were that the b_is were independent and normally distributed with mean 0 and variance σ^2_b (the variance between individuals). Errors are independent and ε_{ij} are independent and normally distributed with mean 0 and variance σ^2_w (the variance within individuals). The b_is and the ε_{ij}s are all independent of each other (Peretz et al., 2002).

Additionally, GEE is robust to deviations from normality as the GEE procedure makes use of the marginal means. A check of the model with both the raw measurements and log-transformed measurements of the dependent variable of capital expenditure in dollars/Number of FTE students were compared and the significance of the findings did not differ between models. It was therefore determined that the normality assumption was not of consequence to the model and the model would be easier to interpret using the raw data. The Gaussian distribution (default) and exchangeable correlation type were used with the *xtgee* command in STATA v. 14 to

perform the regression analysis. In order to account for the skew in the distribution, the GEE model using the raw, untransformed data, automatically returned Wald chi-square tests for the omnibus test of significance. GEE models can also be used with missing data. A total of 143 records were missing data on at least one of the variables in the model (8% missing data). The GEE model incorporates weighting methods to account for missingness when estimating the coefficients of the model.

Correlation Analysis

Prior to hypothesis testing of the regression model, bi-variate correlations were investigated for the variables that were utilized in the analyses. Pearson's product moment correlation analyses were conducted to check the bi-variate relationships between the tested variables. Correlations should not be interpreted as indicating cause-and-effect relationships, as correlation analyses are not designed to detect cause and effect, only to indicate associations. Direct (positive) correlations indicate the values of two variables move in a like manner, values either increase or decrease similarly. An indirect (negative) correlation indicates the values of two variables move in opposing directions, i.e. when the values of one variable increase, the values of the other variable decrease (Pallant, 2013).

Table 4 presents the findings of the Pearson's correlation analyses. Cohen (1988) suggests that the measured effects of correlation coefficients with absolute values between .10 to .29 are weak, between .30 to .49 are moderate, and between .50 to 1.0 are strong. Due to the larger sample size of N = 1,829 records, many statistically significant correlations were found between the variables of study, even when the correlational effect was weak. Therefore, only the significant correlations pertaining to the outcome of capital expenditure in dollars/number of FTE students are reported in the text to preserve parsimony.

The variable of capital expenditure in dollars/number of FTE students had a weak but statistically significant negative correlation with school type of 2-year campus ($r = -.101$, $p < .0005$). The referent group for school type was 4-year campus, and therefore the negative correlation between capital expenditure in dollars/number of FTE students and school type indicated that 2-year campuses received significantly less capital expenditure in dollars/number of FTE students than 4-year campuses.

The variable of capital expenditure in dollars/number of FTE students was significantly positively correlated with majority party of legislature ($r = .112$, $p < .0005$). The referent group for the majority of the legislature variable was Republican, and therefore the positive correlation between capital expenditure in dollars/number of FTE students and majority party of legislature indicated an increase in the amount of capital expenditure in dollars per FTE when the majority party of the legislature was split when compared to Republican.

Table 4

Pearson Product Moment Correlation Coefficients for Bi-variate Relationships of the Variables of Study

	Variable	1	2	3	4	5	6	7	8	9
1.	Capital expenditure in dollars/Number of FTE students									
2.	County population (in thousands)	.007								
3.	School condition: Satisfactory (SQFT)	.042	.473**							
4.	School condition: Minor rehabilitation (SQFT)	.024	.434**	.712**						
5.	School condition: Rehabilitation (SQFT)	.028	.392**	.736**	.776**					
6.	School condition: Major rehabilitation (SQFT)	.017	.302**	.579**	.593**	.640**				
7.	School condition: Physically obsolete (SQFT)	.044	.364**	.396**	.513**	.461**	.547**			
8.	School Type = 2-year campus	-.101**	.021	-.139**	-.232**	-.223**	-.256**	-.188**		
9.	Party of governor = Democrat	-.046	-.005	-.004	-.023	-.007	-.001	.013	<.0005	
10.	Majority party of legislature = Split	.112**	-.007	-.014	-.047*	-.050*	-.052*	-.017	<.0005	.504**

* $p < .05$; ** $p < .0$

Regression Analysis

A multiple regression was modeled according to the criteria in the Methods chapter. Deviations from the model specifications in the Methods chapter included adjustments in the variable coding for the variable of majority party of State legislature. The planned coding (see Chapter 3) was Democrat = 0 and Republican = 1. However, only two categories of (a) Republican and (b) Split (equal distribution of Democrat and Republican) were contained in the data set. Therefore the variable of majority party of State legislature was coded as Republican = 0, and Split = 1.

Hypothesized Regression Model

The hypothesized regression model with the adjustment for the majority party of legislature variable was specified at baseline, for dependent variable of the mean Capital Appropriation / FTE for a 4-year campus, with an average county population of 0 persons, zero square footage on all 5 square footage variables, a Republican governor, and a Republican majority party of State legislature. Coefficients for each of the variables represented the magnitude and direction of change from the model (see Table 5).Results of the hypothesized regression model are presented in Table 5, which includes the B coefficients and associated standard errors, the z-statistics, p-values, and 95% confidence intervals for the estimated B coefficients.

The model was statistically significant (Wald $\chi^2 = 65.45$, $p < .0005$). Statistically significant findings were noted for the political variables of party of governor (B = -274.75, *SE* B = 48.43, $p < .0005$; 95% CI [-369.66, -179.83]), and majority party of legislature (B = 331.79, *SE* B = 45.44, $p < .0005$; 95% CI [242.72, 420.87]). The size and direction of the coefficients suggest that capital expenditure in dollars/number of FTE students decreased by approximately

$275 when the party of the governor was Democrat instead of Republican, and that capital expenditure in dollars/number of FTE students increased by approximately $332 when the majority party of the legislature was Split instead of Republican.

Table 5

Hypothesized Multiple Regression Results for Capital Expenditure in Dollars/Number of FTE Students Regressed onto Predictor Variables (N = 1,686)

Variable	B	*SE* B	*z*	*p*	95% CI for B	
					Lower	Upper
School type	-231.43	142.22	-1.63	.104	-510.17	47.32
County population (in thousands)	0.09	0.22	0.40	.692	-0.34	0.51
School Condition: Satisfactory (SQFT)	-0.00002	0.00003	-0.71	.478	-0.00008	0.00004
School Condition: Minor rehab. (SQFT)	-0.00003	0.00003	-1.00	.319	-0.0001	0.00003
School Condition: Rehab. (SQFT)	0.00002	0.00004	0.48	.632	-0.00006	0.00009
School Condition: Major rehab. (SQFT)	-0.00003	0.00007	-0.39	.698	-0.0002	0.0001
School Condition: Physically obs. (SQFT)	0.0001	0.0003	0.47	.639	-0.0005	0.0008
Party of governor	-274.75	48.43	-5.67	<.0005	-369.66	-179.83
Majority party of legislature	331.79	45.44	7.30	<.0005	242.72	420.87
Constant	659.39	100.34	6.57	<.0005	462.74	856.04

Model Summary: Wald $\chi^2 = 65.45$, sig. < .0005
$N = 1686$
SQRT Scale Parameter (RMSE) = 885.39

Note. SE B = Standard Error of B coefficient; z = z-statistic; p = p-value, CI = Confidence Interval; rehab. = Rehabilitation; obs = Obsolete; sig. = p-value of model fit; SQRT = Square Root; RMSE = Root Mean Square Error.

Reference group for School type = 4-year campus.
Reference group for Party of the governor = Republican.
Reference group for Majority party of legislature = Republican.

Adjusted Regression Model

The hypothesized regression model was statistically significant. However, additional adjustments were made to the variables of (a) school type, (b) county population in thousands, and (c) the five square footage variables, to achieve a more useful and succinct model (see Table 6). Comparison of the square roots of the scale parameters were checked to see which model indicated the best model fit. Similar to the root mean square error (RMSE) of an OLS regression model, lower values of a square root of the scale parameter are indicative of better model fit.

The square root of the scale parameter for the adjusted model in Table 6 (SQRT Scale Parameter = 850.62) was an improvement over the hypothesized model in Table 5 (SQRT Scale Parameter = 885.39). Therefore, the adjusted regression model of Table 6 was used for hypothesis testing. The following changes were made to the model specifications.

School Type Variable

The variable of school type was planned as a dichotomous variable, scored as 0 = 4-year school and 1 = 2-year school. However, three categories of the variable were coded, (a) 4-year school, (b) 4-year regional campus, and (c) 2-year school. The school type variable with two categories was significantly correlated with the variable of capital expenditure in dollars/number of FTE students ($r = -.101$, $p < .0005$; see Table 4) and was close to reaching statistical significance in the hypothesized regression model (see Table 5). It was decided by the researcher to use all three categories of the school type variable in the adjusted regression model to see if splitting the variable into 3 groups would better define the effects of the three types of schools. The variable was dummy coded into three variables of (a) 4-year school, (b) 4-year regional campus, and (c) 2-year school, each of the three variables coded as 0 = no and 1 = yes. The variables of 4-year regional campus and 2-year school were entered into the adjusted regression

model. The variable of 4-year school was not included in the model, but instead was the referent group for school type.

Mean Centering of County Population, in Thousands, Where Campus Resides

The specified coding for the county population, in thousands, where the campus resides was mean centered prior to regression analysis. To mean center a variable, the mean of the variable is subtracted from the raw value of the variable for each record. The resulting mean centered variable then has the mean of the variable as the zero point. Mean centering of the county population in thousands allowed for a baseline regression model in which the intercept was interpretable in a real world sense. If the county population in thousands was not mean centered prior to analysis, then the baseline regression model would represent the mean Capital Appropriation / FTE for a 4-year campus, with an average county population of zero persons, zero square footage on all 5 square footage variables, a Republican governor, and a Republican majority party of State legislature. A county population of zero was not meaningful and thus, the mean centered county population made sense. Mean centering of the square footage variables was considered, however, there were values of zero for each of the square footage variables. Therefore the five square footage variables were not mean centered prior to regression analysis.

Square Footage Variables

Adjustments in the variable coding were required in the regression model for the five square footage variables. The planned coding (see Chapter 3) was to use total square footage in for each of the five classifications of (a) satisfactory, (b) minor rehabilitation, (c) rehabilitation, (d) major rehabilitation, and (b) physically obsolete. However, using the square footage in the regression model returned very small coefficient values for each of the square footage variables, which made interpretation cumbersome (see Table 5). Therefore, each square footage variable

value was divided by one thousand so that the square footage values for each of the five categories were reported in the thousands of square feet. This allowed for a model with more meaningful coefficients (see Table 6) and for ease in interpretation.

Adjusted Regression Model Specifications and Findings.

The changes in variable coding noted above resulted in an adjusted regression model that represented, at baseline, the mean Capital Appropriation / FTE for a 4-year campus, with an average county population of 272,510 persons, zero square footage on all 5 square footage variables, a Republican governor, and a Republican majority party of State legislature. Coefficients for each of the variables represented the magnitude and direction of change from the final baseline model (see Table 6).

The model was statistically significant (Wald $\chi^2 = 65.45$, $p < .0005$). The political variables remained significant in the adjusted regression model. Statistically significant findings were noted for the political variables of party of governor (B = -269.25, *SE* B = 48.45, $p < .0005$; 95% CI [-364.21, -174.29]), and majority party of legislature (B = 316.89, *SE* B = 45.54, $p < .0005$; 95% CI [227.64, 406.15]). Other statistically significant findings were noted. School type = 4-year regional was statistically significant (B = -790.71, *SE* B = 180.62, $p < .0005$; 95% CI [-1144.73, -436.70]). The size and direction of the coefficient suggested that funding for 4-year regional schools decreased by approximately $791 on average when the school was a 4-year regional campus vs. a 4-year school. School type = 2-year school was statistically significant (B = -795.29, *SE* B = 180.29, $p < .0005$; 95% CI [-1148.65, -441.94]). The size and direction of the coefficient suggested that funding for 2-year schools decreased by approximately $795 on average when compared to a 4-year school.

The variable of school condition: minor rehabilitation in thousands of SQFT was also statistically significant (B = -0.07, *SE* B = 0.03, *p* = .029; 95% CI [-0.14, -0.01]). The size and direction of the coefficient suggested that each one thousand square foot increase in the amount of school condition requiring minor rehabilitation resulted in a decrease of capital expenditure in dollars/number of FTE students of approximately 7 cents.

Table 6

Adjusted Multiple Regression Results for Capital Expenditure in Dollars/Number of FTE Students Regressed onto Predictor Variables (N = 1,686)

Variable	B	*SE* B	*z*	*p*	95% CI for B	
					Lower	Upper
School type = 4-year Regional	-790.71	180.62	-4.38	<.0005	-1144.73	-436.70
School type = 2-year	-795.29	180.29	-4.41	<.0005	-1148.65	-441.94
County population (in thousands; mean centered)	0.009	0.19	-0.05	.961	-0.39	0.37
School Condition: Satisfactory (SQFT/1000)	-0.05	0.03	-1.75	.080	-0.10	0.01
School Condition: Minor rehab. (SQFT/1000)	-0.07	0.03	-2.18	.029	-0.14	-0.01
School Condition: Rehab. (SQFT/1000)	0.01	0.04	0.32	.751	-0.06	0.09
School Condition: Major rehab. (SQFT/1000)	-0.11	0.07	-1.49	.136	-0.25	0.03
School Condition: Physically obs. (SQFT/1000)	0.09	0.32	0.30	.766	-0.52	0.71
Party of governor	-269.25	48.45	-5.56	<.0005	-364.21	-174.29
Majority party of legislature	316.89	45.54	6.96	<.0005	227.64	406.15
Constant	1270.66	166.19	7.65	<.0005	944.93	1596.39

Model Summary: Wald $\chi^2 = 85.07$, sig. < .0005
$N = 1686$
SQRT Scale Parameter (RMSE) = 850.62

Note. SE B = Standard Error of B coefficient; z = z-statistic; p = p-value, CI = Confidence Interval; rehab. = Rehabilitiation; obs = Obsolete; sig. = p-value of model fit; SQRT = Square Root; RMSE = Root Mean Square Error.

Reference group for School type = 4-year campus.
Reference group for Party of the governor = Republican.
Reference group for Majority party of legislature = Republican.

Tests of Hypotheses

A total of six research questions were addressed with the correlation and regression findings of this study. The results for each of the tests of hypotheses are presented according to each research question and set of associated statistical hypotheses.

Research Question 1. Is campus condition (satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, physically obsolete) measured in square footage, correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 1. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Alternative Hypothesis 1. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Conclusion as relates to Null Hypothesis 1. None of the school condition variables were statistically significant for capital expenditure in dollars/number of FTE students in the correlational analyses (See Table 3) or the regression model (See Table 5). Therefore, the Null Hypothesis is not rejected. There is not sufficient evidence to indicate that There is a statistically

significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Research Question 2. Is school type (2 year vs. 4 year) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 2. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Alternative Hypothesis 2. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

The variable of capital expenditure in dollars/number of FTE students had a weak but statistically significant negative correlation with school type of 2-year campus ($r = -.101$, $p < .0005$). The referent group for school type in the correlation analysis was 4-year campus, and therefore the negative correlation between capital expenditure in dollars/number of FTE students and school type indicated that 2-year campuses received significantly less capital expenditure in dollars/number of FTE students than 4-year campuses.

The adjusted regression model included three groups of school type, The school type variable was dummy coded into three variables of (a) 4-year school, (b) 4-year regional campus, and (c) 2-year school, each of the three variables coded as 0 = no and 1 = yes. The variables of 4-year regional campus and 2-year school were entered into the adjusted regression model. The variable of 4-year school was not included in the model, but instead was the referent group for

school type. The variable of School type = 4-year regional was statistically significant (B = -790.71, *SE* B = 180.62, $p < .0005$; 95% CI [-1144.73, -436.70]). The size and direction of the coefficient suggested that funding for 4-year regional schools decreased by approximately $791 on average when the school was a 4-year regional campus vs. a 4-year school. School type = 2-year school was statistically significant (B = -795.29, *SE* B = 180.29, $p < .0005$; 95% CI [-1148.65, -441.94]). The size and direction of the coefficient suggested that funding for 2-year schools decreased by approximately $795 on average when compared to a 4-year school.

Conclusion as relates to Null Hypothesis 2. The data indicate the Null Hypothesis is rejected. There is sufficient evidence to indicate that there is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Research Question 3. Is the population of the county in which the campus resides (measured in thousands) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 3. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Alternative Hypothesis 3. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

The variable of county population in thousands was not statistically significant as relates to the variable of capital expenditure in dollars/number of FTE student in either the correlation analysis or the regression model.

Conclusion as relates to Null Hypothesis 3. Therefore, the Null Hypothesis is not rejected. There is not sufficient evidence to indicate that there is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Research Question 4. Is the party of the governor correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 4. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Alternative Hypothesis 4. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

The correlation between the variables of capital expenditure in dollars/number of FTE students and party of the governor was not statistically significant (r = -.046, p = .057). However, statistically significant findings were noted in the adjusted regression model for the political variable of party of governor (B = -269.25, *SE* B = 48.45, $p < .0005$; 95% CI [-364.21, -174.29]). The size and direction of the coefficient suggested that capital expenditure in dollars/number of FTE students decreased by approximately $269 when the party of the governor was Democrat instead of Republican.

Conclusion as relates to Null Hypothesis 4. The data indicate the Null Hypothesis is rejected. There is sufficient evidence to indicate that there is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Research Question 5. Is the party of the legislative majority correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 5. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Alternative Hypothesis 5. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

The variable of capital expenditure in dollars/number of FTE students was significantly positively correlated with majority party of legislature ($r = .112$, $p < .0005$). The referent group for the majority of the legislature variable was Republican, and therefore the positive correlation between capital expenditure in dollars/number of FTE students and majority party of legislature indicated an increase in the amount of capital expenditure in dollars per FTE when the majority party of the legislature was split when compared to Republican. The adjusted regression model also indicated statistical significance between capital expenditure in dollars/number of FTE students and the predictor of majority party of the legislature (B = 316.89, *SE* B = 45.54, $p < .0005$; 95% CI [227.64, 406.15]). The size and direction of the coefficient suggested that capital expenditure in dollars/number of FTE increased by approximately $317 when the majority party of the legislature was Split instead of Republican.

Conclusion as Relates to Null Hypothesis 5. The data indicate the Null Hypothesis is rejected. There is sufficient evidence to indicate that there is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Research Question 6. Which predictor contributes the most to with the amount of institution capital distribution per FTE?

Null Hypothesis 6. None of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Alternative Hypothesis 6. At least one of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Many variables were statistically significant for the criterion variable of capital expenditure in dollars/number of FTE students. Statistically significant Pearson's product moment correlations (see Table 4) indicated that the variable of capital expenditure in dollars/number of FTE students had a weak but statistically significant negative correlation with school type of 2-year campus ($r = -.101$, $p < .0005$). The referent group for school type was 4-

year campus, and therefore the negative correlation between capital expenditure in dollars/number of FTE students and school type indicated that 2-year campuses received significantly less capital expenditure in dollars/number of FTE students than 4-year campuses.

The variable of capital expenditure in dollars/number of FTE students was significantly positively correlated with majority party of legislature ($r = .112$, $p < .0005$). The referent group for the majority of the legislature variable was Republican, and therefore the positive correlation between capital expenditure in dollars/number of FTE students and majority party of legislature indicated an increase in the amount of capital expenditure in dollars per FTE when the majority party of the legislature was split when compared to Republican.

The adjusted regression model (see Table 6) also indicated statistical significance for the criterion variable of capital expenditure in dollars/number of FTE students. Statistically significant findings were noted for the political variables of party of governor (B = -269.25, *SE* B = 48.45, $p < .0005$; 95% CI [-364.21, -174.29]), and majority party of legislature (B = 316.89, *SE* B = 45.54, $p < .0005$; 95% CI [227.64, 406.15]). The size and direction of the coefficients suggest that capital expenditure in dollars/number of FTE students decreased by approximately $269 when the party of the governor was Democrat instead of Republican, and that capital expenditure in dollars/number of FTE students increased by approximately $317 when the majority party of the legislature was Split instead of Republican.

Other statistically significant findings were noted. School type = 4-year regional was statistically significant (B = -790.71, *SE* B = 180.62, $p < .0005$; 95% CI [-1144.73, -436.70]). The size and direction of the coefficient suggested that funding for 4-year regional schools decreased by approximately $791 on average when the school was a 4-year regional campus vs. a 4-year school. School type = 2-year school was statistically significant (B = -795.29, *SE* B =

180.29, $p < .0005$; 95% CI [-1148.65, -441.94]). The size and direction of the coefficient suggested that funding for 2-year schools decreased by approximately $795 on average when compared to a 4-year school.

The variable of school condition: minor rehabilitation in thousands of SQFT was also statistically significant (B = -0.07, *SE* B = 0.03, $p = .029$; 95% CI [-0.14, -0.01]). The size and direction of the coefficient suggested that each one thousand square foot increase in the amount of school condition requiring minor rehabilitation resulted in a decrease of capital expenditure in dollars/number of FTE students of approximately 7 cents.

Squared semi-partial correlation coefficients were examined for the significant variables of the adjusted regression model of Table 6. The squared semi-partial correlation coefficient indicates the amount of unique variance contributed by a predictor to the criterion variable. The highest semi-partial correlation coefficients were for the school type variables of 2-year school (*sr* = .0790) and 4-year regional school (sr = .0797) indicated that about 8% of unique variance was contributed by each of the school types to the criterion variable.

Conclusion as Relates to Null Hypothesis 6. The data indicate the Null Hypothesis is rejected. There is sufficient evidence to indicate that at least one of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students. Additionally, the school type variables of 2-year school (*sr* = .0790) and 4-year regional school (sr = .0797) each contributed about 8% of unique variance to the criterion variable.

Summary

The purpose of this quantitative, cross-sectional, historical study was to determine the basis of capital allocation among Ohio higher education institutions per FTE (as per the reporting precedent set in historical Board of Regents reports and research by Johnson (2012)) as it relates to (1) campus condition, (2) school type (2 year vs. 4 year), (3) county population, (4) party of the governor, and (5) party of the legislative majority. Data were collected for a thirty-year period from 1988 to 2018 because it allowed for review of capital distribution practice in each of the three capital distribution era's described previously (1988-1995; Centralized BOR, 1995 – 2012; Formula Driven and 2012 to 2018; Performance Driven). Chapter 4 began with a description of the population of this study. Following the report of descriptive findings, the required assumptions for the inferential analyses were presented and discussed. Following the descriptive and assumption sections, inferential analyses were performed to investigate the six research questions of study. Hypothesis tests were then performed using the findings from the inferential tests. A series of five bi-variate correlational analyses and one multiple regression model were tested to address the six research questions of this study. Null Hypotheses 2, 4, 5, and 6 were rejected.

The variable of capital expenditure in dollars/number of FTE students had a weak but statistically significant negative correlation with school type of 2-year campus ($r = -.101$, $p < .0005$). The referent group for school type in the correlation analysis was 4-year campus, and therefore the negative correlation between capital expenditure in dollars/number of FTE students and school type indicated that 2-year campuses received significantly less capital expenditure in dollars/number of FTE students than 4-year campuses.

The adjusted regression model included three groups of school type The school type variable was dummy coded into three variables of (a) 4-year school, (b) 4-year regional campus, and (c) 2-year school, each of the three variables coded as 0 = no and 1 = yes. The variables of 4-year regional campus and 2-year school were entered into the adjusted regression model. The variable of 4-year school was not included in the model, but instead was the referent group for school type. The variable of School type = 4-year regional was statistically significant (B = -790.71, *SE* B = 180.62, $p < .0005$; 95% CI [-1144.73, -436.70]). The size and direction of the coefficient suggested that funding for 4-year regional schools decreased by approximately $791 on average when the school was a 4-year regional campus vs. a 4-year school. School type = 2-year school was statistically significant (B = -795.29, *SE* B = 180.29, $p < .0005$; 95% CI [-1148.65, -441.94]). The size and direction of the coefficient suggested that funding for 2-year schools decreased by approximately $795 on average when compared to a 4-year school. Thus, Null Hypothesis 2 was rejected and Alternative Hypothesis 2 was supported.

The correlation between the variables of capital expenditure in dollars/number of FTE students and party of the governor was not statistically significant ($r = -.046$, p = .057). However, statistically significant findings were noted in the adjusted regression model for the political variable of party of governor (B = -269.25, *SE* B = 48.45, $p < .0005$; 95% CI [-364.21, -174.29]). The size and direction of the coefficient suggested that capital expenditure in dollars/number of FTE students decreased by approximately $269 when the party of the governor was Democrat instead of Republican. Thus, Null Hypothesis 4 was rejected and Alternative Hypothesis 4 was supported.

The variable of capital expenditure in dollars/number of FTE students was significantly positively correlated with majority party of legislature (r = .112, p < .0005). The referent group

for the majority of the legislature variable was Republican, and therefore the positive correlation between capital expenditure in dollars/number of FTE students and majority party of legislature indicated an increase in the amount of capital expenditure in dollars per FTE when the majority party of the legislature was split when compared to Republican. The adjusted regression model also indicated statistical significance between capital expenditure in dollars/number of FTE students and the predictor of majority party of the legislature (B = 316.89, *SE* B = 45.54, $p <$ .0005; 95% CI [227.64, 406.15]). The size and direction of the coefficient suggested that capital expenditure in dollars/number of FTE increased by approximately $317 when the majority party of the legislature was Split instead of Republican. Thus, Null Hypothesis 5 was rejected and Alternative Hypothesis 5 was supported.

Finally, many variables were statistically significant for the criterion variable of capital expenditure in dollars/number of FTE students. Statistically significant Pearson's product moment correlations (see Table 4) indicated that the variable of capital expenditure in dollars/number of FTE students had a weak but statistically significant negative correlation with school type of 2-year campus ($r = -.101$, $p < .0005$). The referent group for school type was 4-year campus, and therefore the negative correlation between capital expenditure in dollars/number of FTE students and school type indicated that 2-year campuses received significantly less capital expenditure in dollars/number of FTE students than 4-year campuses. The variable of capital expenditure in dollars/number of FTE students was significantly positively correlated with majority party of legislature ($r = .112$, $p < .0005$). The referent group for the majority of the legislature variable was Republican, and therefore the negative correlation between capital expenditure in dollars/number of FTE students and majority party of legislature

indicated an increase in the amount of capital expenditure in dollars per FTE when the majority party of the legislature was split when compared to Republican.

As indicated in Table 6,.the adjusted regression model indicates statistical significance for the criterion variable of capital expenditure in dollars/number of FTE students. Statistically significant findings were noted for the political variables of party of governor (B = -269.25, *SE* B = 48.45, $p < .0005$; 95% CI [-364.21, -174.29]), and majority party of legislature (B = 316.89, *SE* B = 45.54, $p < .0005$; 95% CI [227.64, 406.15]). The size and direction of the coefficients suggest that capital expenditure in dollars/number of FTE students decreased by approximately $269 when the party of the governor was Democrat instead of Republican, and that capital expenditure in dollars/number of FTE students increased by approximately $317 when the majority party of the legislature was Split instead of Republican. Other statistically significant findings were noted. School type = 4-year regional was statistically significant (B = -790.71, *SE* B = 180.62, $p < .0005$; 95% CI [-1144.73, -436.70]). The size and direction of the coefficient suggested that funding for 4-year regional schools decreased by approximately $791 on average when the school was a 4-year regional campus vs. a 4-year school. School type = 2-year school was statistically significant (B = -795.29, *SE* B = 180.29, $p < .0005$; 95% CI [-1148.65, -441.94]). The size and direction of the coefficient suggested that funding for 2-year schools decreased by approximately $795 on average when compared to a 4-year school.

The variable of school condition: minor rehabilitation in thousands of SQFT was also statistically significant (B = -0.07, *SE* B = 0.03, $p = .029$; 95% CI [-0.14, -0.01]). The size and direction of the coefficient suggested that each one thousand square foot increase in the amount of school condition requiring minor rehabilitation resulted in a decrease of capital expenditure in dollars/number of FTE students of approximately 7 cents.

Squared semi-partial correlation coefficients were examined for the significant variables of the adjusted regression model of Table 6. The squared semi-partial correlation coefficient indicates the amount of unique variance contributed by a predictor to the criterion variable. The highest semi-partial correlation coefficients were for the school type variables of 2-year school (*sr* = .0790) and 4-year regional school (*sr* = .0797) indicated that about 8% of unique variance was contributed by each of the school types to the criterion variable. Thus, Null Hypothesis 6 was rejected and alternative Hypothesis 6 was supported.

Chapter 5 will include a discussion of the results as well as implications of the findings as relates to the literature review and further research.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

The purpose of this quantitative, cross-sectional, historical study was to determine the basis of capital allocation among Ohio higher education institutions per FTE (as per the reporting precedent set in historical Board of Regents reports and research by Johnson (2012)) as it relates to (1) campus condition, (2) school type (2 year vs. 4 year), (3) county population, (4) party of the governor, and (5) party of the legislative majority). The study was conducted to (a) perform a quantitative 30-year review (1988 – 2018) of annual capital allocation per FTE student at publically funded higher education institutions in the state of Ohio. The thirty-year period was selected because it allowed for a review of capital distribution practice in each of the three capital distribution eras (1963-1995; Centralized BOR, 1995 – 2012; Formula Driven and 2012 to Present; Performance Driven).

Chapter 5 includes a discussion of the major findings of this study, the existing literature regarding the distribution of capital funding among public higher education institutions, and the independent variables listed in the above paragraph. Also included in this chapter is a discussion of the connections between this study and the "balance wheel theory" first postulated by Hovey (1999) and later supported by Delaney and Doyle (2007). The findings of this study will also be compared to the literature involving capital allocation as it relates to (a) state share of instruction (SSI), (b) aging of facilities and block obsolescence, (c) historical political factors, and county population.

A series of five bi-variate correlational analyses and one multiple regression model were tested to address the six research questions of this study. The research questions and associated statistical hypotheses are as follows:

Research Question 1. Is campus condition (satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, physically obsolete) measured in square footage, correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 1. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Alternative Hypothesis 1. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete).

Research Question 2. Is school type (2 year vs. 4 year) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 2. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Alternative Hypothesis 2. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of school type (2 year vs. 4 year).

Research Question 3. Is the population of the county in which the campus resides (measured in thousands) correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 3. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Alternative Hypothesis 3. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of population of the county in which the campus resides (measured in thousands).

Research Question 4. Is the party of the governor correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 4. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Alternative Hypothesis 4. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the governor.

Research Question 5. Is the party of the legislative majority correlated with the amount of institution capital distribution per FTE?

Null Hypothesis 5. There is not a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Alternative Hypothesis 5. There is a statistically significant correlation between the criterion (dependent) variable of [capital expenditure in dollars/number of FTE students] and the predictor (independent) variable of party of the legislative majority.

Research Question 6. Which predictor contributes the most to the amount of institution capital distribution per FTE?

Null Hypothesis 6. None of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Alternative Hypothesis 6. At least one of the variables of (a) school type, (b) county population, (c) square footage of school condition = satisfactory, (d) square footage of school condition = minor rehabilitation, (e) square footage of school condition = rehabilitation, (f) major rehabilitation, (g) physically obsolete, (h) party of governor, and/or (i) majority party of State legislature are statistically significant predictors of the criterion of capital expenditure in dollars/number of FTE students.

Overview and Interpretation of Findings

Deviations from the original data collection and analysis planned in Chapter 3 were noted prior to presentation of the findings in Chapter 4. The conclusions made in the interpretation of findings are based on the adjusted regression model specifications (see Table 6). A series of five bi-variate correlational analyses and one multiple regression model were tested to address the six research questions of this study. The adjusted regression model failed to reject Null Hypothesis

for research question 3. However, Null Hypotheses for research questions 1, 2, 4, 5, and 6 were rejected.

Conclusion to research question #1. None of the school condition variables were statistically significant for capital expenditure in dollars/number of FTE students in the correlational analyses (See Table 4) or the regression model (See Table 5). Therefore, the Null Hypothesis is not rejected. There is not sufficient evidence to indicate that there is a statistically significant correlation between the criterion (dependent) variable of capital expenditure in dollars/number of FTE students, and the predictor (independent) variable of campus condition measured in the amount of square footage classified as satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, and physically obsolete.

However, with the variable coding adjustments described in chapter 4 to create the Adjusted Regression model (See Table 6), one of the school condition variables became significant. The variable of school condition: minor rehabilitation in thousands of SQFT was statistically significant (B = -0.07, SE B = 0.03, p = .029; 95% CI [-0.14, -0.01]). The size and direction of the coefficient suggested that for each one thousand square foot increase in the amount of school condition requiring minor rehabilitation resulted in a decrease of capital expenditure in dollars/number of FTE students of approximately 7 cents. At first glance, this does not appear to be impactful, but it can be very impactful if an institution has significant square feet and FTE students. For example, please note that Ohio's largest school is Ohio State. In 2018 Ohio State reported 32,367,113 total gross square feet of facility with 8,390,496 gross square feet reported as minor rehabilitation and a FTE student population of 56,969. The finding suggests Ohio State received $33,516,000 less by reporting 25.9% of their facility inventory as Minor Rehabilitation. In 2018 Ohio State was awarded $40,149,250 state capital appropriations

to apply toward their capital plan. The findings suggest Ohio State could have been awarded $73,665,250 had they recorded zero square feet as minor rehabilitation.

A contrary example would be a small community college like Clark State. In 2018 Clark State reported 520,079 total gross square feet of facility with 318,364 gross square feet reported as minor rehabilitation and a FTE student population of 3,476. This finding suggests Zane State received $77,464 less by reporting 61.2% of their facility inventory as Minor Rehabilitation. In 2018 Clark State was awarded $1,375,000 state capital appropriation to apply toward their capital plan. The findings suggest Zane State could have been awarded $1,452,464 had they recorded zero square feet as minor rehabilitation.

The above two scenarios vary greatly because of institution assignable gross square feet as Minor Rehabilitation and the FTE student multiplier. The Higher Education Capital budget is finite and was established prior to distribution among Ohio's publicly funded higher education institutions. Therefore, in order for one school to receive more funding, the remainder of schools would receive less funding. This discovery is of distribution significance. Therefore, the formal answer to research question #1 is, publicly funded higher education institutions in Ohio that report greater campus condition as Minor Rehabilitation, measured in square feet, receive less capital appropriation.

Conclusion to Research Question #2. The variable of capital expenditure in dollars/number of FTE students had a weak but statistically significant negative correlation with school type (see Table 4) of 2-year campus ($r = -.101$, $p < .0005$). The referent group for school type in the correlation analysis was 4-year campus, and therefore the negative correlation between capital expenditure in dollars/number of FTE students and school type indicated that 2-

year campuses received significantly less capital expenditure in dollars/number of FTE students than 4-year campuses.

The adjusted regression model included three groups of school type, The school type variable was dummy coded into three variables of (a) 4-year school, (b) 4-year regional campus, and (c) 2-year school, each of the three variables coded as 0 = no and 1 = yes. The variables of 4-year regional campus and 2-year school were entered into the adjusted regression model. The variable of 4-year school was not included in the model, but instead was the referent group for school type. The variable of School type = 4-year regional was statistically significant (B = -790.71, *SE* B = 180.62, $p < .0005$; 95% CI [-1144.73, -436.70]) (See Table 6). The size and direction of the coefficient suggested that funding for 4-year regional schools decreased by approximately $791 on average when the school was a 4-year regional campus vs. a 4-year school. School type = 2-year school was statistically significant (B = -795.29, *SE* B = 180.29, $p < .0005$; 95% CI [-1148.65, -441.94]) (See Table 6). The size and direction of the coefficient suggested that funding for 2-year schools decreased by approximately $795 on average when compared to a 4-year school. Thus, Null Hypothesis 2 was rejected and Alternative Hypothesis 2 was supported. Therefore, the formal answer to research question #2 is, 4-year campuses received statistically greater increases in capital allocation per number of FTE students than 4-year regional campuses and 2-year campuses.

Conclusion to Research Question #3. The variable of county population in thousands was not statistically significant as relates to the variable of capital expenditure in dollars/number of FTE student in either the correlation analysis or the regression model. Therefore, the formal answer to research question #3 is, county population does not effect capital allocation distribution.

Conclusion to Research Question #4. The correlation between the variables of capital expenditure in dollars/number of FTE students and party of the governor was not statistically significant (r = -.046, p = .057) (See Table 4). However, statistically significant findings were noted in the adjusted multiple regression model (See Table 6) for the political variable of party of governor (B = -269.25, *SE* B = 48.45, $p < .0005$; 95% CI [-364.21, -174.29]). The size and direction of the coefficient suggested that capital expenditure in dollars/number of FTE students decreased by approximately $269 when the party of the governor was Democrat instead of Republican. Thus, Null Hypothesis 4 was rejected and Alternative Hypothesis 4 was supported. Therefore, the formal answer to research question #4 is, the higher education capital budget is reduced when the governor is a democrat, when compared to a republican governor.

Conclusion to Research Question #5. The variable of capital expenditure in dollars/number of FTE students was significantly positively correlated with majority party of legislature (r = .112, p < .0005) (See Table 4). The referent group for the majority of the legislature variable was Republican, and therefore the correlation between capital expenditure in dollars/number of FTE students and majority party of legislature indicated an increase in the amount of capital expenditure in dollars per FTE when the majority party of the legislature was split when compared to a Republican majority in both houses. The adjusted regression model also indicated statistical significance between capital expenditure in dollars/number of FTE students and the predictor of majority party of the legislature (B = 316.89, *SE* B = 45.54, $p <$ .0005; 95% CI [227.64, 406.15]) (See Table 6). The size and direction of the coefficient suggested that capital expenditure in dollars/number of FTE increased by approximately $317 when the majority party of the legislature was Split instead of Republican majorities in both

houses. Thus, Null Hypothesis 5 was rejected and Alternative Hypothesis 5 was supported. Therefore, the formal answer to research question #5 is, the higher education capital budget is increased when the majority party of the legislature is split when compared to a Republican majority in both houses. During the time period under study, there was no year in which the majority of both houses of the legislature were controlled by Democrats.

Conclusion to Research Question #6. Many variables were statistically significant for the criterion variable of capital expenditure in dollars/number of FTE students. The adjusted regression model indicated the variable of school condition: minor rehabilitation in thousands of SQFT was statistically significant (B = -0.07, *SE* B = 0.03, $p = .029$; 95% CI [-0.14, -0.01]) (See Table 6). The size and direction of the coefficient suggested that each one thousand square foot increase in the amount of school condition requiring minor rehabilitation resulted in a decrease of capital expenditure in dollars/number of FTE students of approximately 7 cents.

Pearson's product moment correlations (see Table 4) indicated that the variable of capital expenditure in dollars/number of FTE students had a weak but statistically significant negative correlation with school type of 2-year campus ($r = -.101$, $p < .0005$). The referent group for school type was 4-year campus, and therefore the negative correlation between capital expenditure in dollars/number of FTE students and school type indicated that 2-year campuses received significantly less capital expenditure in dollars/number of FTE students than 4-year campuses. The adjusted regression model (See Table 6) indicated statistical significance for both School Type, 4-year Regional and 2-year colleges. School type = 4-year regional was statistically significant (B = -790.71, *SE* B = 180.62, $p < .0005$; 95% CI [-1144.73, -436.70]). The size and direction of the coefficient suggested that funding for 4-year regional schools decreased by approximately $791 on average when the school was a 4-year regional campus vs.

a 4-year school. School type = 2-year school was statistically significant (B = -795.29, *SE* B = 180.29, $p < .0005$; 95% CI [-1148.65, -441.94]). The size and direction of the coefficient suggested that funding for 2-year schools decreased by approximately $795 on average when compared to a 4-year school.

The adjusted regression model (see Table 6) indicated statistical significance for the political variable of party of governor (B = -269.25, *SE* B = 48.45, $p < .0005$; 95% CI [-364.21, -174.29]). The size and direction of the coefficients suggest that capital expenditure in dollars/number of FTE students decreased by approximately $269 when the party of the governor was Democrat instead of Republican,

Pearson's product moment correlations (see Table 4) indicated that the variable of capital expenditure in dollars/number of FTE students was significantly positively correlated with majority party of legislature ($r = .112$, $p < .0005$). The referent group for the majority of the legislature variable was Republican, and therefore the positive correlation between capital expenditure in dollars/number of FTE students and majority party of legislature indicated an increase in the amount of capital expenditure in dollars per FTE when the majority party of the legislature was split when compared to Republican. The adjusted regression model (see Table 6) also indicated statistical significance findings for the majority party of legislature (B = 316.89, *SE* B = 45.54, $p < .0005$; 95% CI [227.64, 406.15]). The size and direction of the coefficients suggest that capital expenditure in dollars/number of FTE students increased by approximately $317 when the majority party of the legislature was Split instead of Republican.

Squared semi-partial correlation coefficients were examined for the significant variables of the adjusted regression model of Table 6. The squared semi-partial correlation coefficient indicates the amount of unique variance contributed by a predictor to the criterion variable. The

highest semi-partial correlation coefficients were for the school type variables of 2-year school (*sr* = .0790) and 4-year regional school (*sr* = .0797) indicated that about 8% of unique variance was contributed by each of the school types to the criterion variable. Thus, Null Hypothesis 6 was rejected and alternative Hypothesis 6 was supported. Therefore, the formal answer to research question #6 is, School Type predictor contributes the most to the amount of institution capital distribution per FTE.

Research Implications

Implications for Theory and Research.

The rationale for conducting this quantitative, cross-sectional, historical study was to determine the basis of capital allocation among Ohio Higher Education Institutions per FTE as it relates to 1) Condition of Facilities (satisfactory, minor rehabilitation, rehabilitation, major rehabilitation, physically obsolete; all measured in physical square footage), 2) School Type (2/4 year), 3) Population of County in which the campus resides (measured in thousands, 4) Party of Governor, 5) Party of Legislative Majority. The study was a quantitative 30-year review of annual capital allocation per FTE student at publically funded higher education institutions in the state of Ohio (as per the reporting precedent set in the Board of Regents reports and research by Johnson (2012)).

Little research is offered in the areas of state construction and capital expenditures for higher education (Delaney & Doyle, 2013). Previous research included models that examined all state spending for higher education and have included economic, demographic, and political factors (Archibald & Feldman, 2006; Hossler, Lund, Ramin, Westfall & Irish, 1997; Kane, Orszag, & Gunter, 2003; Lowry, 2001, Peterson, 1976; McLendon, Hearn & Mokher, 2009; Tandberg, 2010). However, these authors investigated overall measures of state spending on

higher education and not on capital allocation separately. The literature relating to capital fund allocation is scarce. Much of the literature review involves older studies and many studies which were researched at the national rather than state levels. Tandberg and Ness (2011) noted that, "Little empirical attention has been paid to state capital expenditures for higher education" (p. 394). Models similar to the OLS fixed regression model used in this study have been used in previous research on capital allocation at the national level (Ness, 2013; Tandberg & Ness, 2011), but this research was focused on addressing the gap in the literature on capital allocation to institutions of higher learning in Ohio. Comparisons between the existing literature and this study will focus on how capital expenditure in the State of Ohio is similar or different to research focused on the national level or other state levels.

School condition variables. The aging of school facilities called "Block Obsolescence", as well as the decrease in the State's capital support over the past decade, has strained the ability of Ohio to address the renewal needs of facilities. A 2004 inventory of all public higher education facilities in Ohio included approximately 2,400 buildings with an estimated replacement value of 23 billion dollars. ("Ohio Department of Higher Education Statewide Capital Master Plan for Public Colleges and Universities," n.d.). Manns (2004) stated that needs are increasing for not only improved facilities, but also for high-tech educational functions and research equipment. Children of baby boomers create a large influx of students at a time when both state and federal levels of educational support are decreasing, while at the same time costs of maintenance and renovation are increasing (Windham, Perkins, & Rogers; 2001). Although the coefficients in the regression model of this study indicated increases in capital expenditure in dollars per FTE student on square footage classified as rehabilitation (an increase of 1 cent per one thousand square feet per FTE student) and physically obsolete (an increase of 9 cents per one

thousand square feet per FTE student) the variables were not statistically significant. Statistical significance was noted for the school condition of minor rehab square footage (B = -0.07, p = .029) and indicated that facility square footage classified as minor rehabilitation received approximately seven cents less per one thousand square feet per FTE student. The largest amount of square footage on average in Ohio's university system is minor rehabilitation (see Table 2). It appears from the regression model that although not statistically significant, more capital funds per FTE student are being spent on square footage that is classified as rehabilitation or physically obsolete.

School Type. The studies reviewed in the existing literature did not include school type as a variable as relates to capital expenditures. The researcher in this study wanted to include it as a variable to investigate if differences in school type were associated with changes in capital expenditure in dollars per the number of FTE students. When compared to 4-year campuses, 4-year regional campuses on average received $791 less in capital funds per FTE student, and 2-year campuses received approximately $795 less. The findings were statistically significant ($p <$ .0005) and indicate that 4-year (main) campuses receive significantly more capital money than the regional and 2-year campuses.

Population. Studies that included a variable representing population have returned mixed results. A study by McLendon, Hearn, & Mokher (2009) indicated that the variable of population share was statistically significant, with higher shares of college-aged and elderly populations associated with lower spending in higher education. The study also indicated that greater enrollments in private colleges were associated with decreased appropriations, and greater enrollments in 2-year colleges were associated with increased appropriations. However, the study was not specified solely for capital expenditures.

A national study by Delaney and Doyle (2013) was performed to investigate state capital expenditure outlays and included a variable representing the total population of each state by each year of study. The population variable was not statistically significant for the Delaney and Doyle (2013) study.

Maiden and Stearns (2007) investigated the association between geography and SSI and capital funds for higher education between rural and non-rural K-12 public schools in Oklahoma. The researchers found a higher degree of equity between rural and non-rural districts for total SSI expenditures per pupil than for total capital expenditures per pupil.

Since population variables are mixed in statistical significance and the Ohio population has differing regional characteristics, a variable representing county population, in thousands, for each institution, was included in this research. The variable was not statistically significant (B = 0.009, p = .961). Thus, the regression model of this study did not support population as a contributing factor in capital expenditure in dollars per number of FTE students.

Political Factors. Higher education has been described as the "balance wheel" of state budgets: state appropriations for higher education tend to rise and fall in relation to the overall economy. The balance wheel model is also disproportionate. In good economic times, states tend to fund higher education at a greater rate than other budget categories. In bad economic times, higher education is one of the first state budget categories to be cut. The cuts in higher education in slow economic times are greater than in other budget categories because higher education institutions can make up the difference by increasing tuition, and seeking additional funding from private sources (Delaney & Doyle, 2011).

The balance wheel model was not supported as relates to capital expenditures on higher education. In the Delaney and Doyle (2014) study, linear, quadratic and balance wheel (cubic)

regression models of higher education capital outlays as a function of total state capital expenditures were tested. The authors hypothesized that the balance wheel regression, which posited that higher education funding would be provided at a higher rate than other state budget categories in "good times", would best model the relationship between total state capital expenditures and capital outlays for higher education. However, the authors found that the relationship between state capital budgets and money allocated to higher education fit the quadratic model better, i.e., that state spending on capital outlays for higher education rose or fell in the opposite direction of total state expenditures

Results from this study mirror the findings of studies that indicate political factors have a strong influence on capital expenditures for higher education. According to Tandberg and Ness (2011) the discretionary nature for capital projects make them vulnerable to political influence. According to a personal correspondence (as cited in Tandberg & Ness, 2011) an appropriations committee chair in one large state was quoted as saying, "General appropriations for higher education is for the bean counters. Capital support is where the real politics happens" (pg. 396). Years with more economic prosperity will include more funding of capital projects, but legislators tend to use the funding to meet the interests of constituents and specific projects in the legislators' districts (Diaz-Cayeros et al., 2003).

The nature of capital funding for higher education in the State of Ohio also may allow for political factors to influence the balance wheel. Currently, capital funding for higher education in the State of Ohio is a de-centralized process with capital requests made by individual institutions and capital decisions are made by the Chancellor of the Ohio Department of Education (ODHE) or a designee of the Chancellor, and eight people appointed by the Governor. The regression model analyzed in the study by Tandberg and Ness (2011) indicated that capital expenditures

decreased when the party of the governor was Democratic rather than Republican. However, the results were not statistically significant (B = 0.16, p = .095). The authors noted that the majority of the variance in the capital expenditure outcome was explained by political variables (Tandberg & Ness).

Political variables were also important predictors in this study. The variable of party of the governor was statistically significant, and similar to Tandberg and Ness (2011) also indicated that capital expenditures per FTE student was lower when the party of the governor was Democratic vs. Republican, and in this study the variable of party of the governor was statistically significant (B = -269.25, p <.0005), indicating that capital expenditures in dollars per the number of FTE students was lower when a Democratic governor held office, which was approximately 23% of the time during the thirty year time frame (see Table 3).

Other studies have indicated that the process of appropriating dollars to higher education institutions is a distinctly political process (McLendon, Hearn & Mokher, 2009; Tandberg, 2010; Tandberg & Ness, 2009). McLendon, et al. (2009) cited five core explanations that were associated with variation in state expenditures on higher education, namely, (1) political-system characteristics, (2) economic condition of the state, (3) state demography, (4) certain higher education policy conditions within states, and (5) post-secondary governance arrangements. The authors found statistically significant relationships between state appropriations for post-secondary education and legislative professionalism, the number and size of higher education interest groups, partisanship, term limits, and gubernatorial power influence. Statistical correlations between partisanship and state appropriations for post-secondary public education have been empirically shown in many studies (Archibald & Feldman, 2006; McLendon, Deaton & Hearn, 2007; McLendon & Hearn, 2006; McLendon, Hearn & Deaton, 2006; Nicholson-

Crotty & Meier, 2003; Tandberg, 2006; 2007). However, a majority of the literature relating to political policy and school funding is focused on per-student spending related to instruction and general fund spending (spending of funds received from state taxes), and not on spending related solely to capital improvement projects. The majority of the legislature over the years of this research was either Republican or Split. The results of the regression model indicated that when the majority of the legislature was split rather than Republican, the capital expenditure in dollars per number of FTE students increased ($B = 316.89$, $p < .0005$).

Implications for Practice.

Previous research includes models which examined state spending for higher education and have included economic, demographic, and political factors (Hossler, Lund, Ramin, Westfall & Irish, 1997; Kane, Orszag, & Gunter, 2003; Lowry, 2001, Peterson, 1976; Archibald & Feldman, 2006; McLendon, Hearn & Mokher, 2009; Tandberg, 2010). However, these studies investigated overall measures of state spending on higher education and not on capital allocation among publicly funded institutions separately. Models similar to the regression modeled in this study have been used in previous research on capital allocation at the national level (Ness, 2013; Tandberg & Ness, 2011), but this research focused on the distribution of Ohio's Biannual Higher Education Capital Fund appropriation among the State of Ohio's publicly funded institutions. Thus, this research filled a gap in the literature by focusing on higher education capital allocation among the State of Ohio publicly funded institutions.

The results of this study may be utilized by higher education administrators and community stakeholders to assist in predicting capital allocations among the higher education institutions in their states to enable them to develop better long term capital plans. The findings can be applied by governing bodies in the state government and school boards of Ohio in fiscal

planning and expenditures. The information can also be used by other states to investigate if the findings are similar to the results of this study. The practice of long-term capital planning is a challenge for Ohio higher education institutions because the higher education capital fund budget may be effected as a result of either good, or bad economic times. Furthermore, once the higher education capital fund budget is established, predicting the distribution of the fund among institutions can be difficult. The results of this proposed study may be utilized by higher education administrators and community stakeholders of Ohio's higher education system to assist in predicting capital distribution among the higher education institutions to enable the stakeholders to develop better and more comprehensive long term capital plans.

Research Limitations

Limitations of this study included lack of information regarding city population which limited the geographical variation of population. The study did not include information on how capital allocations were distributed within each school. Measurement and data entry of information into the databases for the variables included in the study were subject to varying potential errors, such as data entry errors, unbeknownst to the researcher.

A specific limitation noted during the data collection was the reliability of the quantitative data used to report institution square footage base on physical condition. The variable, school condition measured in square footage, is a facility tracking measure recorded within the Higher Education Inventory (HEI) data management system, developed by the Ohio Department of Higher Education. The HEI database was developed to catalog and manage Ohio's inventory of public higher education facility investments. The term *Physical Condition Status* is intended to track the physical condition of the overall institution facility inventory, reported in square feet. The sum total of all square foot categories equals total square feet of the

institution. Physical Condition categories (Satisfactory, Minor Rehabilitation, Rehabilitation, Major Rehabilitation or Physically Obsolete) are qualitatively defined by HEI. School condition data is self reported and uploaded by the higher education institution into the HEI database, which reflects a qualitative judgment of the physical (or structural) condition of the structures. Considering the independent qualitative judgment used by each institution, the consistency in reporting is reduced based upon interpretation of the qualitative condition definitions. Based on this observance, the reliability of physical condition square footage is reduced.

Primary Contributions of this Study and Widening the Scope

Although some research has been performed on capital funding for higher education at the national and some state levels, a study focused on Ohio's budgeting system and capital expenditures was needed. Currently, Ohio uses a bi-annual budgeting cycle. One line item in the Ohio Budget is the Higher Education Capital Fund which is to be distributed among Ohio's public post-secondary education institutions. In 2012, Governor Kasich instituted a call-to-action, "Campus leaders throughout Ohio must work together to rethink how the state allocates its investment in our public higher educational facilities" (Ohio Higher Education Capital Funding Commission, 2016). The intent of Governor Kasich was to drive more equitable outcomes and opportunities in higher education, including capital allocation (Ohio Higher Education Capital Funding Commission, 2016). However, despite the changes in processes over time, there continues to be disproportion in allocation of capital funding per Full Time Equivalent (FTE) student among Ohio's publicly funded member institutions.

A deeper understanding of the historical and current trends of capital allocation to post-secondary public institutions in Ohio was needed to increase awareness of both the favorable and unfavorable aspects of the State's higher education capital funding processes. The findings of

this study will inform policymakers, university administrators, and community stakeholders of the past and current status of capital allocation to public post-secondary education and may allow enhancement of the decision making processes and choice of viable metrics for computing allocation of funds. Additionally, the results of this study may be utilized by higher education administrators and community stakeholders to assist in predicting, via the regression model, a particular higher education institution's future capital allocations that may assist them with long term capital planning.

Suggestions for Future Research

Strong evidence was found in this study that the type of school and political variables of (a) party of the Governor, and (b) majority party of the legislature were associated with significant changes in the capital expenditure in dollars per number of FTE students in higher education, independent of other factors in the model.

There is a need to further delve into the possible reasons as to why politics matters in allocation of capital funding for higher education. Future research could focus on lobbying and incentive efforts of schools on gubernatorial and legislative bodies in the state of Ohio. For example, does the decision making process of capital allocation by the government rely mostly on party lines? Do agents of 3rd parties and interest groups have greater influence on the allocation of capital funds? Further research could also include qualitative or case studies focused on determining the factors that influence a legislator to be more interested in capital funding of higher institutions. Qualitative studies could be developed to discover the thought processes and opinions of legislators that are similar and/or different when working with distribution of SSI funds and capital allocation.

Another future study could investigate the correlation of demographics and capital distribution with special attention directed toward HBCU and minority serving institutions. In Ohio, Central State University is the only higher education institution designated as an HBCU, so this might not avail the breadth of data necessary to conduct a correlational analysis. Maybe the best approach for this study would be to track ethnicity for both the student body of the institution and ethnicity of the city which the institution resides. This way we can consider two measures, student body ethnicity and surrounding region ethnicity.

Another interesting study would be the correlation between partisan composition and change in policy that effected capital distribution. The thirty-year review of partisan composition spanning the duration of this study (1988-2018) highlights an interesting observation with regards to the three capital distribution era's noted prior (1963-1995; Centralized BOR, 1995 – 2012; Formula Driven and 2012 to Present; Performance Driven). Shortly after an era where both the Ohio gubernatorial and the Ohio House of Representatives were democrat, the newly republican dominated Ohio Gubernatorial and Legislative Majority implemented a change in policy that effected capital distribution. This occurred in 1995 and 2012 after the democratic Ohio House of Representative majority ended in 1994 and 2010, respectively.

Further research is needed to determine a more detailed view of the proportion of capital allocation and expenditure on the type of school campus (4-year main campus, 4-year regional, or 2-year). Interactions of school type and square footage, or school type and population or geographic area type could also be studied to investigate if square footage type, population or geographical location (urban, suburban, and rural) differs for the three school types as relates to capital allocation per FTE student, or capital allocation per capita.

Finally, the allocation structure for capital funding for higher education changed over the 30-year time span of this study and will likely change in the future. Future research using the model developed in this study with new data can be performed to see if the model holds up over time. Future research may also indicate ways to better refine the model.

Conclusion

The purpose of this quantitative, cross-sectional, historical study was to determine the basis of capital allocation among Ohio higher education institutions per FTE (as per the reporting precedent set in historical Board of Regents reports and research by Johnson (2012)) as it relates to (1) campus condition, (2) school type (2 year vs. 4 year), (3) county population, (4) party of the governor, and (5) party of the legislative majority. The study was conducted to (a) perform a quantitative 30-year review (1988 – 2018) of annual capital allocation per FTE student at publically funded higher education institutions in the state of Ohio. The thirty-year period was selected because it allowed for a review of capital distribution practice in each of the three capital distribution eras (1963-1995; Centralized BOR, 1995 – 2012; Formula Driven and 2012 to Present; Performance Driven).

The adjusted regression model identified four significant findings. Significant findings include 1) institutions that report campus condition as Minor Rehabilitation, measured in square feet, receive less capital appropriation, 2) 4-year campuses received significantly greater increases in capital allocation per number of FTE students than 4-year regional campuses and 2-year campuses, 3) Significant reductions in capital allocation per number of FTE students was determined when the governor was a Democrat when compared to a republican governor, and 4) Significant reductions in capital allocation per number of FTE students was determined when the majority party of the legislature was Republican in one house, when compared to a Republican

majority in both houses. There was never a democratic majority of the legislature during the years of study.

The adjusted regression model developed in this study could be a useful tool to stakeholders in the State of Ohio educational system for determining current and future allocation of capital expenditures. Please note, the following proposed recommendation for increasing institutional share of the bi-annual higher education capital appropriation is only used to emphasize the findings of this investigation. If an institutions only objective was to maximize their share of the Ohio higher education bi-annual capital fund, the outcome of this investigation would strategically suggest 1) report zero square feet of campus condition as Minor Rehabilitation and instead report as Rehabilitation or Physically obsolete, to the greatest qualitative justifiable extent, 2) seek to offer 4-year degrees and designate themselves as a 4-year campus when feasible and appropriate, 3) become politically active to nominate republican gubernatorial and republican majority in the Ohio Senate and 4) support a democratic majority in the Ohio House of Representatives to encourage a split legislative majority. The above strategies for capital distribution maximization are unethical and unorthodox but are correlational significant for maximizing share of the Ohio bi-annual capital fund.

The author of this dissertation supports a method of capital distribution based on FTE because physical space and equipment should of equal quality for all institutions and able to meet the demands of the population being served. If schools are expected to compete among each other for student enrollment and subsequent SSI revenues, then the campus facilities should be of equal quality to level the competitive playing field.

However, the results of this study support the importance of political affiliation in the allocation of funds for capital expenditure, and school type was shown as an emerging factor that

requires more investigation. Perhaps with more investigation, a system or framework modeled after stakeholders, instead of political variables, will determine capital funding and allocation, while school types are allocated capital funds in a proportional manner.

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APPENDIX A

OBM

Allowable Capital Expenditure Guidelines **May 2018**

Introduction

State capital appropriations are funded primarily through the issuance of State bonds. State bonds must be authorized by Ohio voters via a Constitutional amendment and the interest on State bonds is generally exempt from federal and state income taxes (i.e., tax-exempt bonds). Thus, capital projects funded by State bonds must (1) fall within the authorized purposes for State bonded debt set forth in Article VIII of the Ohio Constitution and (2) meet federal tax law requirements for tax exempt bonds. These Allowable Capital Expenditure Guidelines are intended to assist State agencies in developing and implementing their capital plans and projects within these requirements.

Ohio Constitution -- Article VIII of the Ohio Constitution prohibits the State from incurring or assuming debt without a popular vote. To be eligible for bond funding in the State capital budget, a project must fall within the capital purposes authorized by the voters as set forth in the Ohio Constitution. Those purposes authorized in the Ohio Constitution include: highways; local government infrastructure; parks and recreation; natural resources and conservation; higher education facilities; elementary and secondary public school facilities; facilities to house branches and agencies of State government and their functions, including State office buildings and facilities; correction and juvenile detention facilities, mental health and development disabilities facilities; cultural, historical and sports facilities; and research and development (including coal research and development) and site development. Only projects that are within these purposes may be funded by State bonds.

State Laws and Federal Tax Laws -- As further discussed in this guidance, the Ohio Revised Code and federal tax law also contain provisions that govern the allowable uses of bond proceeds for capital projects, including the types of projects and expenditures, and the extent to which non-governmental entities (both private for-profit and not-for-profit) can benefit from the project. State agencies should carefully review these allowable capital expenditure guidelines and work with OBM to ensure their projects are allowable under State and federal laws.

Not all appropriations for capital projects/purposes are provided for via the capital bill. For instance, debt-supported appropriations for highway purposes are authorized in the biennial transportation budget. In addition, appropriations for some purposes are made only in the aggregate and thus do not specify individual projects. For example, capital funding to support local government infrastructure is appropriated to the Public Works Commission where the Ohio Revised Code governs the project selection process.

Overview

The Ohio Revised Code and each bill containing new capital appropriations or reappropriations (the most recent being H.B 529 of the 132th General Assembly) set forth the allowable uses of capital funds. Capital appropriations for buildings or structures, including remodeling and renovations, are limited to:

- Acquisition of real property or interests in real property (i.e., the purchase of land or easements).
- Buildings and structures, which includes construction, demolition, complete heating and cooling, lighting and lighting fixtures, as well as all necessary utilities, ventilating, plumbing, sprinkling, and water/sewer systems.

- Architectural, engineering, and professional services expenses directly related to the project (including feasibility studies).
- Machinery necessary to the operation or function of the building or structure at the time that it is acquired or constructed or placed into service.

In situations in which the State does not own the property on which the capital facility or improvement will be located, there are requirements that a higher education institution (with respect to Department of Higher Education capital projects) or a governmental agency (with respect to Mental Health and to Developmental Disabilities capital projects) own the property. This ownership requirement may be waived if:

(1) The higher education institution or governmental agency has a long-term lease, or other interest (such as an easement) in the property; or

(2) The Department of Higher Education on behalf of a higher education institution certifies to the Controlling Board that undue delay will occur if planning does not proceed while the property or property interest acquisition process continues. In this case, capital funds may be released upon approval by the Controlling Board to pay for planning through the development of schematic drawings only; or

(3) If the capital facilities will be owned by, or be part of facilities owned by, a separate nonprofit organization or public body and made available to a higher education institution or governmental agency for its use or benefit, the nonprofit organization either owns or has a long-term lease of the real property or other capital facility to be improved, renovated, constructed or acquired, and has entered into an agreement with the state agency or higher education institution that meets applicable statutory requirements.

Joint Use Agreements -- The Department of Higher Education has adopted rules (see OAC 3333-1-03(E)) regarding the release of moneys for capital projects not owned by the State or a higher education institution and the joint use of such projects. The joint use agreement, among other matters, must:

- Provide that the use of the funds and the process to be followed for expenditure of the funds is consistent with the capital appropriation language, the limitations on the use of capital appropriations as set forth in the capital bill, and any applicable state law and federal tax law limitations;
- Specify the extent and nature of the higher education institution's use or benefit of the project or improvement over a term of at least 20 years, with the value of that use or benefit to be reasonably related to the amount of the State capital appropriation.
- Provide for pro rata reimbursement to the State should the arrangement for joint use be terminated prior to the expiration of the 20-year term.
- Provide for payment or reimbursement to the higher education institution (not to exceed 1.5% of the appropriation) of its administrative costs incurred as a direct result of the project. The institution should document those reimbursed amounts by component.

Grant/Cooperative Use Agreements – Other State agencies that administer capital appropriations for projects owned or managed by governmental agencies or not-for profit entities must enter into an agreement with the entity receiving the State capital funding prior to release of those funds. Those agreements, among other matters, must:

- Provide that the use of the funds and the process to be followed for expenditure of the funds is consistent with the capital appropriation language, the limitations on the use of capital appropriations as set forth in the capital bill, and any applicable state law and federal tax law limitations;
- Specify the extent and nature of the State agency's use or benefit, or right to use, or interest in the project or improvement over a period of 10 years or the term of the underlying State bonds, whichever is longer.
- Provide for pro rata reimbursement to the State should the arrangement for the State agency's use, right to use, or interest in the project be terminated prior to expiration of the term of the agreement.

Allowable Equipment and Furnishings

To be financed with capital funds, expenditures for equipment or furnishings that are part of a broader capital project or facility must meet all of the following criteria:

- Essential in bringing the facility up to its intended use or is necessary for the facility to function. The equipment or furnishing must be an integral part of or directly related to the basic purpose or function of the facility.
- Have a unit cost of about $100 or more.
- Have a useful life of at least five years.
- Used primarily in the rooms or areas covered by the financed project.

Allowable equipment and furnishings would include computers and computer peripherals, workstations, lab and research equipment, desks, chairs, tables, bookshelves, file cabinets, carpeting/flooring, blinds, and curtains, provided that they satisfy all of the above criteria. An appropriation item specifically for equipment is allowable provided the equipment meets the above unit cost and useful life provisions.

Non-Allowable Equipment and Furnishings

- Not integral to the broader project or the facility's intended use.
- Motor vehicles used for basic transportation (e.g., cars, trucks, boats, off-road vehicles).
- General supplies and low-cost equipment (unit cost of less than $100).

In most cases, equipment or furnishings being purchased as part of a regular maintenance, upgrade or replacement effort is not appropriate for capital funding. Consumable supplies and low-cost equipment such as fuel, oil, adding machines, calculators, trash cans, common tools, paper stock, staplers, tape dispensers, etc. are not eligible uses of capital funds.

Maintenance/Repairs versus Renovations

- Maintenance and repairs, including maintenance contracts, are not eligible to be paid from capital funds and, thus, must be covered by operating funds.
- Maintenance includes a recurring activity necessary to maintain the operation, functionality, appearance, or safety of a piece of equipment, building or structure. Repairs are maintenance projects that fix a problem but do not extend the useful life of an asset.
- Maintenance and repairs generally include any project with the objective of returning or restoring an item back to its original intended use or state.

- Examples of maintenance and repairs include: fixing a part or component of the heating or cooling system, fixing a leaky pipe, patching a wall, repainting, sealing windows or floors, mold remediation, replacing sections of flooring or ceiling tiles, glass replacement, resetting exterior walkways, replacing roofing shingles to fix a leak, and brick mortar repair/patching (tuckpointing).
- Renovations are more extensive enhancements, upgrades, or replacements of buildings or structures or systems and are an appropriate use of capital funds. Examples include replacing an essential component of the heating or cooling system such that the useful life of the system is extended, renovations of classrooms or other space into computer or research laboratories, upgrading electrical equipment or plumbing system components, replacing a roof, replacing exterior windows, new carpet, painting as part of new construction or a renovation, upgrading a building's security or automation system, replacing stairs or walkways to meet ADA standards, and total brick mortar replacement (repointing).

Leases, Lease-Purchase, and Installment Purchases

- Leases, including leases with an option to purchase, of vehicles or equipment are not allowable capital expenditures.
- Installment purchases while not strictly prohibited are generally not approved as allowable capital expenditures.

INFORMATION TECHNOLOGY (IT) SYSTEM PROJECTS

Capital funds may be used to support the application development, deployment, and integration (including project management) of information technology systems that constitute or are a part of a larger capital projects. Capital funds may not be used to support the ongoing operation and maintenance of such projects.

ALLOWABLE

Allowable capital IT project expenditures include systems developed for internal use that have a useful life of five or more years. Allowable costs generally include the design, configuration, and deployment, customized software and its licensing, interfaces, data conversion, and various hardware and peripherals. State agencies and higher education institutions should consider an IT project as a potential capital expenditure only when the cost of application development is at least $1 million. For new and replacement systems, capital expenditures usually occur after the preliminary project phase is completed and when management implicitly or explicitly authorized funding of the project.

IT system upgrades may also be considered an allowable capital expenditure when they add significant functionality or are necessary to postpone obsolescence. State agencies and higher education institutions should ensure that the postponement of obsolescence is generated by the upgrade and not simply by ongoing maintenance or the maintenance component of the upgrade. For example, a system upgrade that included technical upgrades, security enhancements and significant additions of functionality would be considered an allowable capital expenditure, while an upgrade that included only routine technical and/or security improvements would be an appropriate operating expenditure.

Hardware

Capital funds may be used to purchase hardware for information technology systems and its components, including but not limited to servers, network equipment, desktops/laptops, monitors, printers, scanners, etc.

Software, Licensing, and Warranties

- Purchases of packaged "off-the-shelf" software are allowable if they have an expected useful life of at least five years and have been tailored or customized to the IT project. The software purchase must also meet one of the following criteria:
  - ✓ Related to the initial deployment of an agency or university-wide system or other major project deployment (periodic upgrades must be purchased with operating funds); or
  - ✓ When necessary to bring a newly constructed facility or an allowable piece of equipment up to its intended use (e.g. a computer lab).
- Application development, configuration or deployment.
- Software licenses for commercial off-the-shelf products with a term of at least five years, provided the cost is paid for upfront as part of the development stage.
- Software licenses for cloud based products related to application build, provided the State agency or higher education institution has a contractual right to take possession of the software and it is feasible to run the software on its own hardware.
- Data conversions required to make the new IT system operational.
- Purchase of perpetual licenses enabling the acquisition of shared electronic resources and databases.
- Warranties purchased at the time of initial acquisition with a term of at least five years and provided that the terms and conditions are substantially the same as warranties available to other purchasers.

NON-ALLOWABLE

Operation and Maintenance

Operating, not capital, funds must be used to support the ongoing operation and maintenance of IT systems and other regular, recurring expenses.

Replacement Hardware

Capital funds generally may not be used to purchase end of life or replacement hardware equipment (computers, peripherals, etc.) that do not upgrade or add functionality to an IT system.

Software and Licensing

Capital funds generally may not be used to purchase standard off-the-shelf software (such as MS Office software, Adobe, and web browsers) or any software package with individual license costs under $500. Additionally, capital funds may not be used to purchase: periodic software upgrades, minor upgrades and patches, minor configurations, or security enhancements. Software licenses

for premise-based and cloud-based products post-implementation, including annual licensing and subscription-based software, should also be paid from operating funds.

Planning and Post-Implementation

Capital funds generally may not be used to cover costs associated with planning or post-implementation operation of an IT project, including: project-related research and planning, service management and strategic planning, post-implementation activities including project and change management, and data conversions that are not required for an IT system to be operational. Additionally, costs associated with the solicitation, review and selection of professional service providers or vendors, including contract development, should be paid from operating funds.

Personnel Expenses

Capital funds generally may not be used to cover expenses of State employees working on IT projects. Employees working on IT projects should continue to be funded out of operating funds. In the case of colleges and universities, capital funds may not be used to cover tuition reimbursement or graduate assistantships. (Note, although federal tax law does allow for State personnel expenses under certain circumstances, the extensive and detailed record-keeping requirements necessary to comply with IRS audits generally offset any potential benefit.)

Training

Expenses related to training of personnel on the new IT system or any of its components is generally not an allowable capital expenditure. Some expenses related to the initial deployment of the IT system (e.g., creating the system user manual) may be allowable.

Follow-Up Questions Regarding Proposed Expenditures

- Questions regarding the capital funding eligibility of proposed expenditures should be directed to the agency's operating and capital analysts at the Office of Budget and Management.
- Institutions of higher education should consult with the capital planning Director of the Department of Higher Education.

JOHN D. O'BRIEN

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SUMMARY OF QUALIFICATIONS

- 26 Years Public Administration Exp.
- 22 Years Higher Education Exp.
- Board Of Trustee Presentation Experience
- Community Engagement Representative
- Leadership Skills
- Broad Higher Education Institutional Perspective
- Grant Writing Experience
- Higher Education Liaison w/ Ohio ODHE, CB & OBM
- External & Internal Project Management Experience.
- Budget & Planning Skills
- Knowledgeable of Current Issues Confronting Higher Education (SSI Funding, Student Success, Developmental Education, Workforce Development etc.)

EDUCATION

The University of Akron, Akron, Ohio
● **B.S. Construction Engineering** 12/1993 ● **M.A. Public Administration** 08/2009
Old Dominion University, Norfolk Virginia
● **PhD Community College Leadership** 10/2020

PROFESSIONAL EXPERIENCE

EASTERN GATEWAY COMMUNITY COLLEGE, Steubenville, Ohio 01/2013– Present
Director, Capital Planning & Development

Director, Capital Planning
- Single contact for all State of Ohio Business associated with Ohio Department of Higher Education, Controlling Board and Office of Budget and Management.
- Increased State of Ohio Capital Appropriations funding 60%
- Implement State Mandated Energy Conservation Project utilizing federal subsidies and utility incentives. The performance based proposal guaranteed projected savings, which pays the low interest subsidized bonds. Excess saving enabled college to invest in several major deferred maintenance projects exceeding $700K with zero impact on operational budget.
- Major construction projects include: Student Success Center, Weld Laboratory Restoration, General Science Lab Restoration, Nursing Laboratory Restoration, Mechanical Laboratory Restoration, Safety & Security Project

Director, EGCC Foundation
- Expanded board of trustee appointments, created EGCC Foundation web page with on-line donation capability, developed professional relationships with the JC William Endowment and Esther Simmons Endowment through the PNC Charitable Trust, and submitted and received multiple grant funding for campus initiatives, started annual alumni golf outing.

Other Project Management
- Implement a Comprehensive Master Campus Plan project to support the Succession Plan for our retiring President and strategically prepare for anticipated growth due to new service markets. Plan includes, in order of importance, Overall Strategic Plan, Academic Plan, Staffing Plan and Facilities Plan.

THE UNIVERSITY OF AKRON, Akron, Ohio 01/1998 – 01/2013
Facilities Project Engineer
- Managed over $195,000,000 in capital improvement projects over a fourteen-year period.
- Participate in facility planning initiatives and capital budget allocation.
- Single point of responsibility for total project management. Responsible for overseeing planning, design and construction of campus buildings, utility infrastructure, furniture and landscape capital improvement projects.