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Special District Reform: Enhancement or Impediment

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ABSTRACT

Special District Reform: Enhancement or Impediment

by Steven W. Appel

Special district governments are probably the least understood and seemingly the least studied unit of government. They occupy a unique place in the American government structure and have been described by the Little Hoover Commission as the workhorses of public service delivery and represent the most common form of local government. Critics of special districts cite a lack of efficiency/effectiveness, accountability, and transparency as proof that special districts have something to hide or are outright corrupt. Supporters argue that special districts are not broken and there is no need for broad-brush reforms. This study will advance the discussion of the role special districts play in local government by providing a historical perspective of special districts and by analyzing the merits of two opposing perspectives, institutional reform (traditional public administration) and public choice, through the dimensions of service efficiency/effectiveness and accountability. Using a mixed-methods approach including qualitative and nonexperimental quantitative analysis of various performance indicators from existing data sources, comparisons can be made between smaller local water districts (public choice structure) with larger water districts (reformers optimum structure) to show whether there are any significant differences between the parameters measured. Analysis of the data confirmed that there are no significant differences between small water districts and large water districts in fiscal performance, organizational structure, and customer relations indicators. Additionally, there were no

observed differences between small and large water districts and the relationship of board meeting statistics.

Keywords: institutional reform, public choice, special districts

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Lastly, I am proof that we live in the greatest country in the world. Despite our problems, we live in a free society, and if you set your mind to accomplish something, you still can in the United States of America.

DEDICATION

I dedicate this dissertation to my family. To my wife, Diane, for her continual love, wisdom, patience, help, and support throughout this entire process. I could not have completed this journey without you by my side. To my sons, Ken and Tom, I hope that the perseverance this process required serves as an example to you; no matter how difficult the journey, finishing is just as important as beginning. I especially want to thank my mother, Beverly Appel, for the unyielding support she has given me throughout my life—thanks, Mom! To my late father, Rolland Appel, I still miss your presence in my life, but your spirit lives on in my heart. Finally, all this would not have been possible without the Lord. God, you have been good to me—thank you.

TABLE OF CONTENTS

ABSTRACT iv

ACKNOWLEDGEMENTS vi

DEDICATION viii

LIST OF TABLES xi

LIST OF FIGURES xii

CHAPTER 1: INTRODUCTION 1
Background of the Problem 4
Purpose of the Study 12
Theory Analysis 13
Research Questions and Hypotheses 15
Significance of the Problem 17
Definitions of Terms 19
Organization of the Study 23

CHAPTER 2: REVIEW OF THE LITERATURE 25
Historical Background 25
Special Districts 30
Public Versus Private Water Providers 40
Institutional Reform Theory 42
Orange County, California Special District Consolidation Effort 54
Public Choice Theory 56
Conflict and Contrast: Institutional Reform and Public Choice 65
Ties to Research Questions/Hypotheses 69
Efficiency and Effectiveness 70
Accountability 71
Summary 74

CHAPTER 3: METHODOLOGY 75
Overview 75
Introduction 75
Purpose Statement 76
Research Design: Mixed Methods 76
    Quantitative Analysis 78
    Qualitative Analysis 79
Research Questions and Hypothesis 80
Methodology 82
Population 85
Sample 85
Measurement 87
Validity 88

Reliability 89
Data Collection and Analysis 89
Statistical Analysis Theory: Independent Samples *t*-Test 90
Tests of Assumptions 91
Statistical Analysis Theory: Mann-Whitney U Test 93
Tests of Assumptions 94
Test of Equal Distributions 95
Ethical Assurances 95
Summary 96

CHAPTER 4: FINDINGS AND DISCUSSION 97
Overview 97
Shapiro-Wilk Test for Normality 97
Research Question 1 Findings 99
Research Question 2 Findings 101
Research Question 3 Findings 103
Research Question 4 Findings 105
Research Question 5 Findings 106
Research Question 6 Findings 109
Interpretation of the Findings 110
Summary 119

CHAPTER 5: SUMMARY AND CONCLUSION 121
Overview 121
Summary of Study 122
Descriptive Statistics 123
Limitations of the Study 124
Further Research 126
Summary 127

REFERENCES 129

APPENDICES 143

APPENDIX A 144

A. CALIFORNIA SPECIAL DISTRICTS 144

B. STATISTICAL ANALYSIS 162

LIST OF TABLES

Table 1. Test of Multivariate Normality with Univariate Test 98

Table 2. RQ6: Relationship of Water District Meeting Statistics..... 109
..... 117

Table 3. RQ1: t-Test Results Population Served per Water District Employee 111

Table 4. RQ2: t-Test Results Revenue/Customer Service 113

Table 5. RQ3: t-Test Results Equity/Customer Service 114

Table 6. RQ4: t-Test Results Monthly Residential Service Charge 115

Table 7. RQ5: t-Test Average Board of Directors Tenure..... 116

Table 8. Independent Variable Population Statistics 124

LIST OF FIGURES

Figure 1. 70-year government sector growth rate 50

Figure 2. Convergent parallel mixed-methods design 83

Figure 3. RQ1: Population/employee relationship for small water districts. 100

Figure 4. RQ1: Population/employee relationship for large water districts. 100

Figure 5. RQ2: Revenue per connection relationship for small water districts. 102

Figure 6. RQ2: Revenue per connection relationship for large water districts. 102

Figure 7. RQ3: Equity per connection relationship for small water districts. 104

Figure 8. RQ3: Equity per connection relationship for large water districts. 104

Figure 9. RQ4: Water charge per month relationship for small water districts. 105

Figure 10. RQ4: Water charge per month relationship for large water districts..... 106

Figure 11. RQ5: Board tenure relationship for small water districts. 107

Figure 12. RQ5: Board tenure relationship for large water districts. 108

CHAPTER 1: INTRODUCTION

> Special districts are particularly fascinating because some of their characteristics are very much out of the usual governmental pattern and because they seemingly offer clues and insights into a better understanding of other parts of our governmental system. They are mysterious and phantom-like because many of them have been in the realm of the unknown. One need not write a mystery novel to deal with the mysterious. Locating special districts in a geographical sense and subsequently acquiring information about them are no simple tasks.
>
> —Bollens, *Special District Governments in the United States*

Special districts occupy a unique place in government structure; they have been described by the Little Hoover Commission as the workhorses of public service delivery and represent the most common form of local government (Little Hoover Commission, 2017). In 1887, the California state legislature passed the Wright Act, which allowed landowners to form new public entities to deliver irrigation water, provided the legal foundation for the formation of water districts and, ultimately, other special districts that now deliver a wide range of services used by millions of Californians (Gidney, 1912). By the 1960s, there were a number of independent governmental agencies with a variety of regional functions in California. There was also a growing movement to consolidate and centralize regional government in the interests of efficiency, coordinated planning, and economic integration. Critics of special districts cite a lack of efficiency/effectiveness and accountability (how decisions are made, how funds are spent, and the amount of debt incurred) as proof that special districts have something to

hide or are outright corrupt. Supporters argue that special districts are not broken and there is no need for broad-brush reforms.

Millions of people in California receive public services such as water supply, wastewater collection, trash collection, and fire protection from special districts as opposed to city or county agencies. Those same people who might know their local city councilmember or county supervisor would struggle to name their representative on the local water board. Because of this relative obscurity, some have questioned whether it might be time to reform the special district form of local government in favor of regionalized or consolidated service agencies. Ultimately, the question becomes is it time to reform special districts, or are they performing in an efficient, accountable, and transparent way.

The phenomenon of special district governance is not limited to the United States. For example, in Switzerland, cantons are independent special purpose communities that provide services such as education, water, and electricity (Fink & Wagner, 2010). Additionally, in many other European countries, municipalities cooperate to form special purpose governmental units that provide a broad variety of services (Hulst & Von Montfort, 2007).

While the exact origins are unknown, the American experience with public authorities dates to the founding of the nation (Smith, 1974). George Washington's administration favored "mixed corporations" for the financing of banks, canals, and turnpikes. By the late 19th century, America employed a number of special transportation districts for toll roads and canals (Smith, 1974).

In California, special purpose districts first arose to meet the water needs of the San Joaquin Valley farmers. The farmers, frustrated by inconsistent water supply and unstable prices, formed the Turlock Irrigation District under the Wright Act of 1887. The Wright Act allowed land owners to form new public entities to deliver irrigation water and to finance their activities with water rates and bond sales (Detwiler, Diaz, Arand, & Mizany, 2010). Within 8 years from the passage of the Wright Act, the number of special districts in California had grown to 49. The Depression era of the 1930s and the postwar boom of the 1950s stimulated the growth of special districts.

During the postwar boom of the 1950s, scholars began to be concerned about potential problems associated with the use of special districts. In 1957, John C. Bollens published his book *Special District Governments in the United States*, which is considered the first extensive review of the subject. By the mid-1960s, the U.S. government began to study the question of fragmentation of local public services and the resultant inefficiencies of service delivery created by the proliferation of special districts (Advisory Commission on Intergovernmental Relations, 1964).

The Advisory Commission on Intergovernmental Relations (ACIR), whose mission it is "to strengthen the American federal system and improve the ability of federal, state, and local governments to work together cooperatively, efficiently, and effectively" (para. 2) favored the use of general-purpose governments whenever possible; the ACIR also acknowledged, "In general, the public appears to be satisfied with services received from special districts" (ACIR, 1964, p. 74). As a result of the ACIR report, California began placing restrictions on local government growth. The Local Agency Formation Commission (LAFCO) was created and charged with monitoring local

government changes. This study researched and evaluated whether the problem lies in the organizational structure of the special districts (small versus large) as well as evaluating whether or not these districts are accountable to their customers and are operating in an effective and efficient manner.

Background of the Problem

The history of special districts could be characterized as an institutional biography. It adds to a growing literature emphasizing the importance of political institutions and institutional structures generally, both in the context of national policy and in the field of urban history. It applies the concept of institutional agency, the idea that these organizations have the capacity to pursue their own, independent agenda and interests. This history contributes a new perspective on the legacy of Progressive era reform; the special district as an institution was shaped by ideals of scientific administration, efficiency, and rationality as well as broad-based support for public enterprise. In a larger sense, this story is about bureaucracy, not only as the structure of the modern state but also as the organizational form that came to dominate the social, economic, and political institutions of the 20th century. Despite the good intentions of reformers, the institutions that they constructed in the name of progress and public enterprise often transcended their purpose and took on imperatives of their own.

Max Weber (1978), who pioneered the study of organizational behavior, observed in 1917 that government bureaucracy was "far more persistent and 'escape proof'" than "other historical agencies of the modern rational order of life" (p. 1401). He noted with apprehension the "irresistible advance of bureaucratization" (p. 1403) and the "practically indestructible" power of its officials (p. 1401). Weber (1978) posed the question,

> In view of the growing indispensability of the state bureaucracy and its corresponding increase in power, how can there be any guarantee that any powers will remain which can check and effectively control the tremendous influence of this stratum? How will democracy even in this limited sense be *at all possible*? (p. 1403)

Have special districts, the predominant government bureaucracy of metropolitan areas, undermined democracy in the United States? Is it possible to reform these agencies once they have been established, and to restructure the local state to allow for greater public participation and oversight?

Although few special districts can rival the notoriety of the Golden Gate Bridge and Highway District or the Metropolitan Water District of Southern California, most escape attention because they were intentionally designed to operate outside of the influence of electoral politics. Robert G. Smith, in his 1964 book *Public Authorities, Special Districts, and Local Government* published for the National Association of Counties Research Foundation, remarked that many special districts lack scrutiny and oversight, noting that they do not as a rule have a "loyal opposition."

Special districts vary widely in their form, function, financing, and degree of independence. Their diversity makes generalization difficult, but they do share some basic characteristics, both in terms of their structure and their behavior as organizations. Special districts started to appear in metropolitan areas in the United States around the turn of the 20th century. Though their numbers increased steadily in the 1920s and rapidly following World War II, it was not until 1952 that they were formally defined by federal statisticians. Officially adopting the designation special district, the United States

Census of Government tallied the "local districts, authorities, commissions, boards, and other entities [that] should be classified as independent local governments." They are distinct "special-purpose" governments, neither part of traditional, "general-purpose" local government (municipalities and counties) nor divisions of states or the federal government (U.S. Census Bureau, 1953, p. 4). In order to qualify as special districts, these entities must possess corporate powers, described in 1952 as "perpetual succession, the right to sue and be sued, have a name, make contracts, acquire and dispose of property," and "substantial autonomy" in the form of "considerable fiscal and administrative independence" from other governmental entities (U.S. Census Bureau, 1953, p. 6). Their governing boards and operations must be distinct from and independent of other governmental agencies. They are public corporations either explicitly or effectively.

Most special districts are not charged with duties as spectacular as the construction of the Golden Gate Bridge or the Colorado River Aqueduct; they provide water, manage parks, control pollution, and dispose of waste and sewage in urban and suburban areas across the county. In the rural West including California, early special districts took on the tasks of irrigation and flood control (Pisani, 1984). They have been major players in the development and management of transportation facilities, from ports and airports to mass transportation and, of course, bridges, tunnels, and toll roads.

Special districts appealed to progressive advocates of public enterprise and provided a convenient means of bypassing debt ceilings that limited existing local governments. Their corporate structure, hierarchical organization, and professional management reassured those who opposed the administration of public works by existing

governments. These agencies were designed to uphold ideals of scientific administration, business-like government, efficiency, and rationality. They were usually created to perform a specific purpose or task and could be expected to perform. Often, their boundaries included multiple cities and counties as they took on responsibilities that transcended the capacities of existing local governments.

Special districts have proven to be invaluable as a tool in a crisis. Both 20th-century world wars and the Great Depression produced federal public corporations based on the same general model; among them is the Tennessee Valley Authority (McDiarmid, 1940). The Franklin D. Roosevelt administration actively encouraged their creation at the federal level. Their ranks swelled in metropolitan areas as the rapid and sustained growth after World War II created urgent problems in the nation's cities. More and more agencies appeared with regional scope, independent revenues, and significant responsibilities, particularly as the successes and profits of the Port Authorities of New York and New Jersey garnered national attention in the 1950s. Special districts distinguished by their exclusive reliance on user fees rather than property taxes, became more common. Since the U.S. Census Bureau started publishing comprehensive statistics on their operations in 1932, special districts have been the fastest growing segment of local government in the United States, both in their sheer numbers and in terms of their overall debt, revenue, and assets (Stephens & Wikstrom, 2000).

Water districts in California are typical special districts. Their institutional culture and procedures may have been shaped in response to persistent and coherent criticism, but their resistance to change or interference and stalwart defense of autonomy, resources, and institutional integrity are not unusual. The governing boards of special

districts are generally elected but rarely inspire much discussion or competition. The covert efforts of special districts to influence regional policy and their impulse for secrecy are the norm; these organizations often go to great lengths to avoid referenda or public policy debates. One observer noted in 1962 that "many citizens are completely unaware of the districts to which they pay taxes and from which they receive services. Even the residents who know the districts exist seldom are really interested in and informed on their affairs" (Scott & Corzine, 1963, p. 76). Most water districts are not especially large or powerful; there are a number of regional water districts in California that have considerably more political weight. Their corporate structure, hierarchical organization, and autonomy are all commonplace characteristics of special districts designed to ensure the business-like operation of public enterprise. Many metropolitan special districts rely on user fees for their revenues, like a water district, which depends primarily on water use charges. Once special districts are created, they are notoriously difficult to abolish—they guard their independence and resources with jealousy and fervor.

Reformers have long focused on the representational structure and jurisdiction of special districts, seeking to replace decentralized government networks with comprehensive general-purpose metropolitan governments but rarely succeeding in abolishing existing agencies. The results are clearly reflected in the rapid growth of special districts, both in terms of their size and their overall numbers.

While many special districts have been able to avoid scrutiny, they have been the subject of intense criticism by scholars and policy analysts almost since their emergence. Early in the 20th century, analysts began to sound an alarm at the rapid and

uncoordinated creation of new agencies in urban areas (Stephens & Wikstrom, 2000). Several important studies of metropolitan government in the 1930s and 1940s warned that reliance on this institutional form to solve short-term problems could have long-term negative consequences (Jones, 1942; McKenzie, 1933; Studenski, 1930). By the end of the 1950s, "the metropolitan problem," or the inability of local governments to direct growth and control its impact in rapidly growing cities and sprawling suburbs, was attributed primarily to the proliferation of special districts (Council of State Governments, 1956; Gulick, 1962; Pock, 1962; Wood, 1961). The next 2 decades were marked by frequent conferences, summits, and task forces devoted to finding ways to limit their influence, federal and state programs to encourage governmental coordination, and a nation-wide movement supporting regional planning and centralization. For the most part, these efforts failed to check the ascent of special districts.

Criticism culminated with Annmarie Hauk Walsh's 1978 study of public corporations, *The Public's Business,* a very perceptive analysis (Walsh, 1978). Describing how they came to permeate local government and dominate public enterprise in the United States, Walsh (1978) assessed the results of nearly a century of proliferation. Her conclusions are alarming: she described how government corporations, in a myriad of manifestations and roles, have effectively avoided oversight and bypassed democracy. She also examined the internal power structure of public corporations; noting that their governing boards rarely wield significant decision-making power. Regardless of whether they are appointed or elected, part-time directors generally lack the desire and resources to guide these organizations. In reality, these officials rarely live up to the ideals of expert professionalism and defense of the public interest that their

empowerment was intended to promote. Walsh went on to show that public corporations are just as susceptible to "unethical or illegal behavior," mismanagement, and corruption as other government agencies (Walsh, 1978). She suggested a number of reforms to "harness" the energy of public authorities, emphasizing the need for better information and investigation of their policies, increased oversight and accountability, and a general recognition of the political nature of their operations.

Walsh is one of many who have called for controls on the operations and creation of special districts. Obviously, these organizations did not rise to such predominance without politicians who were willing to ignore their admonitions. The Council of State Governments, advocating the adoption of authorities for a wide variety of public enterprises in 1953, praised the "corporate form of organization" as a "leading symbol of effective and efficient business administration in an urban industrial society" (Council of State Governments, 1953, p. 9). In addition, even as Walsh began her research in 1972, "public choice" theory was gaining influence, both with local defenders of home rule who had always resisted planning and governmental centralization and with federal policymakers. Scholars argued that a decentralized state structure was not detrimental; rather, it encouraged healthy competition among localities and government agencies, making them more responsive to the needs and desires of citizens (Tiebout, 1956). Special districts, particularly the large and independent authorities, began to enjoy a new legitimacy: federal and state programs designed to encourage regional planning and coordination were abandoned in the 1980s.

Although special districts have inspired a longstanding and heated debate among scholars, historical studies seem strangely oblivious to special districts as they constitute

government. Despite a growing awareness of regional systems that develop around and support urban areas, regional government has yet to inspire much interest among historians (Cronon, 1991). This may be due to a perception that the institutional fragmentation of government means that it is weak, ineffective, and therefore unimportant (Lewis, 1996).

Scholars who have dealt with the history of government in the United States tend to characterize its persistent fragmentation as a symptom of regional, economic, political, and/or social fragmentation, generally failing to recognize the possibility of an opposite connection (Teaford, 1997). Bollens (1957) remarked in one of the first systematic studies of special districts that they are in a sense "phantom governments":

> People who receive services from them often do not know that they exist or exactly where they function. . . . Districts often create a crazy-quilt pattern of governmental areas and boundaries with only very slight public knowledge that they do so. Their phantom-like quality does not diminish their collective and sometimes individual importance. It merely increases the difficulty of comprehending a class of governments which is of rising significance. (p. 30)

As for the public at large, it is easy for academics, conditioned to pay attention to high-profile elected leaders taking well-publicized positions on the issues of the day in the upper echelons of traditional government hierarchies, to overlook or discount the deliberately discreet but often immensely significant decisions made by appointed officials from within the complex tangle of local and regional special districts.

Purpose of the Study

The purpose of this study was to examine two related types of special districts in California, specifically small and large single-service independent water districts from two opposing theoretical perspectives: institutional reform and public choice. For this study, small water districts are defined as those serving populations greater than 25,000 and less than 100,000. Large water districts serve populations equal to or greater than 100,000. Literature and other survey data were used to analyze these districts along the public administration perspectives of efficiency/effectiveness and accountability. Until these issues are fully researched and evaluated, there will be no resolution or further understanding of the problem.

Although the theme of examining independent water districts from two opposing perspectives are discussed in more detail later, various performance variables were examined quantitatively and qualitatively through secondary analysis of existing data. Comparisons were made between smaller local water districts that represent the public choice model with larger regional water districts that conform to the institutional reform (traditional public administration) model. These comparisons were then evaluated to determine whether any significant difference exists between the performances of the two types of agencies.

In 1996, California State Assemblyman Curt Pringle introduced legislation to force the consolidation of 25 independent water and sanitation districts in Orange County, California (Assembly Bill 2109, 1996). His bill would have created one single countywide district. Pringle launched his push to consolidate Orange County water districts through legislative means after the 1994 County of Orange bankruptcy sparked

concern over the staggering number of local governments in Orange County (Bailey, 1996). Supporters of his bill argued that the LAFCO system is broken and not conducive to consolidation. Opponents argued that the LAFCO process should be used to handle complex issues like consolidation. Ultimately, Pringle's bill failed and was not implemented. Still, the debate continues.

This study will advance the discussion of the proper role of special districts in local government. By analyzing the merits of two opposing perspectives, institutional reform and public choice through the dimensions of service efficiency/effectiveness and accountability, this study will add to the body of knowledge and possibly narrow the gap between the two viewpoints. The goals for this study were twofold: first was to consider the importance of special districts in the services they provide and second was to evaluate whether significant differences exist in effectiveness/efficiencies and accountability based on the theoretical perspectives.

Theory Analysis

The proposed theoretical frameworks used were institutional reform theory and public choice theory. These theories seem to be logical choices given the dichotomy between those that would like to reform the special district form of government and those who support public choice governance.

Reformer theorists such as Anthony Downs, Victor Jones, John Kirlin, David Rusk, and Robert Wood see regional agencies as the optimum government structure in order to reduce inefficiencies, inequities, and duplication of public services (Gargan, 1997). On the other side are the public choice theorists, Robert Bish, Roger Parks, Ronald Oakerson, Charles Tiebout, Elinor Ostrom, and Vincent Ostrom who believe that

numerous local governments create a competitive marketplace and worry that regionalization could lead to despotism (Gargan, 1997).

California oversight agencies such as county LAFCOs, Little Hoover Commission, and grand juries continue to generate unsupported (nonreferenced) reports on the issue of increasing water district accountability, and efficiency/effectiveness through regionalization. These agencies have unilaterally taken the institutional reform point of view without consideration for the public choice perspective.

Institutional reform theorists argue that special districts are not economical because they do not or cannot capture the financial advantages that larger organizations can (ACIR, 1964). Essentially, they argue that larger/regional districts result in increased economies of scale which will result in lower costs. Public choice advocates argue that the proliferation of governments will result in the best value for the citizen-consumers (Tiebout, 1956). Tiebout (1956) believed that citizens who do not like the mix of services they receive will vote with their feet and move to areas that provide a better mix.

With respect to accountability and transparency, reformers insist that special districts undermine the public interest in several ways. They argue that citizens must recognize which government entities provide service to them and must possess the information needed to hold officials accountable. Additionally, the critics say the proliferation of special districts obscures responsibility making it difficult for citizens to link specific services to the organizations that provide them. Other criticisms include the amount of debt incurred by special districts and the lack of voter involvement in special district elections. Public choice supporters point to multiple studies that bolster their

argument and that show negligible improvements in cost-efficiency and allocation of resources for small districts compared to larger districts (Foster, 1997).

Research and other literature can be found that support both theories, but neither extend specifically to single-purpose independent water districts in California. While the debate is certain to continue, this study attempts to evaluate the merits of each theory and present unbiased findings of the data analyzed for single-service independent water districts in California. Understanding that it may be unlikely that any single comprehensive resolution will result between the theoretical perspectives, all water districts continue to face the demands of reducing costs, increasing efficient service delivery, and increasing accountability; unique case-by-case solutions must be crafted.

Research Questions and Hypotheses

This study analyzed and revealed relationships and commonalities between small and large water districts in California. For this study, small water districts are defined as serving populations between 25,000 and 100,000 and large water districts serving populations equal to or greater than 100,000. Each research question was analyzed to statistically test the validity of the null hypothesis (H_0) or alternative hypothesis (H_a). Research Questions 1-5 (RQ1-RQ5) were analyzed via quantitative methods while Research Question 6 (RQ6) was analyzed via qualitative methods. The research questions for this study are as follows:

1. RQ1: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to the ratio of population served per employee?

H_01: There is no significant statistical difference between the population served per employee for small water districts and large water districts.

H_a1: There is a significant statistical difference between the population served per employee for small water districts and large water districts.

2. RQ2: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to the revenue received per customer service connection?

   H_02: There is no significant statistical difference between the revenue received per customer service connection for small water districts and large water districts.

   Ha2: There is a significant statistical difference between the revenue received per customer service connection for small water districts and large water districts.

3. RQ3: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to equity per customer service connection? Equity is defined as assets minus liabilities.

   H_03: There is no significant statistical difference between the equity per customer service connection for small water districts and large water districts.

   Ha3: There is a significant statistical difference between the equity per customer service connection for small water districts and large water districts.

4. RQ4: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or

greater than 100,000 (large) with respect to their monthly residential water service charge rates?

H_04: There is no significant statistical difference between the monthly residential water service charges for small water districts and large water districts.

Ha4: There is a significant statistical difference between the monthly residential water service charges for small water districts and large water districts.

5. RQ5: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to the average tenure of the board of directors?

   H_05: There is no significant statistical difference between the average tenure of the board of directors for small water districts and large water districts.

   Ha5: There is a significant statistical difference between the average tenure of the board of directors for small water districts and large water districts.

6. RQ6: What is the relationship between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to frequency, time of day, or day of week of board meetings?

Significance of the Problem

Assessment and analysis of special districts has been expanded in the literature by Burns (1994) and Foster (1997) within the last quarter century. The contribution to the understanding of governance choices and service options has enhanced the understanding of structural choice and the related theoretical underpinnings. Burns and Foster

addressed the universe of special districts in defined empirical analysis of selected municipalities and counties.

The position that special districts have assumed in local government structure, including their sheer numbers and growth, requires continued assessment. The provision and financing of services by local governments have been found to take on a variety of forms including direct provision, contracting, privatization, and formation of alternative governments such as special districts. Services generally associated with local governments and structural choice include but are not limited to transportation, fire protection, utilities, social services including health services and hospitals, and various environment and housing activities including natural resources, parks and recreation, housing and community development, sewerage, and solid waste management.

A significant void in the study of special districts is the detailed analysis of particular service types that are provided by a variety of governments, including special districts, as well as nongovernmental entities. Building upon existing knowledge, this dissertation expands the study and knowledge base through analysis of one component of local government service, retail water service, that is provided by a variety of structures.

The overarching aim of the research was twofold: first to analyze the universe of all special districts and second to assess a certain type of special district in California based on the underlying theory. To bring focus and to limit analysis, water districts provide the delimiting factor. One specific type of special district, that of single-service water districts, provided the basis for expansion of the understanding of special district governments.

Special districts have existed in California since the late 1880s. Today there are thousands of special districts ranging in size from the very small to the very large. Some districts have only one employee and others have thousands. They provide many public services from controlling fire ants to controlling wildfires. Millions of people in the state receive public services such as water supply, wastewater collection, trash collection, and fire protection from special districts as opposed to a city or county agency. Those same people might know their local city councilperson or county supervisor but would struggle to name their representative on the local water board. Because of this relative obscurity, some have questioned whether it might be time to reform the special district form of local government in favor of regionalized or consolidated service agencies. Is it time to reform special districts, or are they performing in an efficient, accountable, and transparent way?

This study advances the discussion of the proper role of special districts in local government. By analyzing the merits of two opposing perspectives, institutional reform and public choice through the dimensions of service efficiency/effectiveness and accountability this study adds to the body of knowledge and possibly narrows the gap between the two viewpoints.

Definitions of Terms

Board of directors. The legislative body of governing board of a special district (Assembly Committee on Local Government, 2017).

Consolidation. The uniting or joining of two or more special districts into a single new successor district (Assembly Committee on Local Government, 2017).

Dependent special district. Includes any special district that has a legislative body that consists of ex officio members who are officers of a county or other local agency (Assembly Committee on Local Government, 2017).

General-purpose governments. Organized local governments established to provide general government services. General-purpose governments include counties (parishes, and boroughs), municipalities (cities, villages, and towns), and townships (U.S. Census Bureau, 2013).

Grand juries. Mandated by California law that each county will have a grand jury. The major functions of a grand jury are divided into criminal indictments and civil investigations. The civil, or "watchdog" responsibilities of the grand jury include the examination of all aspects of county government including special districts to ensure the county is being governed honestly and efficiently and county monies are being handled appropriately.

Independent special district. Includes any special district having a legislative body whose members are elected by registered voters or landowners within the district boundary (Assembly Committee on Local Government, 2017).

Institutional reform theory. For purposes of this dissertation, institutional reform theory or reform theory refers to the viewpoint of how institutions should be arranged to achieve efficiency and equity goals. Reform theorists believe that a single metropolitan, multipurpose government provides the optimal institutional arrangement (Foster, 1997).

Little Hoover Commission. The Little Hoover Commission, formally known as the Milton Marks "Little Hoover" Commission on California State Government

Organization and Economy, is an independent state oversight agency that was created in 1962. The Commission's mission is to investigate state government operations and—through reports, recommendations and legislative proposals—promote efficiency, economy and improved service (CA.gov, n.d.).

Local Agency Formation Commission (LAFCO). A state-mandated, county level, independent agency with countywide jurisdiction over changes in organization and boundaries of cities and special districts including annexations, detachments, incorporations, and formations. LAFCOs were created by the State Legislature in 1963 in response to the rapid growth and sporadic formation of cities and special districts in California in the years following World War II. The Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 (CKH Act) established procedures for local government changes of organization, including city incorporations, annexations to a city or special district, and city and special district consolidations. LAFCOs have numerous powers under the CKH Act, but those of primary concern are the power to act on local agency boundary changes and to adopt spheres of influence for local agencies. Among the purposes of LAFCOs are the discouragement of urban sprawl and the encouragement of the orderly formation and development of local agencies (San Mateo LAFCO, n.d.).

Public choice theory. This theory holds that individuals and groups will make rational decisions to maximize their welfare when choosing between alternative courses of action (Foster, 1997).

Public sector. That part of economic and administrative life that deals with the delivery of goods and services by and for the government, whether national, regional, or local.

Special district or district. For this dissertation, special district, special service district, limited purpose district, and special purpose district are used interchangeably. Special districts are agencies of the state formed pursuant to general law or special act for the local performance of governmental or proprietary functions within limited boundaries (Cal. Gov. Code, §56036a, n.d.). Special districts, as defined by the U.S. Census Bureau, are local entities other than school district governments, "authorized by state law to provide only one or a limited number of designated functions, and with sufficient administrative and fiscal autonomy to qualify as separate governments; known by a variety of titles, including *districts*, *authorities*, *boards*, and *commissions*" (ACIR, 1993, p. 2). While special districts and school districts fall under the U.S. Census Bureau definition of special purpose governments, the Census Bureau defines school districts separately from special districts as a separate government type. These districts are local governing units that vary widely in authority, function, and structure. Their functions range from street lighting to a large port authority with a large staff and project portfolio.

All special districts are governed by a board, but their governance structures vary. Some boards may be elected by the public while the majority are appointed by the states, counties, municipalities, or townships that have joined to form the special district. Some municipal governments that cannot finance public improvements without increasing taxes rely on special districts because special districts have several sources of revenue, and some have more than one source. They may have the authority to levy property taxes, impose service charges, accept grants, share taxes with other areas, or rely on other special assessments or taxes. Because of this variability, the special districts may operate in very different intergovernmental political and fiscal frameworks.

Also, known as *ad hoc governments* because they are created to fill in the cracks of the existing government, special districts can overcome jurisdictional, legal, and financial inadequacies of existing governments. For example, proximity to a watershed or river basin may better suggest the area of service than political boundary lines necessitating a new service provider. Or existing city and county areas may be too small for effective management of certain functions. For all their benefits, special districts have occasionally been created to evade constitutional tax and debt limits on local governments. They also reduce the discretionary authority of local governments, fragment service provision, and may produce coordination problems. Special districts also raise the issue of local government accountability as the districts are governed by appointees, only a few of whom may be local elected officials.

Organization of the Study

This study is divided into five chapters. This present chapter provided discussion that included the introduction, background of the problem, purpose of the study, theory analysis, research questions and hypotheses, significance of the problem, and definitions of terms. In this introductory chapter, the general setting of the study was established.

Chapter 2 offers a review of related literature and is divided into sections that include in depth analysis of the two competing theories (institutional reform theory and public choice theory). This chapter also contains a historical discussion of special district in California. The aim is to provide a detailed review of the literature to lay the foundation for the basis of the study.

Chapter 3 offers a discussion the research methodology including research design, methodology, population and sample, measurement, validity, reliability, data collection

and analysis, and statistical analysis theory. This chapter provides a framework of how this study is designed.

Chapter 4 presents the findings of the study and tests the hypotheses. It reports and briefly discusses the findings of the analysis.

The final chapter summarizes the findings and develops conclusions and recommendation for further study.

CHAPTER 2: REVIEW OF THE LITERATURE

Historical Background

Most literature on the topic of political economy revolves around the standard unit of government as a general-purpose unit that provides a variety of services as shown by counties, cities, or towns. While it is understandable for people to think of governments as the general-purpose variety, special districts are as numerous as general-purpose governments in the United States. According to the U.S. Census Bureau, there were 38,266 special district governments in 2012 compared to 38,910 general-purpose governments (U.S. Census Bureau, 2013). Until the early 1900s, these governments created little or no conceptual or practical problems. The Depression era of the 1930s and the postwar boom of the 1950s stimulated the growth of special districts.

It was at this time that scholars began to be concerned about potential problems associated with the use of special districts. In 1957, John C. Bollens published his book *Special District Governments in the United States*, which is considered the first extensive review of the subject. By the mid-1960s, the U.S. government began to study the question of fragmentation of local public services and resultant inefficiencies of service delivery created by the proliferation of special districts (ACIR, 1964).

Because of the relative obscurity of special districts some have questioned whether it might be time to reform the special district form of local government in favor of regionalized, or consolidated service agencies. Is it time to reform special districts, or are they performing in an efficient, accountable, and transparent way?

The rapid rise of special districts in the 20th century began with the Progressive era impulse for structural reform. Appearing in scattered locations at the end of the 19th

century, they were part of a much larger reorganization, a pervasive bureaucratization that changed the structure of private enterprise, social and political organization, as well as the form and function of the local state. While public corporations date back to the beginnings of the American Republic, they were neither widespread nor enduring until Progressives embraced them as a means of reforming local government (Burns, 1994). Special districts took on a variety of public works projects and services early on; later they were adapted to function as *de facto* regional government dominating public enterprise, coordinating services, and regulating and planning in the absence of metropolitan government. As special districts became a fundamental and increasingly significant element of government over the course of the 20th century, they in turn shaped local politics and policy, even the functional imperatives of government. This chapter traces the rise of special districts and perceptions of them, from historical interpretations of their origins, to the midcentury initiatives to define them and quantify their rapid growth, to analysts' and policymakers' attempts to grapple with their consequences. Understanding the water districts as special districts requires approaching them as representatives of a much larger phenomenon.

The rise of special districts is a dramatic, momentous, and largely untold story; there are no comprehensive histories of this important governmental form in the United States. Typically, historians attribute their creation to structural constraints on cities and the imperatives of growth and technological change. They emphasize the usefulness of special districts as tools; the creation of independent agencies whose obligations would not be counted against constitutional debt limits was a strategy for addressing urgent problems and undertaking expensive new projects, an easy though somewhat piecemeal

way of increasing the capacity of local government (Burns, 1994). In metropolitan areas, they could also maintain the delicate balance of power between those defending a suburban independence while fulfilling the traditional functions of city governments (Teaford, 1997). They provided regional services and undertook large-scale projects without threatening the political and fiscal independence of suburbs from cities.

Scholars generally recognize the functional advantages of special districts, which help existing governments address problems that transcend their capacities. Their ideological foundations are more controversial. They are often portrayed as straightforward solutions to urban problems without any conscious political philosophy behind their creation (Walsh, 1978).

Similarly, Elkind (1997) contended that special districts appeared around the country primarily as a response to local crises, drawing upon political theory that interprets all state reorganization as an extraordinary outcome of emergency. She also stressed the implications of their creation for democratic processes in these areas, stressing the shift of control to elites that they represented. Her comparative study of water districts in Boston, Massachusetts and Oakland, California, *Bay Cities and Water Politics,* accounts for the creation of regional special districts in Boston in the 1890s and 2 decades later in California (Elkind, 1998). Elkind (1998) argued that they were both established as problems involving the use of natural resources in urban areas reached critical proportions, and private solutions could no longer meet the needs of urban residents.

Radford (2002) stressed the popular commitment to municipal ownership around the turn of the 20th century, describing special districts as a major product of this

movement and a significant but often unrecognized form of public enterprise. She identified widespread grassroots support for these quasi-governmental agencies around the turn of the 20th century, expressed in a variety of public referenda. She explained, "Direct public involvement in the economy often had wide support, but was impossible given legal barriers" (p. 67). Public authorities, as she calls them, were an "alternative method . . . for getting at least some of the desired results" of actual municipal ownership (Radford, 2002, p. 67). Special districts represented the path of least resistance to reaching the basic goal of public ownership—it was much easier to create a new government agency than to expand the functions and capacities of existing governments (Radford, 2002).

Adding the ideological dimension to discussion of special districts is more than an exercise in historical exposition; the question of the relationship between state structure and ideology goes to the core of understanding progressivism and its legacy. Special districts were just one expression of a broad and multifaceted movement that swept the nation starting in the late 19th century. Under the title of progressivism, historians have addressed a multitude of interrelated impulses and trends; they are so varied that generalizing about the period is extremely difficult or, some argue, impossible (Filene, 1970). If there is one point of consensus, it is that the United States underwent a wholesale transformation: turn of the 20th century reform reflected and contributed to a profound transformation of the American economy, state, and society.

McCormick (1981) observed that reformers were not the visionaries that they fancied themselves to be "progressive reform was not characterized by remarkable rationality or foresight . . . often the results the Progressives achieved were unexpected

and ironical; and, along the way, crucial roles were sometimes played by men and ideas that, in the end, met defeat" (p. 249). Special districts are a prime example of unintended consequences. At the same time that they were removing public works and utilities from the control of private corporations, progressive reformers were recreating those corporations in the public sphere. Progressive era reformers supported special districts based on the idea that government enterprises should have the design and administration of a successful private enterprise, believing that business practices could be successfully adapted for public purposes. At the turn of the 20th century, those purposes included municipal ownership and an increased involvement of the local state in the promotion of economic growth and development.

An organization or an institution can quickly transcend its original purpose regardless of whether the intentions of its creators were cynical or sincere. Special districts were originally designed to reform and strengthen government by progressive reformers and at the same time appeal to business interests recognizing the potential for profit from public enterprise. That does not mean that their founders did not honestly believe in the idea that the interests of the public would be served by these agencies or that reformers were misled by their business allies. These two groups both supported special districts, but it was not necessarily a problematic partnership; both groups held similar values, and progressive ideology sanctioned state support for private enterprises in the name of general prosperity and economic growth (E. W. Hawley, 1974). But special districts, conceived of as tools, quickly evolved into independent agents in the decision-making process. Once incorporated, special districts could use their resources to promote organizational interests independent of the intentions of their original creators

and backers. The circumstances of their creation were important to determining the characteristics of these institutions, but their consequences could not necessarily be foreseen. Special districts emerged from a Pandora's box of progressive ideology; once they were released, their usefulness and pragmatic advantages remained compelling even after intellectual support for them disappeared. It seemed that nothing could effectively rein them in or stop their proliferation.

This study will advance the discussion of the proper role of special districts in local government. By analyzing the merits of two opposing perspectives, institutional reform and public choice through the dimensions of service efficiency/effectiveness, and accountability this study will add to the body of knowledge and possibly narrow the gap between the two viewpoints.

Special Districts

Special districts have been a part of the American governmental structure for a long time. The toll roads and canal corporations of the 1800s are examples of the early use of special districts, which were established to perform functions that government felt obliged to undertake (Smith, 1974). Special districts that provide benefits to limited groups of property owners for maintaining local roads or providing protection against the ravages of fire or flood also have a long history (ACIR, 1964).

In the late 19th century, special districts began appearing in significant numbers in rural areas; drainage, levee, and irrigation districts first appeared in areas with limited general-purpose government, primarily aimed at promoting rural development and agriculture. These agencies were inextricably linked with local land values and boosterism, reflecting the conception of the role of local government as primarily serving

the interests of growth and prosperity. They were public corporations that functioned as governments in only the most limited sense, created in the pursuit of common economic goals, to control the natural environment to allow for its profitable exploitation. These agencies were devoted to the management of natural resources. Drainage was the most common early special district, appearing in the greatest numbers in the South and Midwest starting in the 1870s and taking on local flood control, land reclamation projects, and sometimes water provision. Their functional opposite, irrigation districts, enabled traditional agriculture in relatively arid regions across the West; in California, the first general legislation enabling the formation of irrigation districts was the Wright Act, passed in 1887 (Hundley, 2001).

The history of special districts in California dates back to the earliest days of the state. At that time, the state's first legislature, in order to simplify its task of establishing laws for the state, adopted English common law as the basis for California's legal system. The legislature was not aware that English common law included the doctrine of water law known as riparian rights (Rawls & Bean, 2012). Riparian rights are water use rights that extend to landowners whose land physically touches a river, stream, pond, or lake. Riparian rights allow the landowner the right to use the water for beneficial use, but the water must be returned to the stream from which it came. The law forbids transfers of riparian rights for use on nonriparian lands. The competing water right that was used by gold miners prior to statehood is the appropriative water right. Unlike riparian rights, appropriative rights do not follow land that physically touches the water stream. The appropriative right doctrine is "first in time, first in right" and developed in the western United States in response to the scarcity of water. The rules of appropriation were

simple—the first user to divert water for beneficial use had a senior right to the water for as long as the use continued.

Given the conflicting interests of the advocates of each legal doctrine led them to fight each other to a political standstill (Rawls & Bean, 2012). The legal battle that ensued, *Lux v. Haggin* (1886), ultimately resulted in a California Supreme Court ruling in favor of the riparian rights system. As a result, the state legislature enacted the Wright Irrigation Act of 1887. The act authorized the establishment of irrigation districts. These districts were to have the power of eminent domain, the power to overcome riparian rights by condemnation, and the right to sell bonds to finance the purchase of water rights and construction of dams, canals, and other irrigation works (Rawls & Bean, 2012). Ultimately, this act became the legal basis for other special districts that now deliver a wide range of services used by millions of Californians.

As special districts became more common in rural areas, the institutional form was also adopted in urban and suburban regions. Among the earliest metropolitan special districts were water districts; Massachusetts formed the Metropolitan Water Board in 1895 (Elkind, 1997). Sanitation districts were also common around the turn of the 20th century. In Illinois, consistently a leader in special district government, the Chicago Sanitary District was created in 1889 to serve both the city and surrounding communities (Bollens, 1957). The Boston-area Board of Metropolitan Sewer Commissioners was formed the same year to oversee the extension of services to poorer areas and in 1901 merged with the Water Board (Griffith, 1974). The Passaic Valley Sewage District, serving 100 square miles of New Jersey, was incorporated in 1902. Many large ports were taken over by special districts including the Port of New Orleans in 1890. The Port

of Portland was incorporated in 1891; the Port of Seattle Commission was formed in 1913; and the Port of Tacoma incorporated in 1918. Early park districts in Chicago constructed miles of parkways in the 1890s, and similar agencies were formed in other urban areas to establish and administer regional parks (McShane, 1994).

In 1911, a crucial piece of legislation in the history of California government was signed into law: The Municipal Water District Act (Bollens, 1957). The legislation was drafted and introduced into the state legislature by Assemblyman George Harlan specifically to enable the cities of Marin County, just to the north of San Francisco, to pool their resources to construct dams and develop new water sources. Harlan's inspiration was the Boston area Metropolitan Water and Sewer District, revealing national cross-currents in the development of the special district as an institutional form. Soon after, other water districts came into being, but the significance of the legislation did not end there. It provided the model for the Municipal Utilities Act of 1921, which led to the formation of the first major regional special district, the East Bay Municipal Utilities District (East Bay MUD) in 1923, which spanned two counties. This agency constructed a major aqueduct in 1929 to bring the water of the Mokelumne River, 100 miles to the east in the Sierras, to the Bay Area and expanded its responsibilities to include sewage treatment in 1944 (Bollens, 1957).

By the 1910s, it was clear to observers that special districts were already an important element of local government in the United States, but because of their tremendous variety and relative newness, they were difficult to quantify. The task of defining special districts and making meaningful distinctions among them also posed a significant challenge. Early efforts to collect information on their operations and to

distinguish them from other types of governmental organizations were extremely inconsistent. The early data accumulated by the U.S. Census Bureau on the number and type of governmental units were just a shadow of the changes going on in local and regional governmental structure. Nevertheless, the numbers that are available, starting with the 1913 report on *Wealth, Debt and Taxation,* provide a sense of the emergence of special districts (U.S. Census Bureau, 1915). Although there was no common standard for independent governmental agencies, 25 states reported other "civil divisions having the authority to incur debt" (p. 389), and the census included a general account of their various functions. Based on the descriptions provided in the state reports, it is safe to say that most of the "other civil divisions" reported were special districts, both in name and in function. The census recorded similar state-by-state accounts for 1932, with 40 states reporting special districts with debt and/or revenues.

While the early data collected by the U.S. Census Bureau cannot be taken as anything more than a sketch of the proliferation of special districts in the early decades of the 20th century, observers noted the general trend that they suggest. The *American Political Science Review (APSR)* published periodical reports on the status of what it termed "special municipal corporations," including drainage, irrigation, road, and water districts, starting in 1914 (Kettleborough, 1914). By 1918, it was clear to the *APSR* legislative observer that, despite the "haze and maze" of their legal particulars, "all these districts for special purposes are one in essential nature" (Guild, 1918, p. 679). The 1918 report noted that the power of these agencies was steadily increasing with expanded jurisdiction (e.g., irrigation districts developing and selling electricity) and increasingly, direct contract with the federal government bypassing local authorities (Guild, 1918).

While there was no effort to make a systematic, nationwide count of special districts until the 1930s, by 1913 many states were reporting various "civil divisions" with debt or revenues distinct from counties or incorporated places (U.S. Census Bureau, 1914). In the U.S. Census Bureau report of 1915, eight states reported over a million dollars in special district debt in 1913, including Illinois ($5.3 million), Missouri ($4.1 million), Arkansas ($2.4 million), and California ($1.6 million). By 1922, the numbers reported had risen dramatically, with 16 states reporting over a million dollars in special district debt, and some much more: California reported $102 million, Arkansas $77 million, and Illinois $58 million (U.S. Census Bureau, 1924). Illinois and California, with important, rapidly growing metropolitan regions and strong progressive movements, have consistently been among the leading states in terms of special district numbers and outstanding debt. Early on, special districts were concentrated in the western and southern states, but by 1942 they were reported by all the states and the District of Columbia (U.S. Census Bureau, 1944).

The special district developed into a much more expansive institution after World War I. State governments began to approve these entities at the local level, creating large-scale special districts with multiple purposes and adding new powers and responsibilities to existing agencies (Elkind, 1997). A variety of special districts transcending municipal and county boundaries appeared around the country; regional agencies undertook major projects (such as the Golden Gate Bridge or the Colorado River Aqueduct), and multipurpose agencies appeared in a number of metropolitan areas. The Port Authority of New York and New Jersey was established in 1921 (Elkind, 1997). The Metropolitan Water District of Southern California was formed to build an aqueduct

to bring Colorado River water to the Los Angeles metropolitan area in 1928. Metropolitan special districts extended basic services outside of city limits in smaller urban areas, including Cleveland, Ohio; Indianapolis, Indiana; and Washington, DC (Studenski, 1930). The potential of the special district as a public policy tool was slowly being realized as the power and autonomy of individual agencies grew steadily.

In 1932, for the first time, the census included statistics on the revenues, costs, debt, and tax levies, all quantified by type of government with "other civil divisions" counted separately from states, counties, municipalities, school districts, and townships. The 1932 census did not offer a clear definition of what constituted a "civil division" or a governmental unit other than "the power to levy taxes or incur debt" (U S. Census Bureau, 1935, p. 158). The national totals were based on the unsystematic reports of individual states, which varied in their standards for and definitions of independent local governmental units (U.S. Census Bureau, 1935). In 1934, Anderson published a pioneering survey of governmental units in an effort to address some of the shortcomings of the 1932 census, describing it as "meager, unsystematic, and marred by numerous errors" (p. 1). Anderson observed that the basic information was simply not available:

> In no state has the legislature provided for an adequate, permanent, and continuous registration of information about the organization of local government. . . . Neither has the national government imposed the duty of collecting this information on any of its agencies. (p. 1)

Despite the lack of precise figures, it is clear that there was a rapid increase in the number of special districts during the first 3 decades of the 20th century.

The term “special districts” was introduced in 1942 as the U.S. Census Bureau made its first attempt at establishing reporting standards for states. That year, the count of special districts was considerably lower than the total for other civil divisions reported in 1932. New requirements for the independence of governmental units eliminated many districts that were counted previously, legally distinct entities but functionally an arm of other local governments. In addition, road districts were eliminated as the state and federal governments took on their responsibilities though special districts in nearly all other categories increased in number (Anderson, 1949). It was the only recorded decrease in the 20th century.

Franklin D. Roosevelt’s New Deal embraced the public corporation as a means for economic stimulation at the regional level, acting upon this with the creation of the Tennessee Valley Authority, which he famously praised as “clothed with the power of government but possessed of the flexibility and initiative of private enterprise” (Smith, 1964, p. 88). Federal public corporations had a feedback effect on local policy. Roosevelt encouraged the creation of more special districts around the country, issuing a letter to U.S. governors urging them to promote the creation of new public corporations at the local and metropolitan level in 1934.

Although the advent of World War II generally delayed the creation of new agencies, many states adopted enabling legislation to facilitate special districts on the recommendation of the Roosevelt administration and the Council of State Governments (Council of State Governments, 1953). After 1945, the groundwork for metropolitan special districts was in place and their numbers exploded. They were stimulated by rapid population growth and the physical expansion of metropolitan areas during the post-

World War II era, which lead to increased demand for services and exacerbated problems such as pollution, sprawl, and traffic congestion.

Revenue bonds became the predominant means of funding public enterprise; special districts were usually no longer endowed with the authority to assess taxes, nor were their bonds secured by local governments (Smith, 1964). This shift distinguished the "authority" as a loose subcategory of the special district form. This was especially the case for discrete large-scale projects such as bridges, mass transit systems, water and sewer systems, and dams, all of which required a very large initial investment. Instead of tax assessments, never popular politically, bonds could be issued and redeemed over a period of years with the agencies' own revenues. The financing of special districts through user fees was justified by long-held moral attitudes regarding taxation, the belief that the beneficiaries should pay for services and opposition to any redistributive fiscal policies. Its predecessor, the special assessment district, taxed property owners in urban and suburban neighborhoods for local improvements (such as the installation of water mains, sewers or the construction of streets and sidewalks) based on the expected increase in value of property (Einhorn, 1991).

Revenue bond financing became one of the distinctive characteristics of metropolitan area districts (Radford, 2002). While more of a risk for investors and therefore more expensive for the issuer, this financing allowed for even greater independence from political considerations. Typically, the redemption period for special district bond issues in the 1950s and 1960s was 40 years, and often, the agency was slated for dissolution with their redemption (Smith, 1964). The Port Authority of New York and New Jersey became an important institutional model as it increased its scale and

power in the 1940s and 1950s, reflected in the names of new public corporations. It managed to expand its operations without outside subsidies, relying on the revenues of its existing facilities, primarily toll roads and bridges, to finance new projects and enlarge its jurisdiction. Its example raised expectations for financial autonomy in new special districts, particularly those involving metropolitan transportation, and increased reliance on revenue bonds. While most special districts have always been single-purpose districts, the majority of the few multiple-purpose special districts in the United States are in metropolitan areas, intended as limited, functional stand-ins for comprehensive metropolitan government (Smith, 1964).

The rapid growth in special districts reflects their compelling practical advantages as well as their lasting ideological appeal. Metropolitan areas were facing a variety of critical problems caused by the rapid growth following World War II. Special districts were already a well-established institutional form for local government with successful precedents in metropolitan areas. The formation of a special district quickly relieved pressure on local officials to address regional problems or to undertake large-scale projects. If their purpose and scope were sufficiently restricted, they did not impinge on the jurisdiction or autonomy of existing governmental entities.

Despite having a myriad of missions, all special districts share the same basic structure: board-run, special-purpose local government units that are administratively and fiscally independent from general-purpose governments (Galvan, 2007). Special districts are organizations by the people, for the people.

At the outset of the discussion of public administration theory, any acceptance today of a politics-administration dichotomy as espoused by Wilson in 1887 or Goodnow

in 1900 must be discounted. A premise of this study is that no politics and administration dichotomy exists today; the two concepts are constantly blurred and will continue to be. Waldo (1987) found that the dichotomy was rejected by political scientists after World War II. This rejection of a politics-administration dichotomy has been reflected in the scholarly literature (Golembiewski, 1977; Harmon & Mayer, 1986; Henry, 1987; Ostrom & Ostrom, 1971; Ott, Hyde, & Shafritz, 1991; Van Riper; 1984; Waldo, 1984; Walker, 1989). Rejection of the politics-administration dichotomy allows for analysis and acceptance of other theoretical perspectives in assessment of public policy. Individuals or groups involved in and/or influencing public policy choices are assumed to be elected officials as well as bureaucrats and the interested public. The discussion that follows presents the two bodies of theory—institutional reform and public choice—and focuses on their respective views of governance and responsibility. The theoretical perspectives are discussed, contributions and limitations are identified, and constructs relative to special district governments are presented.

Public Versus Private Water Providers

Private involvement in water supply has a long history. In some places, including the United States, private ownership and provision of water was the custom historically. In the latter half of the 19th century, private water systems began to be municipalized because private operators were not equitably providing access and service to all citizens or making necessary infrastructure investments (Wolff & Palaniappan, 2004). There is much debate between public versus private water service, which is beyond the scope of this study; still, there should be some discussion regarding each type and the role they play. Public water systems are usually nonprofit entities managed by local or state

governments. Cooperative or mutual water companies are private, nonprofit organizations run like cooperatives by the landowners served by the water company. Private water systems, or investor-owned utilities, sell water for a profit and are accountable to investors or shareholders as well as their customers (Kopaskie, 2016).

Public water districts can either be dependent or independent as defined in the definition of terms, but generally the term refers to whether the governing body is directly controlled by either a city or county or whether the governing board is directly elected by the voters ("Water Special Districts," 2002). The governing boards of mutual water companies are usually based on the amount of land owned or the assessed value of the land owned. In California, private water companies are regulated by the California Public Utilities Commission (CPUC) but are typically managed by a board of directors, which is responsible to its shareholders.

Unlike private water companies, which seek to make a profit, mutual water companies seek to keep water local. The delivery of water services to places like present-day Los Angeles began in the 1800s with a mutual water company whose shareholders constructed irrigation channels and installed pumps as well as the basic plumbing that distributes the water to its shareholder-owned properties (California Association of Mutua Water Companies, 2019). Today, California's mutual water companies provide water service in rural areas that have no alternative supplies and in urban pockets where property owners continue to hold mutual water company shares and liability for the integrity of the water system. Mutual water companies are regulated by California's Water Code and Health and Safety Code and must abide by open meeting and records disclosure laws similar to many public water utilities.

The CPUC is responsible for ensuring that California's private water utilities deliver clean, safe, and reliable water to their customers at reasonable rates. Water Division of the CPUC regulates over 100 investor-owned water utilities providing water service to about 16% of California's residents. Approximately 95% of that total is served by nine large water utilities, each serving more than 10,000 connections. Annual water and wastewater revenues under the CPUC's regulation total $1.4 billion (CPUC, 2019).

Institutional Reform Theory

Theoretical basis for institutional reform can trace its beginning to the Progressive era of the 1890s-1920s, in which the dominant view of metropolitan political economies was held by proponents of institutional reform (Foster, 1997). Reformers normalize the metropolitan political organization while minimizing explanatory reasoning in favor of arguments about how institutions ought to be organized to increase efficiency and accountability goals. It is suggested that externalities create inefficiencies and duplication within a specific region (Gargan, 1997).

Reformers' conviction against special districts is based on the belief that a single metropolitan, multipurpose government provides the optimal governmental arrangement for cost-effective service delivery (Foster, 1997). Therefore, special districts fail the reformers' standard on two fronts. First, they fragment the metropolis geopolitically adding to the burdens of fragmentation, and second, they fragment the metropolis functionally increasing service delivery problems and inefficiencies.

Proponents of public enterprise supported special districts early on, but as they gained popularity among lawmakers as a tool for addressing specific problems on a case-by-case basis, analysts began to stress the need for some sort of regulation or

coordination. The National Municipal League sponsored some of the earliest critical studies; alarm about the growing numbers of special districts in metropolitan areas was sounded in the very first issue of the organization's *National Municipal Review* in 1912 (Stephens & Wikstrom, 2000). In 1918, Guild expressed concern in the *American Political Science Review* about the haphazard fashion in which these agencies were being created:

> It would seem pertinent to inquire to what extent such creation of a special municipal corporation for each urgent improvement can be continued. . . . From a legal and constitutional standpoint there has yet been no limit to the number of such corporations that may be created over any given area nor to the public purposes for which they may be established. The question is largely one of legislative discretion and good sense. Unfortunately, in the past special municipal corporations have developed through patchwork legislation in which there was no conscious attempt to understand the nature of the district nor to foresee the possibilities in its development. (p. 681)

By 1925, critics were willing to go further: Thomas H. Reed, professor of Political Science at the University of California Berkeley and the first city manager of San Jose, advocated the wholesale dissolution of special districts in the name of governmental integration. In part as a reaction against special districts, a "regionalist," or institutional reform movement started to take shape, dedicated to reversing the trend toward metropolitan area governmental fragmentation (Foster, 1997).

Paul Studenski, commissioned by the National Municipal League to undertake one of the first systematic studies of metropolitan governance, was one of the most

influential early proponents of comprehensive regional government. In 1930, Studenski issued a critique of the political fragmentation of metropolitan areas that would echo across generations, asserting that it resulted in uneven standards of public services, "sectional treatment of problems that are essentially metropolitan, [and] in radical inequities in the tax resources of the several political divisions" (Studenski, 1930, p. 290). Studenski called for reform measures, including the empowerment of counties, local government consolidation and annexation, and the regional federations. He also suggested that special districts could continue to be a temporary solution to regional problems but qualified this carefully: "Special metropolitan authorities have distinct limitations. They are essentially a makeshift. They do not offer a conclusive answer to the problem of integration of government of metropolitan areas" (Studenski, 1930p. 388). Studenski pointed out that special districts were generally created without much consideration of the overall interests of a given area and were not subject to significant public discussion or scrutiny:

> In almost every instance the creation of a special metropolitan authority has come about as the result of some specific problem of the metropolitan area which had become especially acute and which had attracted the attention of the civic leaders and legislators. Such *ad hoc* districts have quite generally sprung from consideration of a particular metropolitan problem. (p. 277)

He also noted the advantages of such agencies for existing local governments:

> The authorities of the central city may not have enthusiastically welcomed a new authority over them, but they have usually been quick to realize the advantages of an arrangement which did not embarrass their taxing and borrowing powers. The

> governing bodies of the minor municipalities on the other hand have no particular reason to oppose the creation of an authority which was not intended to abrogate their independence, but which on the contrary would strengthen it by taking care of problems which might otherwise led to annexation. (p. 278)

Ironically, it was the very qualities that made the special district attractive to local politicians and legislators that provoked a chorus of condemnation from experts and intellectuals (Studenski, 1930).

Despite escalating criticism of special districts, the ideals of scientific administration, efficiency and rationality, and business-like government that were the ideological legacy of Progressivism remained compelling. Plus, their advantages as a tool for public administration were impossible to ignore; they were easy to establish, flexible, and could provide a quick fix to a variety of problems. Their business structure, hierarchical organization, and freedom from the uncertainties of legislation or the cumbersome bureaucracies of general-purpose government enhanced their appeal. In the short term, they were unrivaled as a tool for dealing with a crisis. By the late 1940s, the nationwide explosion of special districts was clearly apparent, particularly in metropolitan areas.

Regionalism came into vogue among urban policy analysts and intellectuals who condemned the fragmentation of metropolitan area governments. Prominent scholars and policy analysts called for metropolitan political unification by a variety of means: annexation, city-county consolidation and empowerment of urban counties, and the establishment of new government corporations authorized to undertake multiple functions and regional planning. The regional special district was the easiest and most

obvious of these strategies from the perspective of local policymakers, and they were much more likely to win voter approval than more extreme reform measures. Regional special districts provided the means for developing transportation infrastructure, controlling pollution, and providing utilities to rapidly growing incorporated and unincorporated areas, taking on problems that were often outside of the capability or desire of individual counties and municipalities to address (Bollens, 1957). New regional agencies appeared around the country, but few had authority and power enough to approach the task of planning and governmental coordination at the metropolitan level. There are exceptions: both the metropolitan areas of Portland, Oregon and Minneapolis-St. Paul, Minnesota successfully established comprehensive regional governments, expanding their jurisdiction and powers in the 1970s. However, these agencies were atypical; Norris (2001) pointed out that together they represent only 0.6% of metropolitan areas in the United States, and they often fell short of expectations. Generally, reform efforts in the 1960s failed, and the regional special districts that were created had to be pared down to make them politically palatable and nonthreatening to existing local entities. The census statistics on special districts in this period clearly represent the multiplicity of new agencies with regional jurisdictions but strictly limited purposes and authority.

Even as their numbers increased almost exponentially, concern about the long-term consequences of these agencies was growing. Following the lead of Studenski and the National Municipal League, a number of prominent scholars took up the cause of regional government to offset ever-increasing governmental fragmentation. Victor Jones pointed out in several influential essays and lectures on metropolitan government that the

more special districts increased in number, the less likely it was that centralized, comprehensive metropolitan government could be established. Bollens published one of the first comprehensive analyses of special districts in 1957, condemning them for being "uneconomic," calling their rapid proliferation a "piecemeal, unintelligent attack on the problems of government . . . hindering the orderly development and sound utilization of the resources of an area" (p. 255). Bollens believed special districts were uneconomical because they do not capture the financial advantages that accrue to larger organizations, such as "widely accepted administrative devices of personnel pooling and central purchasing, maintenance, and repair" (p. 255). He remarked, "The numerous political units that the people must watch over are a tremendous burden to any conscientious voter" (p. 100). Bollens (1957) stated,

> Democracy can function at its best when there are only as many units of government as can be most effectively controlled by popular will. The longer certain units of government continue to exist, the more firmly entrenched become the most interested in seeing their unit continue to operate as an independent body. (p. 100)

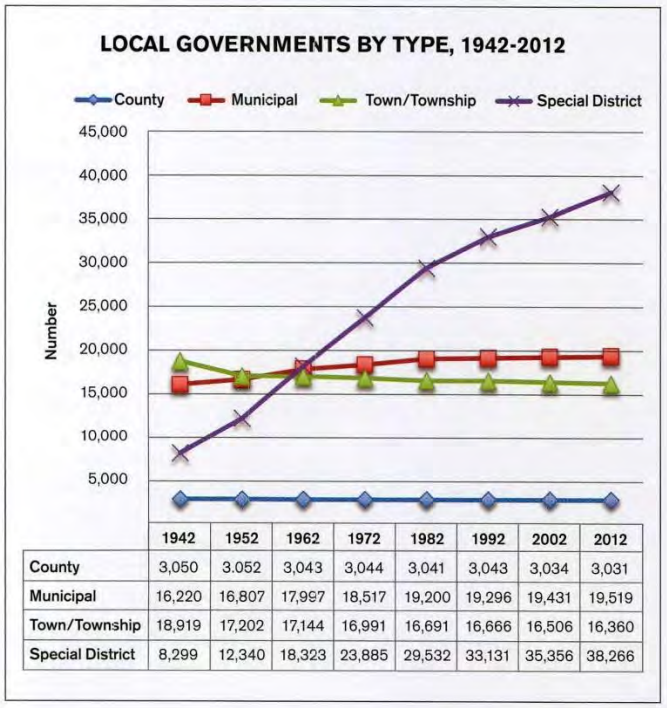
The federal ACIR took on the challenge of finding ways to address the problem of governmental fragmentation in metropolitan areas in 1959. Noting that the "bewildering pattern" of local government had been compounded by the growth of suburbs and the uncontrolled creation of new agencies, the ACIR issued model legislation for regional governmental coordination in 1961, urging states to take action (ACIR, 1961). In 1964 it issued a report on the "Problem of Special Districts," specifically recommending measures to reduce their numbers, restrict their creation, and "insure effective control"

over existing agencies (ACIR, 1964). The ACIR, in 1964, reported that special districts cannot take advantage of economies of scale and, therefore, have higher administrative and overhead costs than general-purpose governments. Luther Gulick (1962), known as the "dean of public administration," also condemned metropolitan area governments for fragmentation. Pock (1962) summed up the scholarly consensus on special districts in metropolitan areas in the 1960s:

> The designation "metropolitan problem" has principally come to serve as a synonym for the proliferation of ineffectual units of local government which, either co-existing side by side or overlapping each other with limited territorial jurisdiction, are pitifully inadequate to the task of rendering urban services or performing regulatory functions that peremptorily demand area-wide jurisdiction and control. (p. 1)

The central irony to all of this criticism was that most of these scholars and experts still supported the creation of new special districts if they were sufficiently large and powerful. Gulick (1962) in particular was an enthusiastic supporter of metropolitan authorities. They recommended the consolidation of existing districts into larger units or the creation of multifunction districts or authorities designed to have the scope and authority to carry out regional planning mandates and coordinate the programs of other governmental agencies (Bollens, 1957). The tragedy was that either the resulting efforts for metropolitan government and planning through comprehensive special districts failed outright, or the proposed agencies were modified and scaled back to such a degree that they ended up contributing to the problem of governmental fragmentation that they were designed to remedy (ACIR, 1973).

Since the early 1900s, special districts have seen an explosion in growth. From 1942 to 2012, nonschool special districts have more than quadrupled from 8,299 to 38,266 (see Figure 1). During that same time, general-purpose governments grew at a much more modest rate. Special districts in metropolitan areas tend to be bigger and more powerful with broader functional and geographic scope than those in rural areas. Multicounty special districts gained numbers starting in the 1920s but exploded after World War II. By 1963, they represented nearly one-half of all special districts in metropolitan areas. In 1962, while less than a third of all special districts were located in metropolitan areas, nearly 57% of multifunction special districts were (U.S. Census Bureau, 1963). By 1972, two thirds of multiple-function special districts were in metropolitan areas (U.S. Census Bureau, 1973). Much more significantly, by the 1960s metropolitan area special districts represented more than two thirds of the debt and revenue of all special districts. Between 1962 and 1972 the revenues of special districts in the United States increased by 166%, from just over $2.5 billion to $6.8 billion, and their collective outstanding debt more than doubled, going from $11.6 to $24.9 billion (U.S. Census Bureau, 1973). Striking as those increases may be, metropolitan area special districts outpaced the rest: their revenues went from $1.8 billion in 1962 to $6.9 billion in 1972, and their outstanding debt went from $8.3 billion in 1962 to $19.5 billion in 1972. These figures also reflect the fact that special districts have gotten a much higher and ever-increasing percentage of their revenues from their own sources (as opposed to taxes or outside appropriations) than other types of government (Bollens, 1957). Their financial self-sufficiency and capacity to take on debt have always been central to their purpose and attractiveness.



	1942	1952	1962	1972	1982	1992	2002	2012
County	3,050	3.052	3,043	3,044	3,041	3,043	3,034	3,031
Municipal	16,220	16,807	17,997	18,517	19,200	19,296	19,431	19,519
Town/Township	18,919	17,202	17,144	16,991	16,691	16,666	16,506	16,360
Special District	8,299	12,340	18,323	23,885	29,532	33,131	35,356	38,266

Figure 1. 70-year government sector growth rate. Adapted from "Hidden Government," by M. E. Wickersham and R. P. Yehl, 2017, *Public Management, 99*(3), 12-15. Copyright 2017 by International City/County Management Association.

This explosive growth in special districts has caused concern by some scholars. In his 1957 book, Bollens noted, "The general lack of information and knowledge about the location and limits of special districts after their establishment makes even their approximate boundaries unknown" (p. 30). He also stated that many new residents "do not discover their special district areas until the tax and service bills arrive . . . in this sense many special districts are phantom governments" (p. 30).

In 1964, a report titled *The Problem of Special Districts in American Government* was published by the ACIR. The findings in the report were critical of special districts because of municipal fragmentation, which the commission believed reduced public visibility and governmental accountability (ACIR, 1964). The report embodied the institutional reform perspective toward special districts.

By the late 1960s, a concerted effort to counter special districts was underway in metropolitan areas around the country. Not only were efforts for comprehensive metropolitan area government backed by prominent scholars, but they also had the support of industry and business, represented at the national level by the Committee for Economic Development, which published a series of reports starting in the late 1960s urging measures to consolidate and strengthen metropolitan level government (Stephens & Wikstrom, 2000). The federal government stepped in as well, adding requirements for regional planning to subsidy programs, starting with housing and transportation. The Intergovernmental Cooperation Act of 1968 encouraged and funded efforts for greater governmental coordination at the regional level; it was followed by the Office of Management and Budget Circular A-95, which provided federal funding for regional planning (Hamilton, 1999). A variety of proposals for city-county consolidation, regional federations, and new, broad based and powerful government corporations resulted. With a few notable exceptions, these efforts failed. Rather than the elimination or coordination of regional agencies, these new entities, often in the form of voluntary Councils of Government (COGs), were composed of existing local governments, which took on the task of planning with little independent authority, generally lacking the power to develop or implement policy and restricted to advisory roles (Hamilton, 1999). By the 1970s, it was widely agreed that the results of 2 decades of efforts for metropolitan political integration or regional government were abysmal. As W. D. Hawley put it in 1976, the institutional reform movement had an "almost unblemished record of failure" (p. 100). In 1973, the ACIR assessed the outcomes of programs for which it was a leading advocate:

> During the 1960s, fragmentation was accelerated by federal areawide grants and planning requirements, by some State governors and legislators being unwilling or unable to grapple with the need for systematic multi-functional planning and development at the State and substate regional levels, and by many county and city officials remaining steadfastly reluctant to change the jurisdictional status quo and reorganize local governments to meet demands for regional services effectively . . . the major byproduct of these policies were a rapid growth in special districts and authorities, the creation of a multitude of limited-purpose multicounty planning and administrative bodies that often operated as separate agency fiefdoms. (p. 11)

In 1971, the Council of State Governments released a report describing what had become a widely recognized reality in metropolitan areas: federal programs requiring regional planning were actually increasing the governmental fragmentation and decentralization that they were designed to counteract:

> Each areawide program, focused on a narrowly defined problem, carries its own set of requirements for designating geographic boundaries and composition of the local board or agency which may administer it. It has become increasingly difficult to use the same boundaries or to call upon local officials in a coordinated attack upon interrelated problems.
>
> This proliferation of programs and requirements has fragmented local leadership and created a maze of overlapping and duplicative efforts. It has spawned a "functional autocracy" of local agencies, boards and constituencies which is self-perpetuating and resistant to external control by local elected

> officials or the electorate. Units of local general government are faced with a highly independent system of multi-jurisdictional special districts. Attempts by local elected officials to tailor a coordinated attack upon interrelated areawide problems have been thwarted by their inability to exercise policy control over these federally initiated areawide boards and agencies. (pp. 3-4)

One of the ironic consequences of the effort for institutional reform area of government in the late 1960s and the early 1970s was the effective reinforcement of the fragmented structure of local government in metropolitan areas. Existing agencies, including both special purpose and traditional governments, consolidated their forces to fight them, which they did through COGs and by supporting measures for new agencies with only nominal planning authority as an alternative to the creation of comprehensive metropolitan area governments. They also had to increase the capacities of local government to address the problems that generated public support for metropolitan area government in the first place, such as pollution, congestion, and the need for services for rapidly growing populations and to meet new federal planning requirements; the rapid increase in the numbers of regional special districts in the period between 1962 and 2012 reflects the solution that was adopted as an alternative to metropolitan government that might infringe upon local autonomy or threaten "home rule" interests.

Institutional reform theorists have argued that special districts are not economical because they do not or cannot capture the financial advantages that larger organizations can (ACIR, 1964). Essentially, their argument was that larger/regional districts result in increased economies of scale which will result in lower costs.

In 1970, a book titled *Special Districts or Special Dynasties? Democracy Denied* was published by the Institute for Local Self Government. The authors' fiercest criticisms focused on the perceived lack of democracy associated with special government: "By far the most serious indictment of special districts is in their patterns of legislator incumbency, failure to provide citizens an opportunity for representation, low visibility and consequent undemocratic nature" (p. 31).

In 1974 Governor Ronald Reagan appointed a commission that was expected to recommend massive consolidations of local governments. Reagan (as cited in Salzman, 1974) said,

> Many citizens wonder whether they are getting their money's worth . . . and whether all these different layers of government are really necessary. The reform and modernization, indeed the streamlining, of local government is, and should be, one of our top priorities. (p. 28)

As an aside, the commission, appointed to reduce the number of special districts, found instead that special districts were quite effective and efficient forms of local government (Salzman, 1974).

Orange County, California Special District Consolidation Effort

In 1996, in Orange County California, a bill was introduced that would have forced the consolidation of the county's 25 independent water and wastewater special districts into one regional special district (Assembly Bill 2109, 1996). Even though the Cortese-Knox Local Government Reorganization Act of 1985 provided the means for consolidating special districts, California Assemblyman Curt Pringle attempted to force the issue through legislative means. Supporters of the bill argued that the established

process to consolidate districts was broken and not conducive to consolidation. The current structure was characterized by inefficiencies and overlapping jurisdictions. The existing governmental streamlining process had produced no substantive action to address perceived problems. For instance, each of the existing 25 water agencies had its own board of directors and operating budgets, and it was unlikely that these administrators would have a strong incentive to see consolidation occur. Creation of a unified water district would result in administrative savings as well as a significant drop in the number of board members.

Further, it came to light during the Orange County bankruptcy (which occurred in 1994) that certain special districts were making speculative investments and raised rates from their customers to recoup their losses. Supporters say there would be more accountability if the districts were consolidated into one agency. Especially "in light of Orange County's bankruptcy, the need for structural reform has increased, spurring efforts to address consolidation through legislation, outside of the Local Agency Formation Commission (LAFCO) process" (Assembly Bill 2109, 1996, p. 3).

California oversight agencies such as County LAFCOs, the Little Hoover Commission, and various Grand Juries continue to generate unsupported (nonreferenced) reports on the issue of increasing special district accountability and efficiency/effectiveness through consolidation and regionalization. These agencies have unilaterally taken the institutional reform point of view without consideration for the public choice perspective.

Public Choice Theory

Public choice theory was developed by economists and political scientists to apply economic principles and techniques to political matters, such as voting behavior, bureaucracies, and resource allocation (Foster, 1997). The main belief is faith in the ability of the competitive market to ensure efficient service delivery and the best value for the citizen-consumers (Tiebout, 1956). Development of the public choice paradigm began in the late 1800s; however, intense study and recognition began after the 1940s (Foster, 1997). Public choice theory evolved primarily through the scholarly works of Buchanan and Tullock (1962), Ostrom and Ostrom (1971), Ostrom, Tiebout, and Warren (1961), Tiebout (1956), and Tiebout and Houston (1962). Modern interest in public choice began with study of nonmarket decision-making. Public choice scholars apply economic or market assumptions about individual behavior to public sector activities in order to explain why governments function as they do (White, 1989).

Public choice scholars such as Charles M. Tiebout challenged conventional wisdom that no free market existed for public goods and that political mechanisms were necessary for achieving efficiency in providing public goods. Tiebout contended that just as multiple private companies competing for customers would result in increased efficiency in providing those private goods, so would multiple public agencies competing for residents foster increasingly efficient provision of public goods (Foster, 1997). His perspective relied on the assumption that citizens were unencumbered with restrictions on mobility and would relocate to jurisdictions whose services more closely matched their needs (Foster, 1997).

In contrast to the institutional reform structure, which is characterized by its centralization and coordinated authority, public choice proponents such as Ostrom and Ostrom (1971) argued that instead of a single integrated hierarchy of authority coordinating all public services, they might anticipate the existence of multiorganizational arrangements in the public sector that tend to take on the characteristics of public service industries composed of many public agencies operating with substantial independence of one another (Ostrom & Ostrom, 1971).

The normative implications for organizations under the public choice paradigm according to Wise (1990) include biases toward (a) small-scale rather than large-scale enterprises in public services provision, (b) performance contracting rather than direct labor, (c) multiple-provider structures of public service provision (preferably involving rivalry among competing providers) rather than single provider structures, (d) user charges (or at least ear-marked taxes) rather than general tax funds as the basis of funding public services other than pure public goods, and (e) private or independent enterprise rather than public bureaucracy as the instrument of service provision.

Public choice theory is deductive as it applies economic or market assumptions to government. Human motivation in public choice is based on economics. Public choice theory challenges the notion that individuals act differently in politics than they do in the marketplace. Public choice theory assumes that all political actors-voters, taxpayers, candidates, legislators, bureaucrats, interest groups, parties, bureaucracies, and governments-seek to maximize their personal benefits in politics as well as in the marketplace (Dye, 1995). With the individual as the focus within public choice, the

concept of methodological individualism assumes that individuals are self-interested, rational, maximizing decision makers (Wise, 1990).

Ostrom and Ostrom (1971) reported three underlying tenets of public choice. The first is the individual as the unit of analysis; the individual is viewed as the decision maker. Second, the conceptualization of public goods is as the type of event associated with the output of public agencies. The third component relates to decision structures.

With individuals as the basic unit of analysis, four basic assumptions about individuals were offered by Ostrom and Ostrom (1971). The first assumption is individual self-interest, and the second assumption is that individuals are rational in that all alternatives are known. The third assumption is that individuals adopt maximizing strategies; and the fourth is that a certain level of information exists that involves certainty, risk, and uncertainty (Ostrom & Ostrom, 1971).

Public choice theory attempts to identify and rectify what are perceived to be problems created by structures in institutional reform. In assessing large metropolitan areas, Ostrom et al. (1961) referred to these areas and corresponding governance structures as "Gargantua," finding that its single dominant center of decision-making is apt to become a victim of the complexity of its own hierarchical or bureaucratic structure. Its complex channels of communication may make its administration unresponsive to many of the more localized public interests in the community. The costs of maintaining control in Gargantua's public service may be so great that its production of public goods becomes grossly inefficient. The problem of Gargantua, then, is to recognize the variety of smaller sets of publics that may exist within its boundaries.

The alternatives proposed by the public choice paradigm are in direct contrast to those of institutional reform. Public choice theory explains government action as rectifying market failure, to provide goods and services that are not provided by the market. Public choice theory assumes that institutions should be designed to satisfy individual preferences expressed as demands (White, 1989). Public choice often views problem solving not as retooling existing governmental structures and/or organizations, but instead creating new ones. Citizens are assumed to be rational and select the best tax service package or the welfare-maximizing mix of costs and benefits; they vote with their feet. Citizens will move to the community with the particular bundle of services they prefer at the most reasonable cost (Tiebout, 1956):

> Just as the consumer may be visualized as walking to a private market place to buy his goods, the prices which are set, we place him in the position of walking to a community where the prices (taxes) of community services are set. Both trips take the consumer to market. (p. 422)

The predominant public choice model in urban economics is the Tiebout model, a model that argues that cities are providers of bundles of services and that citizens choose to live in cities that provide their preferred service bundles; the more cities, the more efficient is the system of service provision because it provides less distortion of individuals' service bundle preferences. Tiebout theorists have extended this model from cities to special districts (Burns, 1994).

One of the significant tenets of public choice theory is the separation of provision and production of public goods and services. Although institutional reform acknowledges and participates in separation of provision and production, it is with

reluctance or with an attempt to maintain some type of centralized control. Public choice, however, promotes the separation of provision and production of goods and services finding that this separation opens up the greatest possibility of redefining economic functions in a public service economy (Ostrom et al., 1961). This separation allows small, specialized governments to tap into cost saving from large-scale purchases through contracting or joint-sourcing.

Key contributions of public choice theory relative to structural choice according to White (1989) are grouped into four categories. First, public choice stresses the importance of making institutional choice, which in turn effect public administration and public policy. Second, public choice proposes a coherent theory for making such choices. Institutions should be designed to fit the characteristics of a policy and the difficulties that individuals have in registering their preferences; one way to improve this fit is to diffuse responsibilities so that units can respond more flexibly. Third, rules that diffuse authority can unleash energies, responsiveness, and innovation among the different units. Fourth and finally, in designing institutional alternatives, it is important to look for occasions when people come together on a voluntary, cooperative basis.

The underlying thesis of public choice is application of economic reasoning to problems of political organization. One aspect of these economic considerations according to Ostrom (1977) is to establish institutional arrangements that are appropriately related to specific goods and services, basically, that some goods and services may be provided/produced by the traditional governmental arrangements, whereas others may be delivered through market forces.

Scaff and Ingram (1987) reported that public choice can be understood as an institutionalized research program incorporating some key shared assumptions concerning theory, method, substance, and applications—all of which permit an ideal characterization typical of the approach. Furthermore, the basic contributions of the paradigm provide alternatives to the study of public administration and public policy. Public choice is viewed as formal and self-evident, constructed deductively and tested inductively. Scaff and Ingram also found that public choice theory can contribute to a more precise understanding of politics, but it must be applied selectively and more attention is also required to political contexts and to alternative modes of analysis (Scaff & Ingram, 1987).

Some scholars view public choice as an attempt to rationalize government and to develop policies through the assessment of the demands of rational, maximizing individuals. Mitchell (1983) stated that modern public choice views representative government not as a separate, responsive entity capable of acting in the public interest; rather, government is treated as a political activity carried on by rational, self-interested individuals. Public policies are the product of many individuals with different values, preferences, beliefs, and knowledge. Some are office holders and employees of the state, but most are simply citizens with extraordinarily limited roles in collective decision processes.

Although the public choice perspective promotes market methods, the theory demands expansion of considerations in service provision. Within public choice three conditions were identified by Ostrom et al. (1961) for public rather than private provision of goods. The three conditions for public service provision include (a) public goods

arising from efforts to control indirect consequences, externalities, or spillover effects; (b) public goods provided because some goods and services cannot be packaged; and (c) public goods consisting of the maintenance of preferred states of community affairs. Furthermore, the criteria suggested for the design of these public goods include control, efficiency, political representation, and self-determination (Ostrom et al., 1961).

Public choice has enhanced public administration literature through its market-oriented, demand-based, individual-maximizing tenets. Public choice has proven to offer alternative explanations of individual and government action. Public choice, as any competing theory, however, has various limitations as presented below.

Public choice theory is found to have some severe limitations. Lane (1995), in generalizing the limitations of public choice, states that it is often argued against the public choice approach that it is not unbiased in the sense of scientific neutrality. It scores low on objectivity as it is inherently oriented toward market values. It is critical of the state and welfare spending simply because it favors market allocation and market values for ideologically right-wing reasons (Lane, 1995).

Regarding organization design, Wise (1990) succinctly identified various limitations of the public choice paradigm. Four limitations were noted including the inability for public choice to provide a comprehensive underpinning or inclusive analytic framework for public organization design: Second, the choice mechanism based on the notions of individual self-interested decision makers espouses a democratic theory that is insufficiently complete. Third, the preference of public choice for courts as the conflict resolution forum is incompatible with the principles of checks and balances upon which the American governmental system and its emphasis on representative government is

based. The fourth limitation noted by Wise is that application possibilities are probably greatest at the local level where the assumption of discrete service domain is more likely to be met than at state and national levels.

One of the underlying philosophies of public choice is human choice and decision-making. Individuals are assumed to have to make two sets of calculations according to Ostrom (1977). First, consequences of alternative courses of action must be calculated, and second, alternatives to the courses of action must be known. This tenet of the theory is often harshly criticized by scholars (i.e., DeGregori, 1974; Golembiewski, 1977).

Public choice also relies on the criterion of Pareto optimality in that efficiency is reached when no change would occur without making someone worse off. Although public choice proponents indicate that the human condition can never attain this ideal (Ostrom, 1977), they do attempt to attain something close to Pareto optimum.

Golembiewski (1977) identified consequences of public choice theory that may result in the opposite effects theorized. The unanticipated consequences include (a) decentralized government is not necessarily better, more democratic, more moral; (b) the case for smaller organizations being more efficient and responsive is far from clear; (c) conditions of resource scarcity or resource affluence are critical in conditioning the choice of a shifting balance of government intervention or of centralization/decentralization; and (d) what may be called "cycles of governance" can be distinguished as cycles to which public policy must be sensitive.

The public choice philosophy supports special districts as an alternative to bureaucratic governments. Public choice supports multiple provider arrangements as a

means to further competition and to improve efficiency through market and competitive pressures (Wise, 1990). Public choice also supports the concept of overlapping jurisdictions that are judged not as problematic but beneficial to the community and for individual choice (Ostrom & Ostrom, 1971).

Ostrom et al. (1961) found that the statement that a government is "too large" (or too small) to deal with a problem often overlooks the possibility that the scale of the public and the political community need not coincide with that of the formal boundaries of a public organization (Ostrom et al., 1961). Special districts are of varying sizes, and more importantly to the support of public choice, often do not coincide with the boundaries of other local governments.

The structure of special district governments may not reflect the usual bureaucracy; their operations and resources are often more market like than traditional, general-purpose governments. Generally, the design and overall operating assumptions of special district governments have been assumed to be within the theoretical purview of public choice theory. The division of authority is a key consideration in public choice; special districts are criticized for lack of authority and accountability. Special district governments encompass a variety of governmental functions and utilize a significant number of policy tools to accomplish governmental tasks. Ostrom and Ostrom (1971) stated that one might anticipate the existence of multiorganizational arrangements in the public sector that tend to take on the characteristics of public service industries composed of many public agencies operating with substantial independence of one another, exceedingly characteristic of special district governments (Ostrom & Ostrom, 1971).

The very nature of special districts and the underlying reasons offered in the literature for their growth mesh favorably with public choice theory. Special districts are often designed to meet very limited demands (i.e., water and sewerage needs of a new development). Public choice theory assumes that institutions should be designed to satisfy individual preferences expressed as demands (White, 1989).

Conflict and Contrast: Institutional Reform and Public Choice

The proponents of the two major theories for structure or governance of public services are generally at odds with one another relative to their underlying tenets. Scholarly debate is evident in the exchanges between Ostrom (1977) and Golembiewski (1977), the strong criticism launched against public choice by DeGregori (1974), and the staunch criticism of institutional reform by Olson (1986) and Ostrom and Ostrom (1971), among others. Moderate debate with less passion for one camp or the other is found in the literature of Lane (1995), White (1989), and Wise (1990), works providing an assumed unbiased review of the conflicting theories.

Some of the very reasons for the growth and utilization of special districts presented earlier in this chapter provide for the divisiveness and criticisms of the two theories. Rationales underlying the use of special districts include public demand, market failure, concentrated service provision, financial considerations, debt and tax limitations, developers and other special interests, fiscal considerations, flexibility, risk and visibility. Both theories tend to take advantage of some of the factors; however, the public choice paradigm holds most closely to the suppositions of special districts.

In order to complete an assessment of institutional reform theory and public choice, several of the central tenets of the two paradigms are selected to compare and

contrast. These tenets are the treatment of individuals and collectives, spillovers and externalities, treatment of social issues, centralization and decentralization of functions, few versus many governments, and efficiency.

Public choice focuses on the concept of methodological individualism in that individuals are the basic units of analysis in political theory (Ostrom, 1977). Golembiewski (1977) countered this argument in that it is seriously questioned where the concept is able to explain collective decision-making as a simple summation of the individual decisions made by separate and distinct persons. Scaff and Ingram (1987) found that the two critical problems of public choice relate to the hypothetical reconstitution of rationality in situations of choice and the obscurity of what might be called the sources of motivation for individual choice (Scaff & Ingram, 1987).

Public choice tends to ignore some critical public and societal issues such as race-related problems and consequences in the political system. Baker argued that public choice theory allows, if not encourages, racial, sexual, and other forms of discrimination (Golembiewski, 1977). Furthermore, DeGregori (1974) stated that tenets of public choice theory favor those who already possess economic and political power. Racial issues including racial discrimination limit mobility of persons (Orfield, 1997); one of the premises of public choice is mobility and the ability to choose not only among service packages but also where to live. Thus, assumptions in public choice do not consider such socioeconomic considerations as racial and sexual discrimination. DeGregori (1974) stated that issues of quality of life or social justice are not manageable by the public choice approach. Ostrom (1977) countered the consideration of racial and sexual

discrimination by stating that these and other wide-ranging problems are appropriate to be dealt with by the national legislature and not at the local government level.

Public choice theory attacks one of the central tenets of institutional reform, centralization and the role of bureaucracy. Ostrom and Ostrom (1971) reflecting on the work of Buchanan and Tullock, and Coase, found that a constitutional system based exclusively upon a bureaucratic ordering would be an extremely costly affair. Furthermore, Ostrom and Ostrom stated that a bureaucratic system may be functional only if the following two conditions are met: (a) appropriate decision-making arrangements are available to assure the integrity of substantial unanimity at the level of constitutional choice and (b) methods of collective choice are continuously available to reflect the social preference of members of the community for different public goods and services (Ostrom & Ostrom, 1971). This theorem under public choice seems rather unrealistic. A further conflicting issue is that Ostrom and Ostrom found that in the institutional reform theory of public administration, no limits to the economies of scale in bureaucratic organizations are recognized (Ostrom & Ostrom, 1971). This statement is essentially false in that many scholars in discussion of institutional reform theory and bureaucracy do indeed recognize its limitations and problems (i.e., Denhardt, 1993; Golembiewski, 1977; Kramer, 1987; March & Olsen, 1984; Waldo, 1987).

The general thesis of public choice and the strongest criticisms of institutional reform are summarized by Ostrom in a discussion of many versus few providers and producers. Ostrom (1977) stated that a public service industry composed of a large number of units operating at several different levels might be expected to supply such services as efficiently as or more efficiently than a public service industry composed of a

single dominant agency serving a comparable monopoly area. The scale problem can easily become a monopoly problem (Ostrom, 1977). However, this argument may be countered by the scholarly literature and activity by governments in coordination efforts through intergovernmental activities, regionalism, and cooperative ventures. The monopoly argument is difficult to dismiss; however, the opposite argument is presented by supporters of public administration in that efficiency cannot be attained through many, decentralized, and uncoordinated providers or producers. Additional arguments revolve around the ability to control the many providers, oversight considerations, and questionable legal authority.

A further consideration is the treatment of spillovers and externalities. These unintended consequences may be favorable or detrimental in nature. Olson (1986) stated that most public goods have beneficiaries that are necessarily all within some geographical area or domain. This domain may be either exogenous or endogenous. If the domain in which the good is received is beyond the control of the political and legal system, Olson defined it to be exogenous, but if it is determined by that system and its jurisdictional boundaries, it is endogenous to that system. The underpinnings of public choice with multiple jurisdictions or providers make it more likely that externalities or spillovers will occur. Institutional reform structures are certainly prone to externalities and spillovers; however, coordination of these effects may be simplified with centralized and fewer structures. The key consideration is the negative aspect of externalities. Positive components may produce free-rider problems; however, negative spillovers or externalities may produce measurable detrimental effects to individuals, organizations, and the environment.

Public choice often assumes that choices of government or service structures are efficient and meet economies of scale. Public choice and institutional reform often argue the same point but for different reasons. As an example, Tiebout and Houston (1962) stated that the economies in production (economies of scale) may indicate that governmental units are too small. Opponents of large-scale governments, on the other hand, have argued in terms of the cost of local sovereignty (Tiebout & Houston, 1962). Both paradigms argue size, but it has never been determined as to what is the perfect size, and studies have never agreed on size and economies of scale issues.

Ties to Research Questions/Hypotheses

The purpose of this study was to examine two related types of special districts in California, specifically small and large single-service independent water districts from two opposing theoretical perspectives: institutional reform and public choice. Literature and other survey data were used to analyze these districts along the public administration perspectives of efficiency/effectiveness and accountability. The problem may or may not be the structure of the special districts or in whether or not these districts are accountable, operate effectively and efficiently, or whether meetings are conducted in an open and transparent way. Until these issues are fully researched and evaluated, there will be no resolution or further understanding of the problem.

The primary goal of this study was to consider and evaluate the merits of each of the two theoretical perspectives relating to special districts in California. By using this analysis, it will become clear whether small districts (public choice model) are providing their service in a comparable way to large districts (reform model).

Efficiency and Effectiveness

Public administration is historically grounded in the achievement of efficiency in the work of public departments in pursuit of goals related to provision of public goods and services. Therefore, efficiency holds a prominent place in the study of public administration and the work of government (Manzoor, 2014). This model is rooted in Woodrow Wilson's (1887) famous essay on public administration that called for the study of the field along professional lines.

In 1973, then California Governor Ronald Reagan (as cited in Salzman, 1974) issued the following statement after he formed a task force on local government:

> Today, California has some 5,800 units of government below the state level, including 58 counties, 407 incorporated cities, more than 1,100 school districts, and almost 4,200 special districts . . . the average citizen is not even aware of all these different units of government. The only time he gets a first-hand knowledge of their existence is when he has a complaint about service, or more likely when he receives his property-tax bill [this same sentiment was expressed by John C. Bollens in 1957]. When they are looking at that long list of governmental units which their tax dollars are taken to support, man citizens wonder whether they are getting their money's worth and whether all these different layers of government are really necessary. The reform and modernization, indeed the streamlining, of local government is, and should be, one of our top priorities. (p. 28)

Even though Reagan rejected proposals to create regional governments, his reasons for doing so mirrored the exact claims made by the reform theorists—that the present system has too much overlap and duplication, that the public has no real voice in

local government, and that wholesale changes must be made to make the system economical and efficient (Salzman, 1974).

While the stated reasons for establishing Reagan's task force on local government was to identify inefficiencies, duplications, and waste, the task force ultimately found none of those claims to be true and that all of the literature on the restructuring of local government was based on false assumptions (Salzman, 1974). A few of the specific findings of the task force include: Local government in California is not unplanned, uncoordinated, inefficient, and uneconomical; local agencies reach their peak efficiency when their populations are between 30,000 and 50,000; the claim that special districts are inefficient is wrong, for they are more efficient than other forms of local government; and there are tremendous amounts of cooperation between government agencies (Salzman, 1974).

Accountability

Special districts are primarily accountable to the voters who elect their boards of directors and the customers who use their services. However, although they are not functions of the state, they also provide critical oversight to special district operations. Special districts must submit annual financial reports to the state controller and must follow state laws pertaining to public meetings, bonded department, record keeping, and elections.

Public administration literature discusses the terms *accountability* and *access* in both the administrative and political sense. Administrative accountability refers to the obligation that public officials have for providing information, explanations, and/or justifications to superior authority (internal or external) for the performance in the

execution of their functions (Cendón, 2000). In this sense, one can say that public administration is not an irresponsible activity, but rather it is always a responsible one, for there is always the duty for public officials to give account for their actions and, therefore, to be subject to a judgement or evaluation to a superior authority.

On the other hand, political access literature discusses how open elected officials are to public input and scrutiny. Writing about their observations of municipal governments, Eulau and Prewitt (1973) noted, "Many councils follow an open-door policy and welcome expressions of political interest and policy preference from the various groups in the community . . . some only reluctantly make themselves available" (pp. 335-336). Californians have tried to codify their right to political access via the Ralph M. Brown Open Meeting Act.

Despite the growing prevalence of special districts in the local public sector, there exists little evidence on their responsiveness to public demands. The dominant view has changed little since mid-20th century observers characterized special districts as politically invisible and unaccountable to the general public (Bollens, 1957; Committee for Economic Development, 1966; Jones, 1942). More recent work highlighting the role of real estate developers in district formation (Burns, 1994; Foster, 1997; D. R. Porter Lin, & Peiser, 1987) has reinforced this view by suggesting that special districts are vulnerable to influence by developers and other stakeholders with a concentrated interest in decisions about city services. Critics contend that the low political profile of special districts makes it difficult for the public to monitor district activities, creating a bias in responsiveness that favors private interests that invest in lobbying district officials. Public choice theory offers an alternative perspective, however, predicting that special

districts will demonstrate less bias than general-purpose governments toward resource-rich stakeholders (Bish, 1971; Ostrom, Bish, & Ostrom, 1988). By separating a specific service from other functions of local government, specialized governance is expected to provide greater transparency and reduce the costs of communicating with public officials, heightening responsiveness to the median resident.

Many policy scholars and political theorists have argued that direct citizen participation in government, particularly through public deliberation, is fundamental to establishing a responsive and accountable democracy (Heikkila & Isett, 2007).

Regardless of size or form of government, residents need assurance that their government—all of their government—meets a high standard for transparency and accountability. California continues to raise that standard in state law (Boone et al., 2017). All special districts in California must meet a wide range of public accountability laws. Some of the laws include: open meetings, regular financial audits, ethics training, right to vote on taxes (also known as Proposition 218), and compensation and financial disclosure reports (Boone et al., 2017).

In 1997, the Commission on Local Governance for the 21st Century was established for the purpose of reviewing current statutes and, where appropriate, recommending revisions to the laws that govern city, county, and special district boundary changes. In January 2000, the Commission published its findings. Among its many recommendations was that government service delivery systems should be transparent to the people so that an individual seeking services or assistance can quickly and logically determine the appropriate provider (Commission on Local Governance for the 21st Century, 2000). The Commission also found that the focus of the public policy

debate should be on the adequacy of provision of services to citizens, not on the number of districts.

Summary

The analysis in this chapter implies that the governmental structural architecture involves a dilemma. On one hand, for more than 50 years, some scholars, a few elected officials, vocal individuals, and state oversight agencies have continued to generate reports on the problems with special district governments. On the other hand, public choice advocates' theory relies on the competitive market mechanisms to ensure efficient service delivery. Reformers challenge the current situation of special district governance while public choice supporters favor the status quo. Since special districts in California are the most common form of local government and the theoretical dichotomy between institutional reformers and public choice advocates are evident, this topic seems ripe to explore and evaluate the merits of both.

Chapter 4 provided a cursory discussion with respect to the literature available on the topic reform theory versus public choice and how theories of the two concepts argue in favor or against their optimized organizational structure when considering efficiency/effectiveness and accountability.

CHAPTER 3: METHODOLOGY

Overview

This chapter includes an explanation of the methods and procedures used in a comparative convergent parallel mixed-methods design. Detailed information regarding the research questions, research design, context of the study, participants, instruments, data collection, methods, methods used in data analysis, and an explanation for data interpretation are included.

Introduction

Although special districts are the workhorses of public service delivery and originated in the earliest days of California's statehood (Little Hoover Commission, 2017), special districts are perceived by some as shadow governments, districts that obscure responsibility, making it difficult for citizens to link services to entities that provide them (Wickersham & Yehl, 2017). Reformers want to sweep away all these special districts with bold gestures, to consolidate counties, to abolish popular elections, to set up county managers, or to establish full state control over local government and administration (K. H. Porter, 1994).

For over 25 years, a few California elected officials and vocal individuals have pushed for reform; and state oversight agencies (LAFCOs, Little Hoover Commission, and grand juries) continue to generate unproven reports on the issue of increasing accountability, visibility, and efficiency and effectiveness through forced special district consolidation and mergers. The fact that many of these districts operate independently from cities, counties, and state agencies have led many to challenge whether special districts operate efficiently, are properly overseen, and represent the will of the people.

Purpose Statement

The purpose of this study was to examine two related types of special districts in California, specifically small and large single-service independent water districts from two opposing theoretical perspectives: institutional reform and public choice. Large water districts serve populations equal to or greater than 100,000. Literature and other survey data were used to analyze these districts along the public administration perspectives of efficiency/effectiveness and accountability.

Research Design: Mixed Methods

Traditionally, most social science studies have used one of two generally accepted approaches: quantitative or qualitative. This study utilized a mixed-methods approach. In a mixed-methods study, the researcher employs strategies of inquiry that involve collecting quantitative and qualitative data (Creswell, 2014). Quantitative research is often defined by values and statistical outcomes that are definitive, and results are often expressed in numerical form before they are defined in the text. Qualitative research often provides data that are descriptive and explanatory in nature, and results are often expressed in narrative form (Creswell, 2014).

In recent years, interest has grown in mixed-methods research. In mixed-methods research, the main idea is to integrate various methods and/or techniques from quantitative and qualitative approaches to provide a better, more comprehensive understanding of a particular research question. Creswell (2014) described mixed-methods designs as procedures for collecting, analyzing, and linking both quantitative and qualitative data in a single study or in a multiphase series of studies. Advocates of mixed-methods designs encourage researchers to focus on specific design formulation

and consensus for specific types and uses of mixed-methods research in social research (Greene & Caracelli, 1997).

Greene and Caracelli (1997) questioned what exactly mixed-methods approaches include. In addition, other researchers have addressed various ways mixed methodology can be used within research studies. Mixed-methods may consist of strategies identified by one methodology and incorporated during data collection, data analysis, or post analysis comparison. Mixed-methods may also consist of an assortment of quantitative and qualitative data collection methods that are used separately throughout the analysis for comparison. Finally, a mix of methods from both methodologies may be integrated during the collection or analysis phase (Riggin, 1997).

In general, mixed-methods research involves combining components or phases from both quantitative and qualitative research. Integration of the two types of data can occur at various stages of data collection, analysis, or interpretation of findings. According to Creswell (2014), quantitative and qualitative models are mixed together in two main ways. The first mixed-methods design is identified as sequential; one type of data method is used (such as quantitative) and then the other is used (qualitative). The second type of mixed-methods design is identified as convergent; the researcher "implements both the quantitative and qualitative strands during a single phase of the research study" (Creswell & Plano Clark, 2018). This study utilized a convergent design.

For this study, the examination of the efficiency, effectiveness, and accountability of water districts in California, a convergent parallel mixed-methods design was ideal because of the necessitated responses to both quantitative and qualitative research questions (Creswell, 2014). This research project required the collection of multiple

independent strands of data. A strand of data is the product of the quantitative or qualitative research process when the researcher formally poses an inquiry, gathers data, analyzes data, and draws conclusions (Creswell, 2014). The convergent parallel approach was the best mixed-methods model for this study because it facilitated the collection of independent, noninteractive, qualitative and quantitative data (Harwell, 2011, Creswell 2014).

Quantitative Analysis

A quantitative research study, as well as the readily available data sets, lends itself to the utilization of a combination of nominal, ordinal, and ratio measurement scales. The nominal scale puts attributes into categories based on a common trait or characteristic. An example would be to distinguish between water districts whose water source is groundwater, surface water, or a combination of the two. The ordinal scale differs from the nominal scale in that it ranks the data from lowest to highest and provides information regarding where the points lie in relation to one another. An example would be to rank water districts based on revenue received or rates charged. Ratio measurement scales are defined by values having a logical order, equal and constant distance between each value, and a true zero point. Although not defined, an interval scale is similar to the ratio scale with the exception that ratio scales have a zero point. An example would be annual revenue or expenses by each water district.

In regard to the research design, there are two basic types of research questions that shape the design of the research project: what and why (Creswell, 2014). The what question performs descriptive research, and the why question performs explanatory research. From these two questions, a broader set of research designs have been created

that are generally accepted within academic writing. They are as follows: historical research design, case and field research design, descriptive or survey research design, correlation or prospective research design, causal comparative or ex post facto research design, developmental of time-series research design, experimental research design, and quasi-experimental research design (Creswell, 2014).

A correlation approach to a study measures the degree of relationship between two or more variables (Salkind, 2012). The association can be evaluated by the degree of association to which one variable affects the other (Salkind, 2012). If the relationship is positive, then there is a linear relationship between the variables. That is, if one variable is perceived positively, the other is also perceived positively. Thus, a correlation is determined. If there is no correlation between two variables, there is no statistically significant effect of one variable on the other, positively or negatively.

This type of correlational design is considered to be a nonexperimental design since the purpose of the researcher is to observe the interaction of the variables within a sample to anticipate similar outcomes within an entire population (Creswell, 2014). In contrast, the true experiment investigates cause and effect relationships. In this type of experiment, the researcher manipulates the variables in order to predict cause and effect relationships between variables. Since this study does not involve the manipulation of variables, the chosen design was a nonexperimental design.

Qualitative Analysis

Qualitative data are collected from a variety of sources including documents from private and public sources. Qualitative research emphasizes the role of words, actions, and records on a topic. Creswell (2014) articulated that qualitative researchers state only

questions and not hypotheses and further note that qualitative research looks for an in-depth understanding of a central phenomenon, not explanations. Qualitative research usually addresses the questions beginning with *how, why,* or *what.*

Qualitative research is in contrast with quantitative approaches focused on the amount of what is under study—relationships between variables, comparisons, and cause and effect using controlled variables. Qualitative research has been criticized for relying on personal interpretation of data inferences as such interpretations can dilute outcomes (Berg, 2014). Berg (2014) highlighted such continuous "back and forth" arguments regarding the two designs using the statement, "There is no such thing as qualitative data. Everything is either 1 or 0," and "all research ultimately has a qualitative grounding" (pp. 2-3). Berg ultimately concluded that both strategies have merit depending on the focus of the research.

Research Questions and Hypothesis

Both quantitative and qualitative research questions guided this study. According to Creswell and Plano Clark (2018), "Both quantitative and qualitative data collection are central to this form of inquiry" (p. 77). The study analyzed and revealed relationships and commonalities between small and large water districts in California. Each research question was analyzed to statistically test the validity of the null hypothesis (H_0) or alternative hypothesis (H_a). Research Questions 1-5 (RQ1-RQ5) were analyzed via quantitative methods while Research Question 6 (RQ6) was analyzed via qualitative methods. The research questions for this study are as follows:

1. RQ1: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or

greater than 100,000 (large) with respect to the ratio of population served per employee?

H_01: There is no significant statistical difference between the population served per employee for small water districts and large water districts.

H_a1: There is a significant statistical difference between the population served per employee for small water districts and large water districts.

2. RQ2: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to the revenue received per customer service connection?

   H_02: There is no significant statistical difference between the revenue received per customer service connection for small water districts and large water districts.

   Ha2: There is a significant statistical difference between the revenue received per customer service connection for small water districts and large water districts.

3. RQ3: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to equity per customer service connection? Equity is defined as assets minus liabilities.

   H_03: There is no significant statistical difference between the equity per customer service connection for small water districts and large water districts.

   Ha3: There is a significant statistical difference between the equity per customer service connection for small water districts and large water districts.

4. RQ4: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to their monthly residential water service charge rates?

   H_04: There is no significant statistical difference between the monthly residential water service charges for small water districts and large water districts.

   Ha4: There is a significant statistical difference between the monthly residential water service charges for small water districts and large water districts.

5. RQ5: Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to the average tenure of the board of directors?

   H_05: There is no significant statistical difference between the average tenure of the board of directors for small water districts and large water districts.

   Ha5: There is a significant statistical difference between the average tenure of the board of directors for small water districts and large water districts.

6. RQ6: What is the relationship between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to frequency, time of day, or day of week of board meetings?

Methodology

This study used a type of convergent design called the convergent parallel design of mixed-methods. The design is often thought as "triangulation" and was previously

called the convergence model (Creswell, 2014). In this convergent parallel design, both quantitative and qualitative data were collected and independently analyzed, then integrated and interpreted (Creswell & Plano Clark, 2018). Following the separate analysis of all quantitative and qualitative instruments in a mixed-methods study, the results are then merged and integrated to form inferences. Inferences in mixed-methods research are conclusions or interpretations drawn from the separate quantitative and qualitative strands of the study as well as across the quantitative and qualitative strands (Creswell & Plano Clark, 2018).

The trustworthiness of the findings could be enhanced because multiple sources and types of data make triangulation possible. For example, qualitative data from the board meeting minutes expand on the quantitative data from other sources. Creswell and Plano Clark recommend a procedural diagram of the convergent design to convey the complexity of a mixed-methods design. See Figure 2 for this study's procedural diagram.

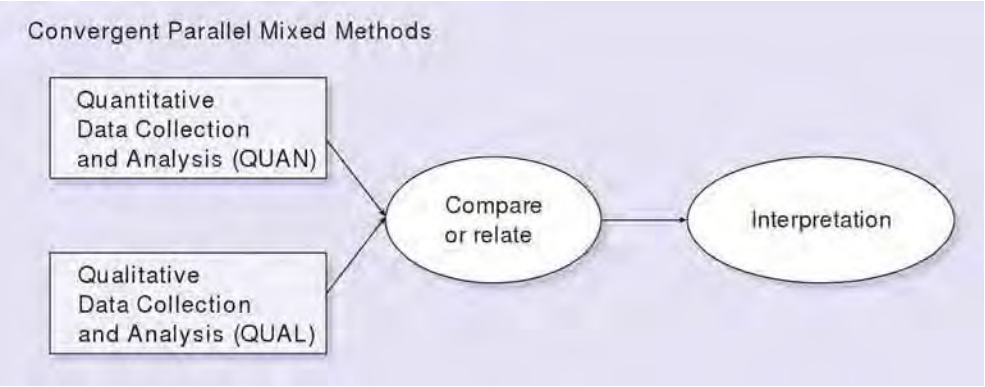


Figure 2. Convergent parallel mixed-methods design. From *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, by J. W. Creswell, p. 220, 2014, Thousand Oaks, CA: Sage.

By examining various performance indicators through secondary analysis of existing data, a comparison can be made between small local water districts with larger water districts that would be considered "regional" to show whether or not there is a significant difference between the parameters measured. For this portion of the study, the quantitative analysis included evaluating data that have been provided to the State of California and readily available on the Internet. The data sets allowed evaluation of the following: fiscal performance indicators (equity and revenue/customer connection); organizational indicators (staffing levels/population, board tenure); and customer relations (residential service charges). These variables were measured in terms of a comparative analysis between small water districts and large water districts. Most of the above listed benchmark comparisons are easily data-mined from existing publicly reported data.

Research Question 6 (RQ6) was analyzed by reviewing and coding water district board meeting minutes in order to determine whether meeting time, frequency, or day of the week affect citizen involvement (participation).

The primary goal of this study was to consider and evaluate the merits of each of the two theoretical perspectives relating to special districts in California. By using this analysis, it will become clear whether small districts are providing their service in a comparable way as large districts.

A secondary, but significant goal of the research was presenting a consolidated historical perspective of how, why, and for what purpose special districts were originally created. In this respect, the study brought together information from multiple sources.

Population

In statistical analysis, a population is the total collection of all cases in which the researcher is interested and wishes to understand (Healey, 2016). An example of a population is the number of voters in the United States. When the population is too large to evaluate, generalizations are made from a representative sample of the population. A sample is a carefully chosen subset of the population (Healey, 2016). An example of a sample would be randomly chosen voters from each state.

According to the U. S. Census Bureau (2013) government units survey conducted in 2012, there are 38,266 special districts in the United States. Of this total, almost 28% of these special districts are in four states including Illinois, Missouri, Texas, and California. For purposes of this study, only special districts in California were analyzed further.

Sample

In California, there are over 5,300 special districts (California State Controller's Office, n.d.). These districts provide a diverse number of services to their customers. Appendix A lists the number and types of special districts in California. The sheer number of these special districts is far too large and diverse to reasonably analyze in a single study; therefore, a convenience sample procedure was selected to determine a limiting population for this study while at the same time maintaining homogeneity of districts. There are several advantages to using a convenience sampling procedure, including simplicity of sampling and ease of research, helpfulness for pilot studies and for hypothesis generation, facilitation of data collection in short term studies, and inexpensiveness to implement compared to alternative sampling methods (Saunders,

Lewis, & Thornhill, 2016). Three disadvantages of convenience samples are that they are highly susceptible to selection bias and influences beyond the control of the researcher, they risk a high level of sampling error, and for the above reasons, they lose credibility.

The following steps were used to determine the population for this study:

1. Special districts that provide water service in California. n = 1,286. Although not a part of the research in this study, the researcher notes that this number represents public water serving agencies or 88% of the total water districts in California. Privately-owned or investor-owned water districts account for the additional 12%;
2. Special districts that provide water service only. n = 503;
3. Independent special districts that provide water service only. n = 214. After preliminary analysis, it became obvious to the researcher that water districts serving populations of 25,000 or less skewed the data given their limited fiscal resources, managerial and staffing capacity, and limited customer base. Therefore, one additional step was added;
4. Water providing, independent special districts serving populations greater than 25,000. n = 65. These steps resulted in a population size of 65 water districts. This population is large enough to provide meaningful results, as well as providing manageability in data analysis. The final step was to create the two independent variables (small water districts and large water districts);
5. Creating the independent variable grouping. Small water districts (> 25,000 and < 100,000), n = 44 and large water districts (≥ 100,000), n = 21. Relying on analytics used by the American Water Works Association in various publications, the

researcher used a population of 100,000 as the break point between small water districts and large water districts.

Measurement

For this study, the problem research questions were analyzed along two theoretical perspectives of efficiency/effectiveness and accountability. Efficiency and effectiveness are defined as achieving the most, the best, or the most preferable public service for available resources (Frederickson, 2010). Efficiency and effectiveness can be further segregated along three dimensions: efficiency, impact, and quality. These dimensions are defined as follows: efficiency—(a) technical: greatest outputs in the least amount of time, for the least amount of cost; (b) social: the optimal distribution of resources in society (related to Pareto efficiency); impact—meeting the needs of the citizens precisely and correctly in a measurable or other meaningful way; quality—the ability to consistently provide a service without error or defect, that is speedy, and a useful service to the citizens served. Efficiency and effectiveness were measured in terms of a comparative analysis among the sample.

Accountability is the means by which organizations and their workers answer to the citizens directly and indirectly for the use of their powers, authority, and resources. Accountability is also subdivided into three dimensions that include transparency, responsibility, and judgement. Transparency is the act of conducting activities or performing actions in an open and clear manner. The focus is on openness and clarity. Responsibility includes capacity, which is the ability of the public servant to act. Accountability refers to the obligation that public officials have of providing information, explanations, and/or justifications to a superior authority (internal or external). Liability

is the assumption of consequences of one's own acts, or sometimes of acts carried out by others (Cendón, 2000). Judgement involves relying on officials to make the right decision without personal bias on behalf of the citizenry or constituents.

All researchers should be concerned with the validity of their research. Validity is the degree to which a research study measures what it intends to measure. In essence, it means the truthfulness of the findings. There are two main types of validity, internal and external. Internal validity refers to the validity of the measurement or test itself. External validity refers to the ability to generalize the findings to the target population ("What Is Validity and Why Is It Important in Research?" 2011).

Research requires dependable measurement. Measurements are reliable to the extent that they are repeatable and that any random influence that tends to make measurements different from occasion to occasion or circumstance to circumstance is a source of measurement error (Mills & Gay, 2016). Reliability is the degree to which a test consistently measures whatever it measures. Errors of measurement that affect reliability are random errors, and errors of measurement that affect validity are systematic or constant errors.

Validity

Creswell (2014) explained that an instrument is valid when the scores obtained from the instrument are meaningful and make sense. Creswell further stated that when the instrument and data collected are valid, a researcher can draw meaningful conclusions about the data. Various dimensions of validity exist, including face validity, factorial validity, content validity, criterion-related validity, and construct validity (Creswell, 2014; Leedy & Ormrod, 2018).

There are also validity concerns relative to the identification of special districts (Leigland, 1990). Not only in the totality of special districts is there concern, but there is also concern for proper identification of water districts, and water districts that provide multiservice versus single service.

Validity is the strength of our conclusions or our inferences. Cook and Campbell (1979) defined it as the "best available approximation to the truth or falsity of a given inference, proposition or conclusion" (p. 37). In other words, were the assumptions right? Or did the arrow hit the target bulls-eye?

Reliability

The reliability of a study demonstrates consistent and repeatable administration and response (Creswell, 2014). That is, the ability to repeat the findings of a study represents meaningful reliability. Creswell (2014) reported that there are multiple classes of reliability, including test-retest reliability, alternate forms reliability, alternate forms and test-retest reliability, interrater reliability, and internal consistency reliability.

The reliability of this study is supported by the validity of the data provided by each water district to the state controller's office and to the U. S. Census Bureau. In essence, reliability is the ability to hit the same point on a target consistently. Whether that point is the bulls-eye does not matter with respect to reliability. For a research study to be accurate, the findings must be reliable and valid.

Data Collection and Analysis

For this study, the nonexperimental quantitative analysis included evaluating data that have been provided to the state of California and readily available on the Internet. These data included budgets, audits, compensation, and to a limited extent, customer

satisfaction surveys. The data were analyzed to determine whether a water district is providing service to their customers in an efficient and effective manner such as evaluating the number of employees per population, analyzing revenues to expenditures, or many others. The results were then compared between different districts.

Statistical Analysis Theory: Independent Samples *t*-Test

The first analysis conducted was the independent samples *t*-test. The independent samples *t*-test determines whether a difference exists between the means of two independent groups on a dependent variable (Lund & Lund, 2018). Specifically, this test allows for the determination of whether the difference between these groups is statistically significant (Lund & Lund, 2018). For this study, independent samples *t*-test was used to calculate and compare the mean differences in population/employee, revenue/connection, equity/connection, residential water charge/month, and average board tenure between two groups (small water districts and large water districts) and test their significance. With an independent samples *t*-test, each case must have scores on two variables, the grouping (independent) variable and the test (dependent) variable. The grouping variable divides cases into two mutually exclusive groups or categories, such as small water districts or large water districts for the grouping variable water district while the test variable describes each case on some quantitative dimension such as population served per district employee. The *t*-test evaluates whether the mean value of the test variable (e.g., population/employee) for one group (e.g., small water districts) differs significantly from the mean value of the test variable for the second group (e.g., large water districts).

The null hypothesis (H_0) is used in statistics to propose that no statistically significant difference exists in a set of given observations. The null hypothesis attempts to show that no variation exists between variables or that a single variable is no different than its mean. The null hypothesis is assumed to be true until statistical evidence nullifies it for an alternative hypothesis (Lund & Lund, 2018). The opposite of the null hypothesis is the alternative hypothesis (H_a)

The researcher used a free statistical calculator publicly available on the Internet (www.socscistatistics.com) in order to analyze the statistical significance. As described by the calculator creator, "The output of the calculators and tools have been audited for accuracy against the output produced by a number of established statistical packages, including SPSS (Statistical Package for Social Sciences) and Minitab."

The independent samples *t*-test was used to determine any significant differences in the two variables. Additionally, the quantitative study determined alpha using the independent sample *t*-tests at $\alpha = 0.05$ for statistical analysis.

The level of significance, or α (alpha), is the probability of rejecting the null hypothesis by mistake. The most common but fairly arbitrary significance level is $\alpha = 0.05$. This means that there is a 5% probability of rejecting the null hypothesis by mistake.

Tests of Assumptions

Independent-sample *t*-test has six assumptions that must be considered to determine whether the usage of these data is appropriate (Lund & Lund, 2018). The first three assumptions pertain to the study design. It is generally considered that if these three

assumptions are not met, independent samples *t*-test is not the correct statistical test to utilize to analyze the data. The three assumptions that were met were as follows.

Assumption 1. A continuous dependent variable is present (Lund & Lund, 2018). Five continuous dependent variables were tested and analyzed. The five dependent variables were population/employee, revenue/connection, equity/connection, residential water charge/month, and average board tenure.

Assumption 2. The independent variable is categorical with two groups (Lund & Lund, 2018). The independent variable is this study was water districts, which was categorized into two groups or values: small water districts and large water districts.

Assumption 3. Observations are independents (Lund & Lund, 2018). The independent observations utilized in this study totaled 65. The observations that pertained to small water districts was 44, and 21 observations pertained to large water districts, each district being mutually exclusive.

The last three assumptions pertain to the nature of the data that can be tested and analyzed with a statistical analysis package.

Assumption 4. There should be no significant outliers in the two groups of the independent variable in terms of the dependent variable (Lund & Lund, 2018). For both groups of the independent variable, there should not be any outliers, or values that are extremely smaller or larger compared to all other scores for that group (Lund & Lund, 2018). No outlying data were noted in any of the observations. For this study, the two groups of independent variables were small water districts and large water districts. The dependent variables were population/employee, revenue/connection, equity/connection, residential water charge/month, and average board tenure.

Assumption 5. The dependent variable should be approximately normally distributed for each group of the independent variable (Lund & Lund, 2018). The assumption of normality is required for statistical significance testing using an independent-samples *t*-test (Lund & Lund, 2018). However, the independent-samples *t*-test is considered "robust" to violations of normality; this means that the normality assumption may be violated but still provide valid results (Lund & Lund, 2018). The results utilizing the Shapiro-Wilk method to determine normality for each dependent variable are presented in Chapter 4.

Assumption 6. Homogeneity of variances is present (i.e., the variance is equal in each group of the independent variable) (Lund & Lund, 2018). The assumption of homogeneity of variances states that the population variance for each group of the independent variable is the same (Lund & Lund, 2018).

The independent samples *t*-test is one of the most used statistical procedures. Its purpose is to test the hypothesis that the means of two groups are the same. The test assumes that the variable in question is normally distributed in the two groups. When this assumption is in doubt, the nonparametric Mann-Whitney U test (or rank sum) test, which does not rely on distributional assumptions, is sometimes suggested as an alternative to the *t*-test.

Statistical Analysis Theory: Mann-Whitney U Test

Next the Mann-Whitney U test, also referred to as the Wilcoxon-Mann-Whitney test, a rank based nonparametric equivalent to the independent samples *t*-test was run to test for differences between various group means. Lund and Lund (2018) explained that the Mann-Whitney U test can be used as an alternative to the two-sample *t*-test when the

assumption of normal population distributions is not met. Sums of the ranks are computed for each group and entered into a formula that yields a U statistic that is compared to a critical value. If the computed U is more than the critical value, the difference is considered significant. In this study, the Mann-Whitney U test was used to verify and support the results of the independent samples *t*-test.

Tests of Assumptions

To run a Mann-Whitney U test, four assumptions must also be met (Lund & Lund, 2018). Three of these assumptions focus on the design of the study, and the fourth assumption reflects the study's data (Lund & Lund, 2018).

Assumption 1. One dependent variable is measured at the continuous or ordinal level (Lund & Lund, 2018).

Assumption 2. One independent variable consists of two categorical independent groups (Lund & Lund, 2018). The independent variable in this study, single-service independent water districts, consists of two categorical independent groups or values: small water districts and large water districts.

Assumption 3. Independence of observations (Lund & Lund, 2018). Previously noted in this study was that there was neither a relationship between the observations in each group—small water districts and large water districts—nor a relationship between the groups themselves.

Assumption 4. An evaluation of the distribution of the two groups or values of the independent variable must be made (Lund & Lund, 2018). A determination must be made whether the distribution of scores for both groups of the independent variable have the same shape or different shape, or are there differences in the medians of the two

groups. For this study, the two groups of the independent variable were small water districts and large water districts. The two tests that were performed are (a) the test of equal distributions and (b) the test of medians.

Test of Equal Distributions

To utilize the Mann-Whitney U test to determine whether there exists a statistically significant difference in the medians of each group of the independent variable, which for this study were the small water districts and large water districts, the shapes of the distributions in each group must be similar to each other (Lund & Lund, 2018). If the declaration that the distributions were similar could not be made, the inferences made about the data would be different (Lund & Lund, 2018).

Ethical Assurances

Before data collection began, approval was obtained from the Institutional Review Board (IRB) of California Baptist University to conduct the study. The four categories of ethical issues in human research are (a) protection from harm, (b) informed consent, (c) right to privacy, and (d) honesty with professional colleagues. No human participation was involved in the study, and all information was obtained from readily available historical databases and websites. No personal identification information was downloaded from the databases. Thus, no informed consent was needed, and there were no risks in terms of privacy or personal harm. All data used in the study were historical, and the research could be replicated to ensure a factual basis for professional colleagues.

Summary

Undeniably, some assumptions about small and large independent water district organizations do not apply in all cases. There are many extraneous factors that ultimately cause the outcomes to be more complex.

This analysis does not account for the variable of "time." Changes in efficiency/effectiveness and accountability naturally take place in any organization. While there are certain changes that an organization can implement that will make a sudden, dramatic shift in citizen perceptions, more common are gradual changes that may take a year or more to be fully recognized and implemented.

CHAPTER 4: FINDINGS AND DISCUSSION

Overview

The researcher's intention with this study was to quantitatively compare how fiscal performance indicators (equity and revenue), organizational indicators (staffing levels and board tenure), and customer relations indicators (service charges) compare between small water districts and large water districts. Statistical analysis methods were used to examine the relationships. Additionally, this study sought to collect and compare board meeting data including frequency of meetings, meeting days, and meeting times. The data for Research Questions 1 through 5 were collected from a variety of sources including the State of California Controller's website, and State Water Resources Control Board website. Data for Research Question 6 were collected from the websites of each of the 65 water districts included in this study. This chapter presents the findings from the data analysis in relation to the research questions. Appendix B includes copies of the *t*-test and *U* test printouts

Shapiro-Wilk Test for Normality

The normality in each group of the independent variable for each dependent variable was assessed (Lund & Lund, 2018). The Shapiro-Wilk test for univariate normality, which is considered commonly used, was performed for each value of the independent variable, small water districts and large water districts, and for the five dependent variables: population/employee, revenue/connection, equity/connection, residential water charge/month, and average board tenure. The "Sig." column located under the "Shapiro-Wilk" column in Table 1 denotes the significance value for this test for each value of the independent variable and for the five dependent variables (Lund &

Lund, 2018). The results for testing for multivariate normality using Shapiro-Wilk are recorded in Table 1.

Table 1

Test of Multivariate Normality with Univariate Test

Research question	Water district value	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistics	*df*	Sig.	Statistics	*df*	Sig.
Population/employee	Small	0.160	44	0.186	0.927	44	**0.008**
	Large	0.146	21	0.709	0.941	21	0.232
Revenue/connection	Small	0.120	44	0.510	0.951	44	0.059
	Large	0.183	21	0.430	0.899	21	**0.034**
Equity/connection	Small	0.139	44	0.356	0.873	44	**0.000**
	Large	0.218	21	0.238	0.871	21	**0.010**
Monthly res. charge	Small	0.183	44	0.091	0.882	44	**0.000**
	Large	0.067	21	1.000	0.988	21	0.993
Avg. board tenure	Small	0.143	29	0.542	0.957	29	0.280
	Large	0.140	19	0.801	0.952	19	0.431

The column labelled Sig. located under the Shapiro-Wilk column denotes the significance value for this test for each level of the two values of the independent variable and for each dependent variable, as highlighted in Table 1. If the value of "Sig," or *p,* is greater than .05 ($p > .05$), then the data in that row for that independent variable group and that dependent variable is considered to be normally distributed, and the assumption of normality has not been violated (Lund & Lund, 2013). If the value of Sig. is less than

.05 ($p < .05$), the assumption of normality has been violated (i.e., the test is significant at the $p < .05$ level), and the data independent variable and the specific dependent variable are not considered to be normally distributed.

The Shapiro-Wilk test for univariate normality tested the null hypothesis that the data distribution was equal to a normal distribution. Rejecting or failure to accept the null hypothesis means that the data's distribution is not normally distributed. In Table 1, the Sig. values for five categories are less than .05, denoting $p < .05$. This means that the data in these classifications are not normally distributed subject to the error probability. The other five categories are considered to be normally distributed. However, given the *t*-test's robustness to deviations from normality, *t*-test testing can still be undertaken and still get reliable results (Lund & Lund, 2018).

Research Question 1 Findings

Research Question 1 (RQ1): Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to the ratio of population served per employee?

$H_0 1$: There is no significant statistical difference between the population served per employee for small water districts and large water districts.

$H_a 1$: There is a significant statistical difference between the population served per employee for small water districts and large water districts.

For Research Question 1, the observed data are plotted as shown in Figures 3 and 4.

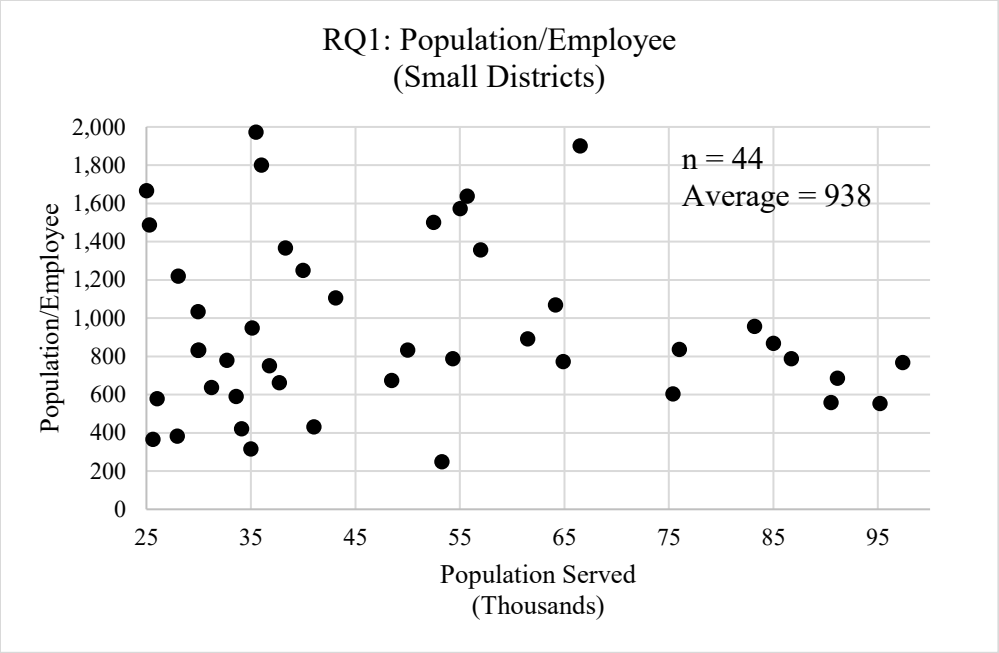


Figure 3. RQ1: Population/employee relationship for small water districts.

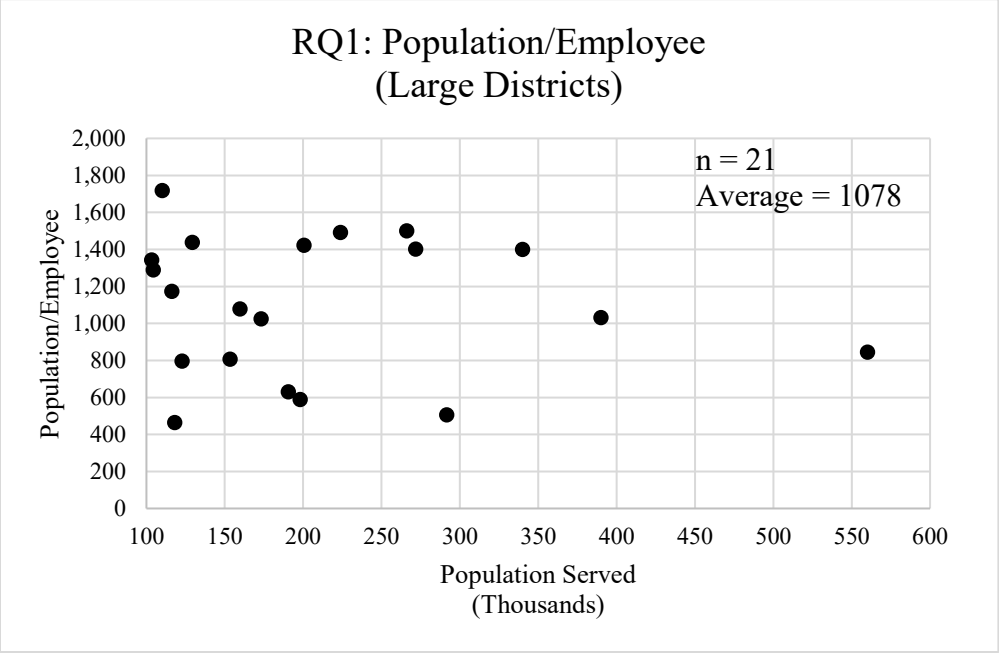


Figure 4. RQ1: Population/employee relationship for large water districts.

An independent samples *t*-test was conducted to compare small water districts to large water districts with respect to the number of customers (population) served per

district employee. No data errors, inconsistencies, or outliers were identified. The analysis found that there was no significant difference in the scores for small water districts (M = 938.4, SD = 446.2) and large water districts (M = 1077.7, SD = 377.5); where $t(63) = -1.2348$, and $p = 0.22149$. For the Mann-Whitney U test, the mean rank was 30.74 and 37.74 respectively and the $z = -1.38873$, and $p = 0.16452$. The Mann-Whitney U test and t-test results were similar. These results fail to reject the null hypothesis and that there is no significant difference in the respective populations served per district employee for small water districts and large water districts.

Research Question 2 Findings

Research Question 2 (RQ2): Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to the revenue received per customer service connection?

$H_0 2$: There is no significant statistical difference between the revenue received per customer service connection for small water districts and large water districts.

$H_a 2$: There is a significant statistical difference between the revenue received per customer service connection for small water districts and large water districts.

For Research Question 2, the observed data are plotted as shown in Figures 5 and 6.

An independent samples t-test was conducted to compare small water districts to large water districts with respect to the annual revenue received per customer connection. No data errors, inconsistencies, or outliers were identified. The analysis found that there was no significant difference in the scores for small water districts (M = \$320.1, SD = \$129.2) and large water districts (M = \$291.4, SD = \$93.7) where $t(63) = 0.91242$, and

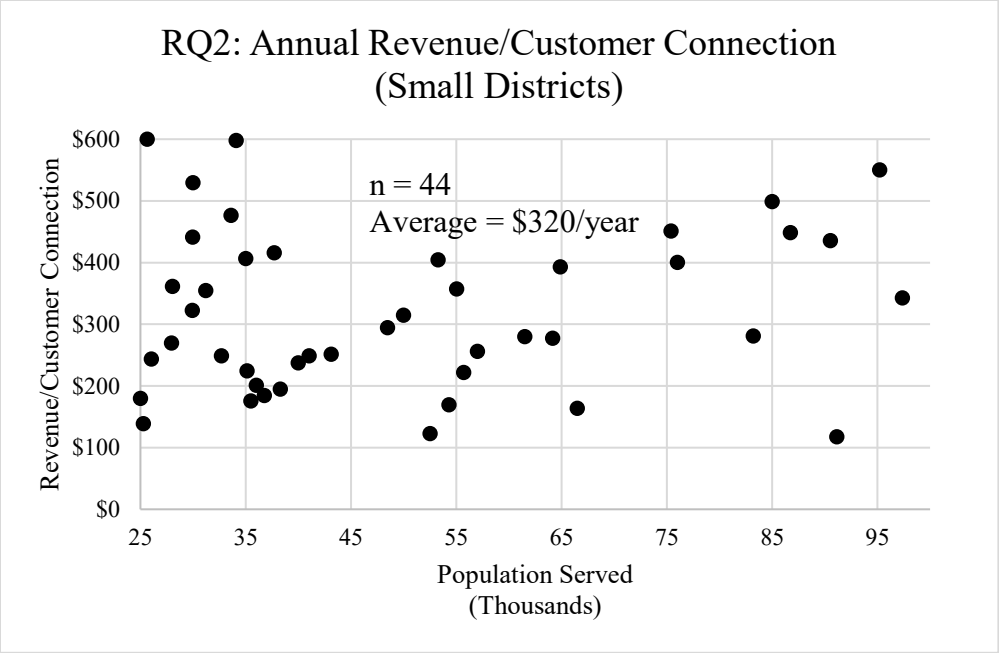


Figure 5. RQ2: Revenue per connection relationship for small water districts.

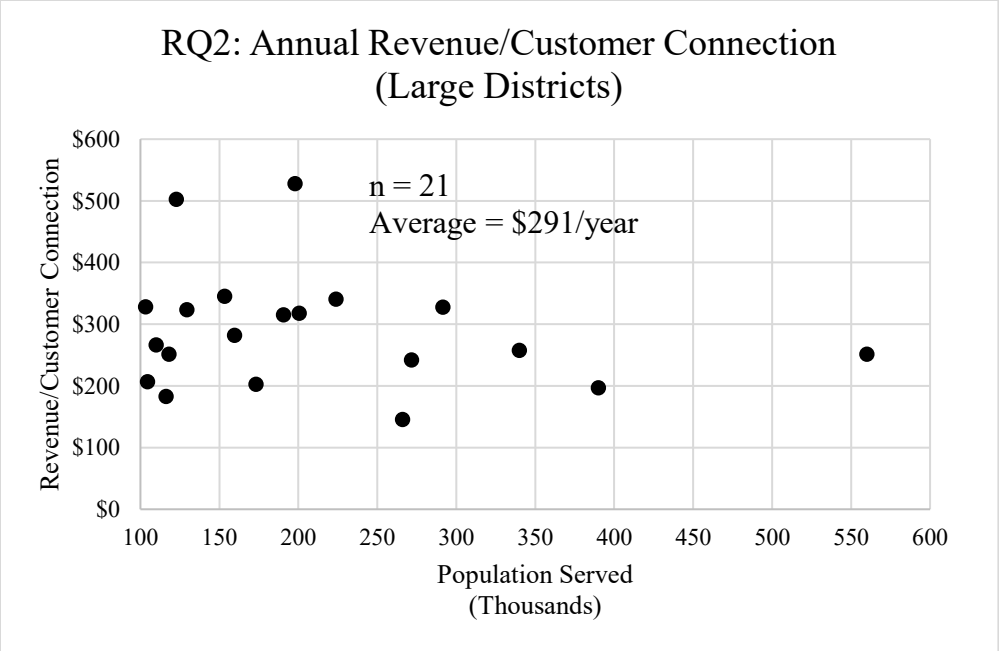


Figure 6. RQ2: Revenue per connection relationship for large water districts.

p = 0.365026. For the Mann-Whitney U test, the mean rank was 33.97 and 30.98 respectively and the z = 0.58916, and p = 0.5552. The Mann-Whitney U test and t-test results were similar. These results fail to reject the null hypothesis and that there is no significant difference in the revenue per customer service connection for small water districts and large water districts.

Research Question 3 Findings

Research Question 3 (RQ3): Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to equity per customer service connection? Equity is defined as assets minus liabilities.

$H_0 3$: There is no significant statistical difference between the equity per customer service connection for small water districts and large water districts.

$H_a 3$: There is a significant statistical difference between the equity per customer service connection for small water districts and large water districts.

For Research Question 3, the observed data are plotted as shown in Figures 7 and 8.

An independent samples t-test was conducted to compare small water districts to large water districts with respect to district equity/customer connection. No data errors, inconsistencies, or outliers were identified. The analysis found that there was no significant difference in the scores for small water districts (M = \$5,755.60, SD = \$3,221.40) and large water districts (M = \$5,821.50, SD = \$3,153.50) where $t(63)$ = -0.07767, and p = 0.938335. For the Mann-Whitney U test, the mean rank was 32.66 and 33.71 respectively and the z = -0.2034, and p = 0.84148. The Mann-Whitney U test and t-test results were similar. These results fail to reject the null hypothesis and that there is

no significant difference in the equity per customer service connection for small water districts and large water districts.

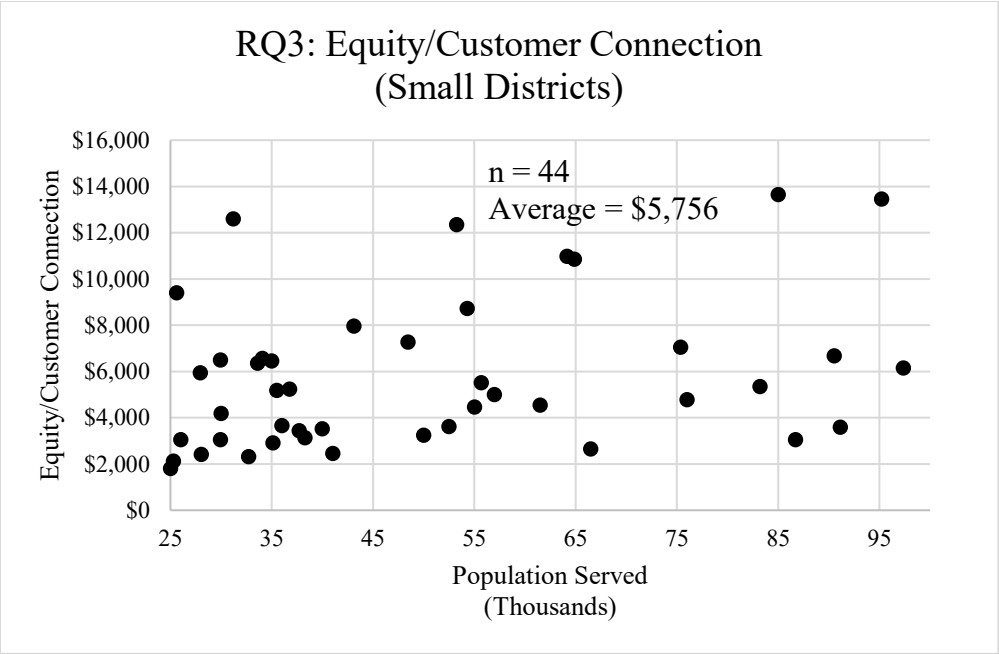


Figure 7. RQ3: Equity per connection relationship for small water districts.

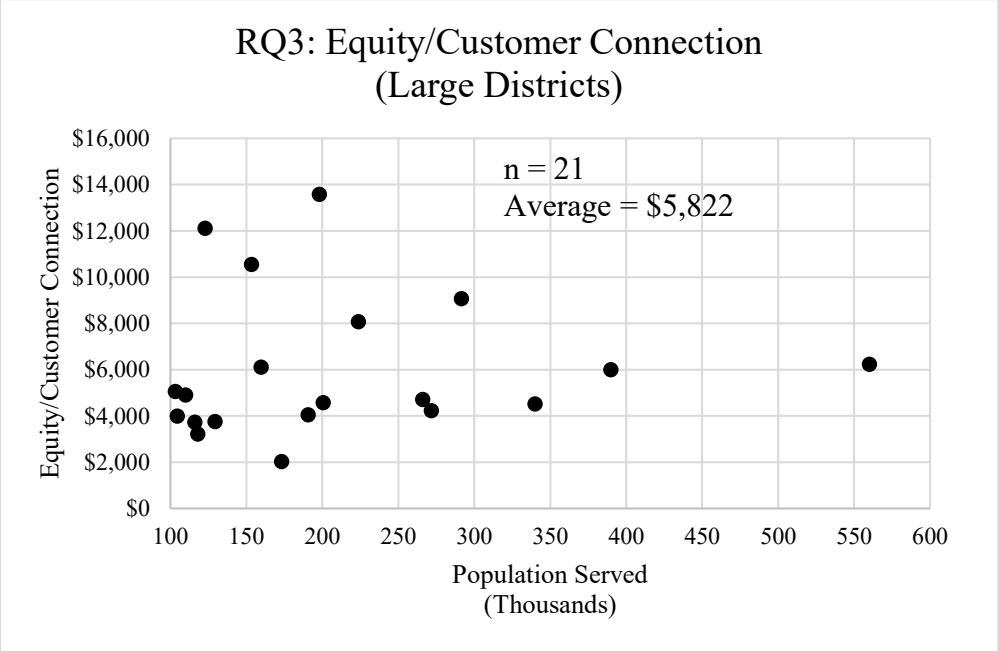


Figure 8. RQ3: Equity per connection relationship for large water districts.

Research Question 4 Findings

Research Question 4 (RQ4): Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to their monthly residential water service charge rates?

$H_0$4: There is no significant statistical difference between the monthly residential water service charges for small water districts and large water districts.

H_a4: There is a significant statistical difference between the monthly residential water service charges for small water districts and large water districts.

For Research Question 4, the observed data are plotted as shown in Figures 9 and 10.

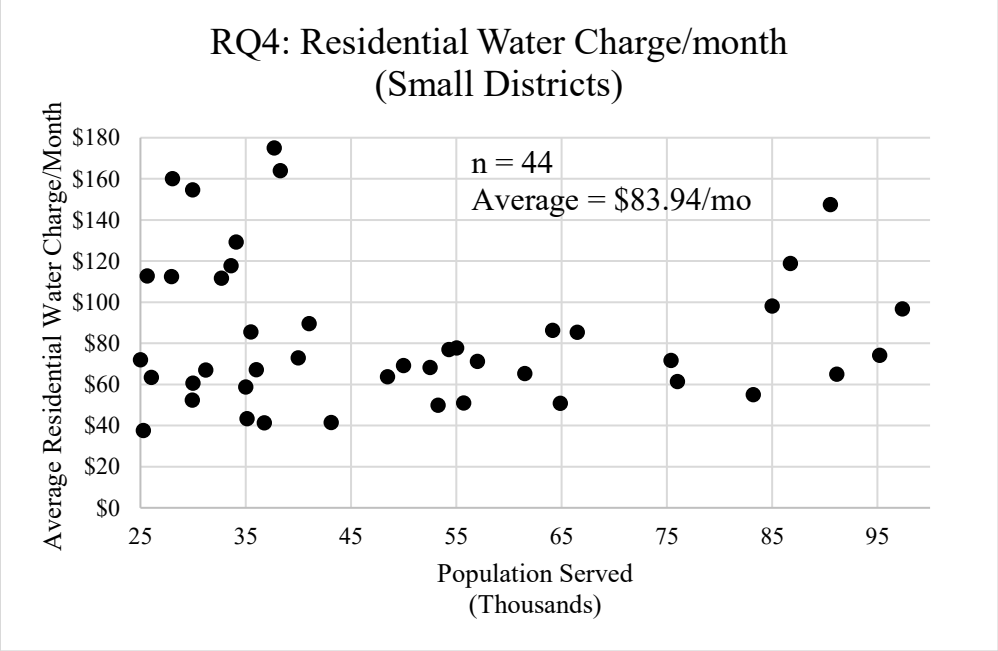


Figure 9. RQ4: Water charge per month relationship for small water districts.

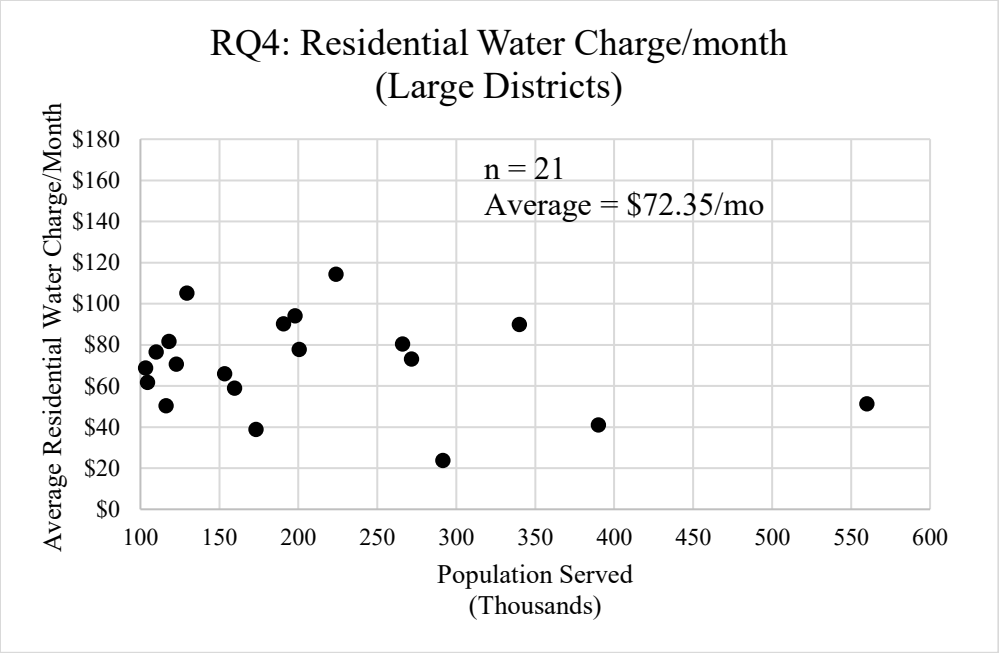


Figure 10. RQ4: Water charge per month relationship for large water districts.

An independent samples *t*-test was conducted to compare small water districts to large water districts with respect to residential water charge per month. No data errors, inconsistencies, or outliers were identified. The analysis found that there was no significant difference in the scores for small water districts (M = \$83.94, SD = \$35.56) and large water districts (M = \$72.35, SD = \$23.41) where $t(63) = 1.35699$, and $p = 0.179627$. For the Mann-Whitney U test, the mean rank was 34.05 and 30.81 respectively and the $z = 0.63825$, and $p = 0.52218$. The Mann-Whitney U test and *t*-test results were similar. These results fail to reject the null hypothesis and that there is no significant difference in the respective monthly residential water service charge for small water districts and large water districts.

Research Question 5 Findings

Research Question 5 (RQ5): Is there a difference between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve

populations equal to or greater than 100,000 (large) with respect to the average tenure of the board of directors?

$H_0$5: There is no significant statistical difference between the average tenure of the board of directors for small water districts and large water districts.

H_a5: There is a significant statistical difference between the average tenure of the board of directors for small water districts and large water districts.

For Research Question 5, the observed data are plotted as shown in Figures 11 and 12.

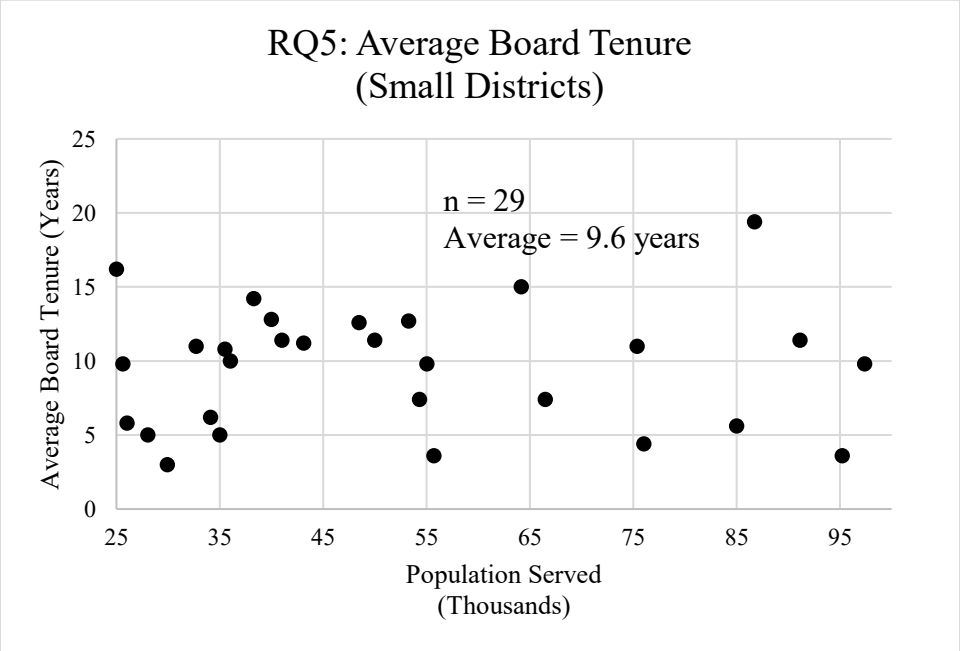


Figure 11. RQ5: Board tenure relationship for small water districts.

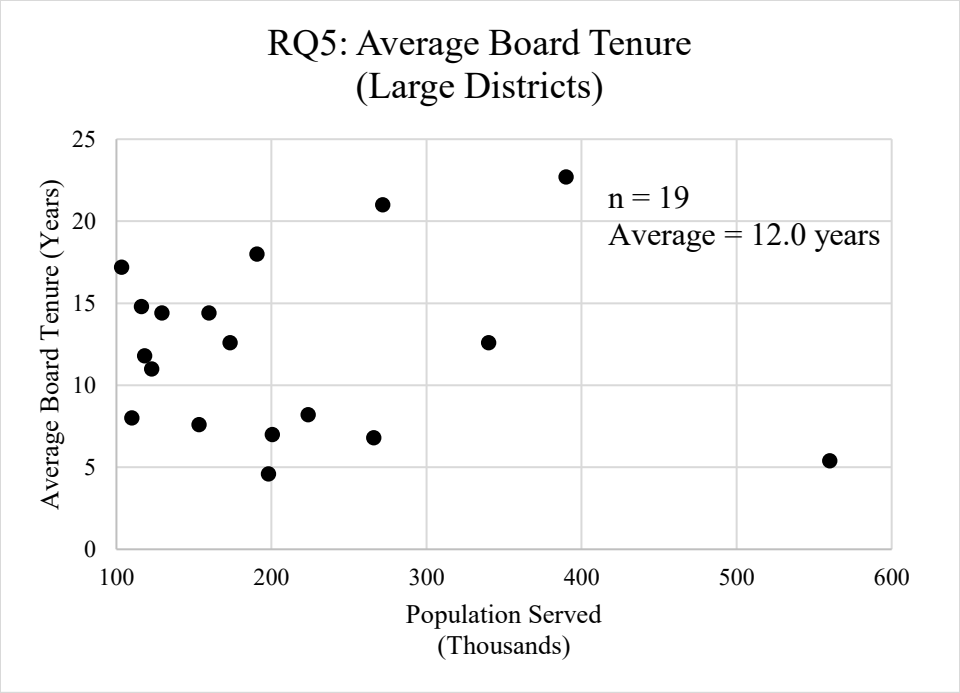


Figure 12. RQ5: Board tenure relationship for large water districts.

An independent samples *t*-test was conducted to compare small water districts to large water districts with respect to board of directors' tenure. No data errors, inconsistencies, or outliers were identified. The analysis found that there was no significant difference in the results for small water districts (M = 9.6 years, SD = 4.1 years) and large water districts (M = 12.0 years, SD = 5.2 years) where $t(46) = -1.77924$, and $p = 0.081809$. For the Mann-Whitney U test, the mean rank was 22.00 and 28.32 respectively and the $z = -1.51792$, and $p = 0.12852$. The Mann-Whitney U test and *t*-test results were similar. These results fail to reject the null hypothesis and that there is no significant difference in the respective populations served per district employee for small water districts and large water districts. Note that the *t*-test significance value is close to the 0.05 threshold, indicating that only a small shift in the results is necessary to make the test result significant. Therefore, there may be a trend toward significance, and based on

this finding researchers should use caution when deciding whether board tenure is significantly different between small water districts and large water districts.

Research Question 6 Findings

Research Question 6 (RQ6): What is the relationship between water districts that serve populations between 25,000 and 100,000 (small) and water districts that serve populations equal to or greater than 100,000 (large) with respect to frequency, time of day, or day of week of board meetings?

For Research Question 6, the gathered data are shown in Table 2.

Table 2

RQ6: Relationship of Water District Meeting Statistics

	Small districts (n = 44)	Large districts (n = 21)	All districts (N = 65)
Meeting day of week:			
Mon	8 (18%)	4 (19%)	12 (18%)
Tues	14 (32%)	4 (19%)	18 (28%)
Wed	14 (32%)	8 (38%)	22 (34%)
Thurs	8 (18%)	5 (24%)	13 (20%)
Fri	0 (0%)	0 (0%)	0 (0%)
Meetings per month:			
1	22 (50%)	7 (33%)	29 (45%)
2	22 (50%)	14 (67%)	36 (55%)
Meeting time of day:			
Day (< 5 p.m.)	16 (36%)	8 (38%)	24 (37%)
Evening (> 5 p.m.)	28 (64%)	13 (62%)	41 (63%)

With respect to board meeting days of week, the combined small and large water districts conduct their meetings more often on Wednesday (34%), followed by Tuesday (28%), Thursday (20%), and Monday (18%). None of the 65 districts conducted board meetings on Friday.

The number of board meetings per month was fairly evenly split between water districts that held one meeting per month compared to two meetings per month; 45% of the combined water districts held one meeting per month while 55% held two meetings per month. Small water districts were evenly split 50/50 on frequency of meetings while large water districts favored two meeting per month 2:1 over one meeting per month.

Finally, almost two thirds of the sample conducted their board meetings after 5:00 p.m. Both small water districts and large water districts mirror the combined percentage.

Interpretation of the Findings

Research Questions 1-5 (RQ1-RQ5) compared the relative efficiencies of small water districts to large water districts. The measure of relative efficiencies was considered through three performance indicator categories. Research Questions 2 and 3 measured fiscal performance, Research Questions 1 and 5 measured organizational performance, and Research Question 4 measured customer relations performance. Research Question 6 (RQ6) evaluated water district accountability by analyzing board of directors meeting time, frequency, and day of week.

This study has advanced the discussion of the proper role of special districts in local government. By analyzing the merits of two opposing perspectives, institutional reform and public choice, through the dimensions of service efficiency/effectiveness, and accountability this study adds to the body of knowledge and possibly narrows the gap between the two viewpoints.

Research Question 1 (RQ1) sought to determine whether there was a difference between small water districts ($n = 44$) and large water districts ($n = 21$) with respect to the ratio of population served per employee. The established null hypothesis was that

there is no significant statistical difference between the population served per employee for small water districts and large water districts. An independent samples *t*-test was used to assess whether small water districts have significantly different staffing levels when compared to large water districts. The assumption for normality was violated for the small water districts for this research question. All other assumptions were met. As a result of the normality failure, the researcher conducted a nonparametric Mann-Whitney U test to verify the *t*-test results. A Levene's test for homogeneity of variance showed that the assumption for homogeneity of variance was met for small water districts and large water districts. The independent samples *t*-test revealed that there was no statistically significant difference between the means of small water districts (M = 938.4, SD = 446.2) when compared to large water districts (M = 1,077.7, SD = 377.5) at a confidence level of 95% where $t(63) = -1.2348$, and $p = 0.22149$. The Mann-Whitney U test supported the result of the *t*-test, which was no statistically significant difference with a $z = -1.38873$, and $p = 0.16452$. Based on the statistical analysis of the data, the null hypothesis cannot be rejected, which was that there is no significant difference in the staffing levels of small water districts and large water districts. Table 3 explains the results of the *t*-test.

Table 3

RQ1: t-Test Results Population Served per Water District Employee

Source	*n*	*M*	*SD*	*t*	*df*	*p*
Small water districts	44	938.4	446.2	-1.2348	63	0.22149
Large water districts	21	1,077.7	377.5			

Note. $\alpha = 0.05$ (2-tailed).

Research Question 2 (RQ2) sought to determine whether there was a difference between small water districts (n = 44) and large water districts (n = 21) with respect to the ratio of revenue received per customer service connection. The established null hypothesis was that there is no significant statistical difference between the revenue received per customer service connection for small water districts and large water districts. An independent samples t-test was used to assess whether small water districts have significantly different revenue levels when compared to large water districts. The assumption for normality was violated for the large water districts for this research question. All other assumptions were met. As a result of the normality failure, the researcher conducted a nonparametric Mann-Whitney U test to verify the t-test results. A Levene's test for homogeneity of variance showed that the assumption for homogeneity of variance was met for small water districts and large water districts. The independent samples t-test revealed that there was no statistically significant difference between the means of small water districts (M = \$320.10, SD = \$129.20) when compared to large water districts (M = \$291.40, SD = \$93.70) at a confidence level of 95% where $t(63) = 0.91242$, and $p = 0.365026$. The Mann-Whitney U test supported the result of the t-test, which was no statistically significant difference with a $z = 0.58916$, and $p = 0.5552$. Based on the statistical analysis of the data, the null hypothesis cannot be rejected, which was that there is no significant difference in the revenue received for small water districts and large water districts. Table 4 explains the results of the t-test.

Research Question 3 (RQ3) sought to determine whether there was a difference between small water districts (n = 44) and large water districts (n = 21) with respect to the district equity per customer service connection. Equity is defined as assets minus

Table 4

RQ2: t-Test Results Revenue/Customer Service

Source	*n*	*M*	*SD*	*t*	*df*	*p*
Small water districts	44	$320.10	$129.20	0.91242	63	0.365026
Large water districts	21	$291.40	$ 93.70			

Note. α = 0.05 (2-tailed).

liabilities. The established null hypothesis was that there is no significant statistical difference between the water district equity per customer service connection for small water districts and large water districts. An independent samples *t*-test was used to assess whether small water districts have significantly different equity levels when compared to large water districts. The assumption for normality was violated for both the small water districts and large water districts for this research question. All other assumptions were met. As a result of the normality failure, the researcher conducted a nonparametric Mann-Whitney U test to verify the *t*-test results. A Levene's test for homogeneity of variance showed that the assumption for homogeneity of variance was met for small water districts and large water districts. The independent samples *t*-test revealed that there was no statistically significant difference between the means of small water districts (M = \$5,755.60, SD = \$3,221.40) when compared to large water districts (M = \$5,821.50, SD = \$3,153.50) at a confidence level of 95% where $t(63) = 0.07767$, and $p = 0.938335$. The Mann-Whitney U test supported the result of the *t*-test, which was no statistically significant difference with a $z = -0.2034$, and $p = 0.84148$. Based on the statistical analysis of the data, the null hypothesis cannot be rejected, which was that there is no

significant difference in the equity per customer service for small water districts and large water districts. Table 5 explains the results of the *t*-test.

Table 5

RQ3: t-Test Results Equity/Customer Service

Source	*n*	*M*	*SD*	*t*	*df*	*p*
Small water districts	44	$5,755.60	$3,221.40	0.07767	63	0.938335
Large water districts	21	$5,821.50	$3,153.50			

Note. α = 0.05 (2-tailed).

Research Question 4 (RQ4) sought to determine whether there was a difference between small water districts ($n = 44$) and large water districts ($n = 21$) with respect to the monthly residential water service charge. The established null hypothesis was that there is no significant statistical difference between the monthly residential service charge for small water districts and large water districts. An independent samples *t*-test was used to assess whether small water districts have significantly different water service charge when compared to large water districts. The assumption for normality was violated for the small water districts in this research question. All other assumptions were met. As a result of the normality failure, the researcher conducted a nonparametric Mann-Whitney U test to verify the *t*-test results. A Levene's test for homogeneity of variance showed that the assumption for homogeneity of variance was met for small water districts and large water districts. The independent samples *t*-test revealed that there was no statistically significant difference between the means of small water districts ($M = \$83.94$, $SD = \$35.56$) when compared to large water districts ($M = \$72.35$, $SD = \$23.41$) at a confidence level of 95% where $t(63) = 1.35699$, and $p = 0.179627$. The

Mann-Whitney U test supported the result of the *t*-test, which was no statistically significant difference with a $z = 0.63825$, and $p = 0.52218$. Based on the statistical analysis of the data, the null hypothesis cannot be rejected, which was that there is no significant difference in the monthly residential service charge for small water districts and large water districts. Table 6 explains the results of the *t*-test.

Table 6

RQ4: t-Test Results Monthly Residential Service Charge

Source	*n*	*M*	*SD*	*t*	*df*	*p*
Small water districts	44	$83.94	$35.56	1.35699	63	0.179627
Large water districts	21	$72.35	$23.41			

Note. $\alpha = 0.05$ (2-tailed).

Research Question 5 (RQ5) sought to determine whether there was a difference between small water districts ($n = 29$) and large water districts ($n = 19$) with respect to the average tenure for the elected board of directors. The established null hypothesis was that there is no significant statistical difference between the tenure of the board of directors for small water districts and large water districts. An independent samples *t*-test was used to assess whether small water districts have significantly different board of directors' tenure when compared to large water districts. Although all assumptions for this research question were met, the researcher decided to conduct a nonparametric Mann-Whitney U test to verify the *t*-test results to stay consistent with the analysis of the previous research questions. A Levene's test for homogeneity of variance showed that the assumption for homogeneity of variance was met for small water districts and large water districts. The independent samples *t*-test revealed that there was no statistically

significant difference between the means of small water districts (M = 9.6 years, SD = 4.1 years) when compared to large water districts (M = 12.0 years, SD = 5.2 years) at a confidence level of 95% where $t(46)$ = -1.77924, and p = 0.081809. The Mann-Whitney U test supported the result of the t-test, which was no statistically significant difference with a z = -1.51792, and p = 0.12852. Based on the statistical analysis of the data, the null hypothesis cannot be rejected, which was that there is no significant difference in the average board of directors' tenure for small water districts and large water districts. Table 7 explains the results of the t-test.

Table 7

RQ5: t-Test Average Board of Directors Tenure

Source	*n*	*M*	*SD*	*t*	*df*	*p*
Small water districts	29	9.6	4.1	-1.77924	46	0.081809
Large water districts	19	12.0	5.2			

Note. α = 0.05 (2-tailed).

Research Question 6 (RQ6) addressed the issue of accountability through citizen participation and board meetings, specifically, whether there is any consistency among water districts with respect to when and how often board meetings are held. Many citizens, administrators, and politicians are interested in increasing public participation in public decisions, but there appears not to be an overwhelming majority in any of the three data parameters measure (meeting day of week, meeting frequency, and meeting time of day). One factor that emerged in the analysis of the 65 water districts in this study was the lack of consistency in recording public participation at board meeting. Some districts recorded detailed information about who spoke and on what topic. Other districts merely

mentioned that a member of the public spoke, and still others were silent on public involvement. The one factor that did emerge in the review of the board meeting minutes was the lack of public involvement. The lack of involvement was a consistent theme for all districts and is significant to this study. It shows that when meetings are held, the frequency of the meetings, or the time of the meetings have little impact on public involvement. Table 2 as shown earlier in this chapter is reproduced here to aid in the discussion of the findings.

Table 2

RQ6: Relationship of Water District Meeting Statistics

	Small districts (n = 44)	Large districts (n = 21)	All districts (N = 65)
Meeting day of week:			
Mon	8 (18%)	4 (19%)	12 (18%)
Tues	14 (32%)	4 (19%)	18 (28%)
Wed	14 (32%)	8 (38%)	22 (34%)
Thurs	8 (18%)	5 (24%)	13 (20%)
Fri	0 (0%)	0 (0%)	0 (0%)
Meetings per month:			
1	22 (50%)	7 (33%)	29 (45%)
2	22 (50%)	14 (67%)	36 (55%)
Meeting time of day:			
Day (< 5 p.m.)	16 (36%)	8 (38%)	24 (37%)
Evening (> 5 p.m.)	28 (64%)	13 (62%)	41 (63%)

Public meetings of special district boards in California are governed by the Ralph M. Brown Act (Brown Act), which requires that all meetings of local governments be open to the public and allow for public participation. The Brown Act declares that the public commissions, boards, and councils, and the other public agencies in this state exist to aid in the conduct of the people's business. It is the intent of the law that their actions

be taken openly and that their deliberations be conducted openly. Upon adoption of the Brown Act in 1953, the state legislator's intent was clear:

> The people, in delegating authority, do not give their public servants the right to decide what is good for the people to know and what is not good for them to know. The people insist on remaining informed so that they may retain control over the instruments they have created. (California Special Districts Association, 2016, p. 5)

Additionally, the Brown Act gives the public the right to comment on items before the board.

With respect to the most common day of the week to conduct board meetings, Wednesdays are the most common meeting day with 34% of water districts conducting their meetings on that day. Small water districts split their most frequent day between Tuesdays and Wednesdays at 32% each while large water districts mirrored the overall result with a slightly higher percentage of 38%. An interesting note is that none of the 65 water districts conduct their meetings on Friday.

All of the districts surveyed in this study conducted their meeting either once or twice per month. No district held meetings more or less frequently. Overall, 55% of water districts have meetings twice per month with the remaining districts conducting one meeting per month. The 44 small water districts were evenly split 50/50 with districts conducting one meeting per month equal to districts conducting two meetings per month. Large water districts conducted two meetings per month by a factor of 2:1 over one meeting per month.

The most common time of day for meetings is in the evening (after 5:00 P.M). Evening meetings are held by 63% of water districts. Small and large water districts conduct their meeting at almost the same percentage as the over all. Small districts with evening meeting are 64%, and large water districts are 62%.

While these results might not be surprising, the interesting take-away is that none of the water districts recorded any significant public involvement at board meetings. This leads to the conclusion that it does not matter when or how often meetings take place; public involvement is the same and is almost nonexistent.

Summary

In summary, Chapter 4 presented the results of the statistical analysis performed on the data collected as well as a comprehensive analysis of the findings. Prior to the independent samples *t*-test and Mann-Whitney U test, tests of the assumptions were performed and presented.

For independent-samples *t*-test, the presence of nonnormally distributed data raised concerns in the research. Because of the concerns regarding assumption testing results for independent samples *t*-test, the Mann-Whitney U test was performed. A nonparametric rank-based nonparametric test, the Mann-Whitney U test, also known as the Wilcoxon-Mann-Whitney test, was used to determine whether differences exist between the two independent variable groups, small water districts and large water districts, on a continuous or ordinal dependent variable.

The probability level accepted for statistical significance was $p = 0.05$. Without exception, the analysis found none of the null hypotheses should be rejected.

The findings of the study are preceded by a review of the demographics and a presentation to build the groundwork for the analysis. A detailed analysis of the findings follows each of the components: each hypothesis and corresponding null hypothesis.

CHAPTER 5: SUMMARY AND CONCLUSION

Overview

The purpose of this study was to examine two related types of special districts in California, specifically small and large single-service independent water districts from two opposing theoretical perspectives: institutional reform and public choice. Literature and other survey data were used to analyze these districts along the public administration perspectives of efficiency/effectiveness and accountability.

Various performance variables were examined quantitatively and qualitatively through secondary analysis of existing data. Comparisons were made between larger regional water districts conforming to the institutional reform model with smaller water districts that represent the public choice model. These comparisons were then evaluated to determine whether any significant difference exists between the two organizational theories.

In 1996, a California state assemblyman introduced legislation to force the consolidation of 25 independent water and sanitation districts in Orange County, California (Assembly Bill 2109, 1996). The bill would have created one single countywide district. The assemblyman's bill did not consider how effectively and/or efficiently the water districts were operating, but rather assumed a larger agency would provide "better" service to its customers when compared to the existing smaller water districts. Supporters of his bill argued that the consolidation process was ineffective and not conducive to consolidation. Opponents argued that the established consolidation process should be used to handle complex issues like consolidation. Ultimately, the assemblyman's bill failed and was not implemented. Still, the debate continues.

Summary of Study

This study sought to analyze the merits of two opposing perspectives, public choice (small water districts) and institutional reform (large water districts) through the dimensions of service efficiency/effectiveness (RQ1-RQ5), and accountability (RQ6).

To accomplish the analysis goals of this study, two independent variables were created. The first variable was to represent small independent water districts and the second variable to represent large water districts. Using analytics established by the American Water Works Association, the researcher used a population of 100,000 as the break point between small water districts and large water districts. Additionally, small water districts were further limited to those serving populations greater than 25,000. The above criteria resulted in a sample size of $n = 44$ for small water districts and $n = 21$ for large water districts.

Through quantitative analysis, five research questions (RQ1-RQ5) were evaluated through secondary analysis of existing data. These five research questions fall into three performance indicator categories. These categories include fiscal performance (RQ2: revenue/customer connection, and RQ3: equity/customer connection), organizational indicators (RQ1: population served/employee, and RQ 5: board tenure), and customer relations indicator (RQ4: residential service charge). After analysis, a comparison can be made between small water districts with large water districts to show whether or not there is a significant difference between the performance indicators measured. Research Question 6 (RQ6) was analyzed by reviewing and coding water district board meeting minutes in order to determine whether meeting time, frequency, or day of the week affect citizen involvement (participation).

Contributions to Public Administration

As stated in Chapter 1, the purpose of this study was to examine two related types of special districts in California, specifically small and large single-service independent water districts from two opposing theoretical perspectives: institutional reform and public choice. Literature and other survey data were used to analyze these districts along the public administration perspectives of efficiency/effectiveness and accountability.

Five research questions were posed evaluating three performance indicators (fiscal performance, operational indicators, and customer relations) were evaluated to determine whether there were any statistically significant differences between the efficient/effective operations of two theoretically opposed models of water district organization (small customer base versus large customer base). Additionally, one research question was developed to analyze board meeting times, frequency, and days of the week to determine whether any differences exist in public accountability between small and large water districts. This study furthered the discussion of the proper role of special districts in local government through the dimensions of service efficiency/effectiveness and accountability by analyzing the merits of two opposing perspectives, institutional reform and public choice theories.

Descriptive Statistics

This study compared three performance indicators between two groups, small water districts and large water districts. The combined sample size was 65 water districts, with 44 being small districts (67.7%) and 21 being large water districts (32.3%).

Small water districts had a mean population of 50,499, a standard deviation of 22,033, and a median population of 42,068. Large water districts had a mean population

of 266,788, a standard deviation of 279,091, and a median population of 190,600. This information is presented in Table 8.

Table 8

Independent Variable Population Statistics

Population table	*M*	*SD*	Median
Small water districts	50,499	22,033	42,068
Large water districts	266,788	279,091	190,600

Delimitations

Delimitations are those characteristics that limit the scope and define the boundaries of the study (Simon & Goes, 2012). Delimiting factors include the choice of topic, research questions, variables, and theoretical perspective. The delimitations are under the researcher's control.

The research on special districts was restricted by the selection of small water districts (populations > 25,000 and < 100,000) and large water districts (populations ≥ 100,000) in California. Further, the research was restricted to water districts that were single-service retail water districts. With these delimitations, the smaller number of water districts allowed the researcher to analyze the water districts more completely.

Limitations of the Study

Limitations are potential weaknesses in the research and are out of the researcher's control (Simon & Goes, 2012). There are potential limitations in respect of measurement validity, reliability, internal validity and external validity in the study. Measurement validity arises on account of the difficulty in directly measuring or observing information asymmetry and all range of incentives. There are also threats to

internal validity and exogenous factors, such as susceptibility to drought situations and an exacerbation of regulatory requirements with adverse impacts to the cost of service and efficient service delivery. The reliability of data is also a limitation. Each of these limitations were carefully considered in research design, and efforts were made to reduce their impact on the research findings.

In order to make valid comparisons, performance indicators must be well defined and consistently used in context. External comparisons are not often straightforward because numerous system-specific factors can influence the system performance. Important variables that may be outside of a water district's control include the following: water sources, treatment requirements, system age, topography, budget, customer base, regulations, governance, and political environment.

Additionally, certain economic phenomena can make utility-to-utility comparisons difficult and can influence the observed levels of performance. They include the following:

- Economies of scale (as system size increases, efficiency may improve)
- Economies of scope (diversification of services may lead to efficiencies)
- Economies of density (as population density increases, unit costs may decrease)

The research was limited by the self-reporting of data from each water district to the state controller. It is beyond the scope of this study to identify the range and complexity of information required to understand the specific nuances of a given water district's performance indicators.

This study used a convenience sample procedure as opposed to a random sample in order to provide the limiting population used in this research. Accordingly, the results

of the study cannot be generally applied to a larger population, only suggested. The results of this study may not be generalizable to other special districts.

Another limitation to this study is time. This study was conducted using data sets from a single data submission year and accordingly is a snapshot dependent on conditions occurring during that time.

Further Research

The results of this study are reported tentatively, not conclusively, pointing to other research questions and additional hypotheses to test. The first question emerging for further research is whether these same analyses extend to other special districts in California or other states. The recommendation is to replicate the procedures in this study in another setting, to determine whether other areas present statistically significant differences. The second question is whether or not these findings are affirmed using other types of special districts (cemetery, recreation and parks, etc.). The final question is whether other dependent variables would result in the same conclusions for the same population.

A more robust qualitative methodology would help both scholars and practitioners to understand the "why." These recommendations are made to continue to close the gap between institutional reform and public choice perspectives.

While researching water district board meeting statistics for this study, two thoughts came to mind regarding further research. Does the board of directors demographically represent their constituency; and, does any significant number of directors use their elected position to aspire to higher elected office.

It should also be noted that this study was not designed to determine whether water district boards of directors represent the demographics of their constituency. What does representation mean as it applies to bureaucracy? Future research should be conducted to determine how closely the directors represent their local area population demographics. Such information would help support whether the theory of representative bureaucracy extends to special districts.

In addition, further research should be conducted to study the ambition of elected officials who aspire to higher office. Some might see election to a water district board of directors simply as a springboard to higher office. An evaluation of motivations for seeking reelection or running for higher office to determine whether the springboard phenomenon occurs should be made.

Finally, the relationships between representation, accountability, and efficiency merit further attention in the literature. Future research should devote more theoretical as well as empirical attention to these issues

Summary

Collectively, these finding confirm that there are no significant differences between small water districts and large water districts in fiscal performance, organizational structure, and customer relations indicators. Additionally, there were no observed differences between small and large water districts and the relationship of board meeting statistics.

One significant lesson learned from the study of special districts is that not all are created equal. Scholars including Burns (1994), Foster (1997), and Morgan (1996) have

argued that generalizations about special districts are often meaningless. Foster (1997) found,

> When analysts and policymakers speak of special districts, emphasis must be on the final "s" [special districts are plural]. As the conceptual and empirical analyses have emphasized, districts are far from a uniform local government type motivated by a single factor and driven toward a single outcome. (pp. 218-219)

It was not expected that the results of this research would bridge the gap between institutional reform and public choice theorists, so in that regard, the discussion was not concluded. The expectation from this study is that the findings of the research will add to the body of knowledge for others to consider and build on.

The gap between reformers and public choice supporters is wide and may never be closed. There may be unique situations or circumstances that may favor one theory over the other in practical application, but it is more likely that some common ground or narrowing of the gap can be found to allow the two theories to coexist.

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APPENDICES

APPENDIX A

California Special Districts

Special Districts by Type:

Special District Type (California)	Number
Air Pollution Control	31
Airport	10
Bridge and Highway	1
California Water	132
Cemetery	253
Citrus Pest Control	10
Community Services	335
County Sanitation	77
County Service Area	852
County Water	173
County Waterworks	29
Drainage	23
Fire Protection	385
Flood Control and Water Conservation	41
Flood Control Maintenance Area	10
Garbage Disposal	8
Harbor and Port	13
Health	3
Highway Lighting	142
Hospital	84
Irrigation	94
Joint Powers Authority	1,382
Levee	13
Library	13
Maintenance	241
Memorial	27
Metropolitan Water	1
Mosquito Abatement	48
Municipal Improvement	5
Municipal Utility	5
Municipal Water	38
Nonprofit Corporation	158
Parking	17
Permanent Road Division	55

Pest Abatement	4
Police Protection	3
Public Utility	54
Reclamation	155
Recreation and Park	114
Resource Conservation	103
Road Maintenance	3
Sanitary	73
Sanitation and Flood Control	2
Separation of Grade	1
Sewer and Sewer Maintenance	18
Storm Water Drainage and Maintenance	23
Water Agency or Authority	31
Water Conservation	13
Water Replenishment	2
Water Storage	8
50 different special district types totaling	**5,316**

Source: California State Controller's office.

Special Districts Listing:

Entity Name or Number of Districts	**County**	**Activity Type**	**District Type**
Twenty-one (21)	State-wide	Air Pollution Control	Dependent
Ten (10)	State-wide	Air Pollution Control	Independent
Ten (10)	State-wide	Airport	Independent
One (1)	San Francisco	Bridge & Highway	Independent
Twenty-five (25)	State-wide	California Water	Dependent
4-E Water District	Glenn	California Water	Independent
4-M Water District	Colusa	California Water	Independent
Adams Springs Water District	Lake	California Water	Independent
Angiola Water District	Tulare	California Water	Independent
Antelope Valley Water District	Mono	California Water	Independent
Atwell Island Water District	Tulare	California Water	Independent
Ballico-Cortez Water District	Merced	California Water	Independent
Bard Water District	Imperial	California Water	Independent

Bear Valley Water District	Alpine	California Water	Independent
Bella Vista Water District	Shasta	California Water	Independent
Berrenda Mesa Water District	Kern	California Water	Independent
Biggs-West Gridley Water District	Butte	California Water	Independent
Borrego Water District	San Diego	California Water	Independent
Brophy Water District	Yuba	California Water	Independent
Butte Water District	Butte	California Water	Independent
Caspar South Water District	Mendocino	California Water	Independent
Cawelo Water District	Kern	California Water	Independent
Chiriaco Summit Water District	Riverside	California Water	Independent
Chowchilla Water District	Madera	California Water	Independent
Clay Water District	Sacramento	California Water	Independent
Corning Water District	Tehama	California Water	Independent
Cortina Water District	Colusa	California Water	Independent
Cuyamaca Water District	San Diego	California Water	Independent
Davis Water District	Colusa	California Water	Independent
Del Puerto Water District	Stanislaus	California Water	Independent
Dudley Ridge Water District	Kings	California Water	Independent
Dunnigan Water District	Yolo	California Water	Independent
Eagle Field Water District	Merced	California Water	Independent
Eastside Water District	Stanislaus	California Water	Independent
El Solyo Water District	Stanislaus	California Water	Independent
El Toro Water District	**Orange**	**California Water**	**Independent**
Farmers Water District	Fresno	California Water	Independent
Feather Water District	Sutter	California Water	Independent
Fern Valley Water District	Riverside	California Water	Independent
Fresno Slough Water District	Fresno	California Water	Independent
Garfield Water District	Fresno	California Water	Independent
Glide Water District	Glenn	California Water	Independent
Grassland Water District	Merced	California Water	Independent
Gravelly Ford Water District	Madera	California Water	Independent
Henry Miller Water District	Kern	California Water	Independent
High Valleys Water District	Riverside	California Water	Independent
International Water District	Fresno	California Water	Independent
Irish Beach Water District	Mendocino	California Water	Independent
Irvine Ranch Water District	**Orange**	**California Water**	**Independent**
Kanawha Water District	Glenn	California Water	Independent

Kern Delta Water District	Kern	California Water	Independent
Kern-Tulare Water District	Kern	California Water	Independent
Kings River Water District	Fresno	California Water	Independent
Kirkwood Water District	Tehama	California Water	Independent
LaGrande Water District	Colusa	California Water	Independent
Lake Madrone Water District	Butte	California Water	Independent
Lakeside Irrigation Water District	Kings	California Water	Independent
Last Chance Creek Water District	Plumas	California Water	Independent
Le Grand-Athlone Water District	Merced	California Water	Independent
Leland Meadow Water District	Tuolumne	California Water	Independent
Lewis Creek Water District	Tulare	California Water	Independent
Liberty Water District	Fresno	California Water	Independent
Los Carneros Water District	Napa	California Water	Independent
Lost Hills Water District	Kern	California Water	Independent
Madera Water District	Madera	California Water	Independent
Maine Prairie Water District	Solano	California Water	Independent
McKinney Water District	Placer	California Water	Independent
Melga Water District	Kings	California Water	Independent
Mercy Springs Water District	Fresno	California Water	Independent
Mid Valley Water District	Fresno	California Water	Independent
Moulton-Niguel Water District	**Orange**	**California Water**	**Independent**
North Dos Palos Water District	Merced	California Water	Independent
Oak Flat Water District	Stanislaus	California Water	Independent
Oakwood Lake Water District	San Joaquin	California Water	Independent
Omochumne - Hartnell Water District	Sacramento	California Water	Independent
Orland-Artois Water District	Glenn	California Water	Independent
Oro Loma Water District	Fresno	California Water	Independent
Pacheco Pass Water District	San Benito	California Water	Independent
Pacheco Water District	Merced	California Water	Independent
Pacific Reefs Water District	Mendocino	California Water	Independent
Panoche Water District	Fresno	California Water	Independent
Patterson Irrigation District	Stanislaus	California Water	Independent
Pleasant Valley Water District	Fresno	California Water	Independent
Proberta Water District	Tehama	California Water	Independent
Quail Valley Water District	Kern	California Water	Independent
Raisin City Water District	Fresno	California Water	Independent
Ramirez Water District	Yuba	California Water	Independent

Rancho California Water District	**Riverside**	**California Water**	**Independent**
Rio Alto Water District	Tehama	California Water	Independent
Rock Creek Water District	Stanislaus	California Water	Independent
Root Creek Water District	Madera	California Water	Independent
San Ardo Water District	Monterey	California Water	Independent
San Luis Water District	Merced	California Water	Independent
Santa Margarita Water District	**Orange**	**California Water**	**Independent**
South Sutter Water District	Sutter	California Water	Independent
Spanish Flat Water District	Napa	California Water	Independent
St. Johns Water District	Tulare	California Water	Independent
Stinson Water District	Fresno	California Water	Independent
Stony Creek Water District	Glenn	California Water	Independent
Sutter Extension Water District	Sutter	California Water	Independent
Tea Pot Dome Water District	Tulare	California Water	Independent
Temescal Valley Water District	Riverside	California Water	Independent
Thomes Creek Water District	Tehama	California Water	Independent
Tri Valley Water District	Fresno	California Water	Independent
Tucker Oaks Water District	Shasta	California Water	Independent
Turner Island Water District	Merced	California Water	Independent
Walnut Valley Water District	**Los Angeles**	**California Water**	**Independent**
Western Canal Water District	Butte	California Water	Independent
Westlands Water District	Fresno	California Water	Independent
Westside Water District	Colusa	California Water	Independent
Wheatland Water District	Yuba	California Water	Independent
Widren Water District	Fresno	California Water	Independent
Twenty-nine (29)	State-wide	Cemetery	Dependent
Two hundred Twenty-four (224)	State-wide	Cemetery	Independent
Four (4)	State-wide	Citrus Pest Control	Dependent
Six (6)	State-wide	Citrus Pest Control	Independent
Thirty (30)	State-wide	Community Services	Dependent
Three hundred Five (305)	State-wide	Community Services	Independent
Sixty-seven (67)	State-wide	County Sanitation	Dependent
Ten (10)	State-wide	County Sanitation	Independent

Eight hundred Fifty-one (851)	State-wide	County Service Area	Dependent
One (1)	Sacramento	County Service Area	Independent
Twenty (20)	State-wide	County Water	Dependent
Alameda County Water District	**Alameda**	**County Water**	**Independent**
Aldercroft Heights County Water District	Santa Clara	County Water	Independent
Alderpoint County Water District	Humboldt	County Water	Independent
Alleghany County Water District	Sierra	County Water	Independent
Alpine Springs County Water District	Placer	County Water	Independent
Apple Valley Foothill County Water District	San Bernardino	County Water	Independent
Apple Valley Heights County Water District	San Bernardino	County Water	Independent
Aromas County Water District	San Benito	County Water	Independent
Arrowbear Park County Water District	San Bernardino	County Water	Independent
Buckingham Park Water District	Lake	County Water	Independent
Burney Water District	Shasta	County Water	Independent
Buttonwillow County Water District	Kern	County Water	Independent
Cabazon County Water District	Riverside	County Water	Independent
Calaveras County Water District	**Calaveras**	**County Water**	**Independent**
Callayomi County Water District	Lake	County Water	Independent
Calpella County Water District	Mendocino	County Water	Independent
Camrosa Water District	**Ventura**	**County Water**	**Independent**
Canebrake County Water District	San Diego	County Water	Independent
Carpinteria Valley Water District	Santa Barbara	County Water	Independent
Castle Rock County Water District	Contra Costa	County Water	Independent
Cedarville County Water District	Modoc	County Water	Independent
Central Water District	Santa Cruz	County Water	Independent
Circle Oaks County Water District	Napa	County Water	Independent
Clearlake Oaks Water District	Lake	County Water	Independent
Coachella Valley Water District	**Riverside**	**County Water**	**Independent**
Coastside County Water District	San Mateo	County Water	Independent
Cobb Area County Water District	Lake	County Water	Independent
Colusa County Water District	Colusa	County Water	Independent
Congress Valley Water District	Napa	County Water	Independent
Contra Costa Water District	**Contra Costa**	**County Water**	**Independent**
Cottonwood Water District	Shasta	County Water	Independent
Crescenta Valley County Water District	**Los Angeles**	**County Water**	**Independent**

Crestline Village Water District	San Bernardino	County Water	Independent
Cucamonga Valley Water District	**San Bernardino**	**County Water**	**Independent**
Del Paso Manor Water District	Sacramento	County Water	Independent
Delhi County Water District	Merced	County Water	Independent
Diablo Water District	**Contra Costa**	**County Water**	**Independent**
Drytown County Water District	Amador	County Water	Independent
East Orange County Water District	Orange	County Water	Independent
East Valley Water District	**San Bernardino**	**County Water**	**Independent**
El Dorado Hills County Water District	El Dorado	County Water	Independent
Elk County Water District	Mendocino	County Water	Independent
Firebaugh Canal Water District	Fresno	County Water	Independent
Florin County Water District	Sacramento	County Water	Independent
Forestville Water District	Sonoma	County Water	Independent
Franklin County Water District	Merced	County Water	Independent
Free Water County Water District	Fresno	County Water	Independent
Garden Farms Community Water District	San Luis Obispo	County Water	Independent
Goleta Water District	**Santa Barbara**	**County Water**	**Independent**
Green Valley County Water District	Los Angeles	County Water	Independent
Greenfield County Water District	Kern	County Water	Independent
Hi-Desert Water District	San Bernardino	County Water	Independent
Hilmar County Water District	Merced	County Water	Independent
Home Garden County Water District	Riverside	County Water	Independent
Hydesville County Water District	Humboldt	County Water	Independent
Idyllwild Water District	Riverside	County Water	Independent
Indian Wells Valley Water District	**Kern**	**County Water**	**Independent**
Jacoby Creek County Water District	Humboldt	County Water	Independent
Juniper-Riviera County Water District	San Bernardino	County Water	Independent
Kings County Water District	Kings	County Water	Independent
Konocti County Water District	Lake	County Water	Independent
La Habra Heights County Water District	Los Angeles	County Water	Independent
La Puente Valley County Water	Los Angeles	County Water	Independent
Laytonville County Water District	Mendocino	County Water	Independent
Lebec County Water District	Kern	County Water	Independent
Leucadia Wastewater District	San Diego	County Water	Independent
Linda County Water District	Yuba	County Water	Independent
Linden County Water District	San Joaquin	County Water	Independent
Lompico County Water District	Santa Cruz	County Water	Independent

Malaga County Water District	Fresno	County Water	Independent
Mammoth County Water District	Mono	County Water	Independent
Mariana Ranchos County Water District	San Bernardino	County Water	Independent
Marina Coast Water District	**Monterey**	**County Water**	**Independent**
Meadow Vista County Water District	Placer	County Water	Independent
Meiners Oaks County Water District	Ventura	County Water	Independent
Merquin County Water District	Merced	County Water	Independent
Mesa Water District (Orange)	**Orange**	**County Water**	**Independent**
Mettler County Water District	Kern	County Water	Independent
Mid-Peninsula Water District	**San Mateo**	**County Water**	**Independent**
Midway Heights County Water District	Placer	County Water	Independent
Millview County Water District	Mendocino	County Water	Independent
Mineral County Water District	Tehama	County Water	Independent
Mission Springs Water District	**Riverside**	**County Water**	**Independent**
Monte Vista Water District	**San Bernardino**	**County Water**	**Independent**
Montecito Water District	Santa Barbara	County Water	Independent
Newell County Water District	Modoc	County Water	Independent
Newhall County Water District	Los Angeles	County Water	Independent
North Coast County Water District	**San Mateo**	**County Water**	**Independent**
North Edwards Water District	Kern	County Water	Independent
North Marin Water District	**Marin**	**County Water**	**Independent**
North Yuba Water District	Yuba	County Water	Independent
Orchard Dale Water District	**Los Angeles**	**County Water**	**Independent**
Palo Verde County Water District	Imperial	County Water	Independent
Pico Water District	**Los Angeles**	**County Water**	**Independent**
Pine Cove Water District	Riverside	County Water	Independent
Pinedale County Water District	Fresno	County Water	Independent
Pinyon Pines County Water District	Riverside	County Water	Independent
Pleasant Valley County Water District	Ventura	County Water	Independent
Purissima Hills Water District	Santa Clara	County Water	Independent
Quartz Hill Water District	Los Angeles	County Water	Independent
Rains Creek Water District	Sonoma	County Water	Independent
Rand Communities Water District	Kern	County Water	Independent
Redwood Valley County Water District	Mendocino	County Water	Independent
Rio Linda-Elverta Community Water District	Sacramento	County Water	Independent
Rossmoor/Los Alamitos Area Sewer District	Orange	County Water	Independent
Round Valley County Water District	Mendocino	County Water	Independent

Rowland Area County Water District	**Los Angeles**	**County Water**	**Independent**
Running Springs Water District	San Bernardino	County Water	Independent
Russian River County Water District	Sonoma	County Water	Independent
Sacramento Suburban Water District	**Sacramento**	**County Water**	**Independent**
San Gabriel County Water District	**Los Angeles**	**County Water**	**Independent**
San Juan Ridge County Water District	Nevada	County Water	Independent
San Lorenzo Valley Water District	Santa Cruz	County Water	Independent
San Lucas County Water District	Monterey	County Water	Independent
San Martin County Water District	Santa Clara	County Water	Independent
Santa Nella County Water District	Merced	County Water	Independent
Sativa-Los Angeles County Water District	Los Angeles	County Water	Independent
Sawyers Bar County Water District	Siskiyou	County Water	Independent
Scotts Valley Water District	Santa Cruz	County Water	Independent
Seeley County Water District	Imperial	County Water	Independent
Sierra Lakes County Water District	Placer	County Water	Independent
Skyview County Water District	Tehama	County Water	Independent
Sonoma Mountain County Water District	Sonoma	County Water	Independent
Soquel Creek Water District	**Santa Cruz**	**County Water**	**Independent**
South Coast Water District	**Orange**	**County Water**	**Independent**
South Dos Palos County Water District	Merced	County Water	Independent
South Yuba Water District	Yuba	County Water	Independent
Squaw Valley Public Service District	Placer	County Water	Independent
Stinson Beach County Water District	Marin	County Water	Independent
Sunnyslope County Water District	San Benito	County Water	Independent
Sweetwater Springs Water District	Sonoma	County Water	Independent
Tehachapi-Cummings County Water Dist	Kern	County Water	Independent
Thunderbird County Water District	San Bernardino	County Water	Independent
Timber Cove County Water District	Sonoma	County Water	Independent
Trabuco Canyon Water District	Orange	County Water	Independent
Tuolumne Utilities District	**Tuolumne**	**County Water**	**Independent**
Twentynine Palms County Water District	San Bernardino	County Water	Independent
Upper Lake County Water District	Lake	County Water	Independent
Vallecitos Water District	**San Diego**	**County Water**	**Independent**
Valley County Water District	**Los Angeles**	**County Water**	**Independent**
Valley of the Moon Water District	Sonoma	County Water	Independent
Ventura River County Water District	Ventura	County Water	Independent
Washington County Water District	Nevada	County Water	Independent

West Kern Water District	Kern	County Water	Independent
West Valley County Water	Los Angeles	County Water	Independent
West Valley Water District	**San Bernardino**	**County Water**	**Independent**
Westborough County Water District	San Mateo	County Water	Independent
Westport County Water District	Mendocino	County Water	Independent
Willow County Water District	Mendocino	County Water	Independent
Windsor County Water District	Sonoma	County Water	Independent
Winterhaven Water District	Imperial	County Water	Independent
Yorba Linda Water District	**Orange**	**County Water**	**Independent**
Yucaipa Valley Water District	**San Bernardino**	**County Water**	**Independent**
Twenty-six (26)	State-wide	County Waterworks	Dependent
Three (3)	State-wide	County Waterworks	Independent
Seven (7)	State-wide	Drainage	Dependent
Sixteen (16)	State-wide	Drainage	Independent
Seventy-four (74)	State-wide	Fire Protection	Dependent
Three hundred Eleven (311)	State-wide	Fire Protection	Independent
Thirty-one (31)	State-wide	Fld Cntrl & Water Cnsrv	Dependent
Ten (10)	State-wide	Fld Cntrl & Water Cnsrv	Independent
Ten (10)	State-wide	Flood Cntrl Maint Area	Dependent
Seven (7)	State-wide	Garbage Disposal	Dependent
One (1)	Monterey	Garbage Disposal	Independent
Two (2)	State-wide	Harbor & Port	Dependent
Eleven (11)	State-wide	Harbor & Port	Independent
Two (2)	State-wide	Health	Dependent
One (1)	Mendocino	Health	Independent
One hundred Forty-two (142)	State-wide	Highway Lighting	Dependent
Thirteen (13)	State-wide	Hospital	Dependent

Seventy-one (71)	State-wide	Hospital	Independent
Six (6)	State-wide	Irrigation	Dependent
Alpaugh Irrigation District	Tulare	Irrigation	Independent
Alta Irrigation District	Tulare	Irrigation	Independent
Anderson-Cottonwood Irrigation District	Shasta	Irrigation	Independent
Banta-Carbona Irrigation District	San Joaquin	Irrigation	Independent
Beaumont-Cherry Valley Water District	**Riverside**	**Irrigation**	**Independent**
Big Springs Irrigation District	Siskiyou	Irrigation	Independent
Browns Valley Irrigation District	Yuba	Irrigation	Independent
Butte Valley Irrigation District	Siskiyou	Irrigation	Independent
Byron-Bethany Irrigation District	Contra Costa	Irrigation	Independent
Camp Far West Irrigation District	Yuba	Irrigation	Independent
Carmichael Water District	**Sacramento**	**Irrigation**	**Independent**
Central California Irrigation District	Merced	Irrigation	Independent
Citrus Heights Water District	**Sacramento**	**Irrigation**	**Independent**
Consolidated Irrigation District	Fresno	Irrigation	Independent
Corcoran Irrigation District	Kings	Irrigation	Independent
Cordua Irrigation District	Yuba	Irrigation	Independent
Delano-Earlimart Irrigation District	Tulare	Irrigation	Independent
Ducor Irrigation District	Tulare	Irrigation	Independent
Durham Irrigation District	Butte	Irrigation	Independent
East Contra Costa Irrigation District	Contra Costa	Irrigation	Independent
El Camino Irrigation District	Tehama	Irrigation	Independent
El Dorado Irrigation District	**El Dorado**	**Irrigation**	**Independent**
Empire West Side Irrigation District	Kings	Irrigation	Independent
Exeter Irrigation District	Tulare	Irrigation	Independent
Fair Oaks Water District	**Sacramento**	**Irrigation**	**Independent**
Fresno Irrigation District	Fresno	Irrigation	Independent
Galt Irrigation District	Sacramento	Irrigation	Independent
Glenn-Colusa Irrigation District	Glenn	Irrigation	Independent
Grenada Irrigation District	Siskiyou	Irrigation	Independent
Helix Water District	**San Diego**	**Irrigation**	**Independent**
Hills Valley Irrigation District	Fresno	Irrigation	Independent
Hot Spring Valley Irrigation District	Modoc	Irrigation	Independent
Imperial Irrigation District	Imperial	Irrigation	Independent
Ivanhoe Irrigation District	Tulare	Irrigation	Independent

Jackson Valley Irrigation District	Amador	Irrigation	Independent
James Irrigation District	Fresno	Irrigation	Independent
Kinneloa Irrigation District	Los Angeles	Irrigation	Independent
La Canada Irrigation District	Los Angeles	Irrigation	Independent
Laguna Irrigation District	Fresno	Irrigation	Independent
Lakeside Water District	**San Diego**	**Irrigation**	**Independent**
Lindmore Irrigation District	Tulare	Irrigation	Independent
Lindsay-Strathmore Irrigation District	Tulare	Irrigation	Independent
Littlerock Creek Irrigation District	Los Angeles	Irrigation	Independent
Lower Tule River Irrigation District	Tulare	Irrigation	Independent
Madera Irrigation District	Madera	Irrigation	Independent
Maxwell Irrigation District	Colusa	Irrigation	Independent
McAllister Ranch Irrigation District	Kern	Irrigation	Independent
Merced Irrigation District	Merced	Irrigation	Independent
Modesto Irrigation District	Stanislaus	Irrigation	Independent
Montague Water Conservation District	Siskiyou	Irrigation	Independent
Naglee Burk Irrigation District	San Joaquin	Irrigation	Independent
Nevada Irrigation District	**Nevada**	**Irrigation**	**Independent**
Oakdale Irrigation District	Stanislaus	Irrigation	Independent
Orange Cove Irrigation District	Fresno	Irrigation	Independent
Palm Ranch Irrigation District	Los Angeles	Irrigation	Independent
Palmdale Water District	**Los Angeles**	**Irrigation**	**Independent**
Palo Verde Irrigation District	Riverside	Irrigation	Independent
Paradise Irrigation District	**Butte**	**Irrigation**	**Independent**
Pixley Irrigation District	Tulare	Irrigation	Independent
Porterville Irrigation District	Tulare	Irrigation	Independent
Potter Valley Irrigation District	Mendocino	Irrigation	Independent
Princeton-Codora-Glenn Irrigation District	Colusa	Irrigation	Independent
Provident Irrigation District	Glenn	Irrigation	Independent
Richvale Irrigation District	Butte	Irrigation	Independent
Riverdale Irrigation District	Fresno	Irrigation	Independent
Santa Fe Irrigation District	**San Diego**	**Irrigation**	**Independent**
Saucelito Irrigation District	Tulare	Irrigation	Independent
Scott Valley Irrigation District	Siskiyou	Irrigation	Independent
Serrano Irrigation District	Orange	Irrigation	Independent
Shafter-Wasco Irrigation District	Kern	Irrigation	Independent
Solano Irrigation District	Solano	Irrigation	Independent

South Bay Irrigation District	San Diego	Irrigation	Independent
South Feather Water and Power Agency	Butte	Irrigation	Independent
South Fork Irrigation District	Modoc	Irrigation	Independent
South Montebello Irrigation District	Los Angeles	Irrigation	Independent
South San Joaquin Irrigation District	San Joaquin	Irrigation	Independent
Stone Corral Irrigation District	Tulare	Irrigation	Independent
Stratford Irrigation District	Kings	Irrigation	Independent
Terra Bella Irrigation District	Tulare	Irrigation	Independent
Thermalito Water and Sewer District	Butte	Irrigation	Independent
Tranquillity Irrigation District	Fresno	Irrigation	Independent
Tulare Irrigation District	Tulare	Irrigation	Independent
Tulelake Irrigation District	Siskiyou	Irrigation	Independent
Turlock Irrigation District	Stanislaus	Irrigation	Independent
Vista Irrigation District	**San Diego**	**Irrigation**	**Independent**
West Side Irrigation District	San Joaquin	Irrigation	Independent
West Stanislaus Irrigation District	Stanislaus	Irrigation	Independent
Woodbridge Irrigation District	San Joaquin	Irrigation	Independent
One Thousand Three Hundred Eighty-two (1,382)	State-wide	JPA	JPA
Nine (9)	State-wide	Levee	Dependent
Four (4)	State-wide	Levee	Independent
Two (2)	State-wide	Library	Dependent
Eleven (11)	State-wide	Library	Independent
Two hundred Forty-one (241)	State-wide	Maintenance	Dependent
Two (2)	State-wide	Memorial	Dependent
Twenty-five (25)	State-wide	Memorial	Independent
One (1)	Los Angeles	Metropolitan Water	Independent
One (1)	Santa Clara	Mosquito Abatement	Dependent
Forty-seven (47)	State-wide	Mosquito Abatement	Independent
Three (3)	State-wide	Municipal Impr	Dependent

Two (2)	State-wide	Municipal Impr	Independent
East Bay Municipal Utility District	**Alameda**	**Municipal Utility**	**Independent**
Lassen Municipal Utility District	Lassen	Municipal Utility	Independent
Sacramento Municipal Utility District	Sacramento	Municipal Utility	Independent
South Placer Municipal Utility District	Placer	Municipal Utility	Independent
Southern San Joaquin MUD	Kern	Municipal Utility	Independent
Four (4)	State-wide	Municipal Water	Dependent
Big Bear Municipal Water District	San Bernardino	Municipal Water	Independent
Calleguas Municipal Water District	Ventura	Municipal Water	Independent
Casitas Municipal Water	Ventura	Municipal Water	Independent
Central Basin Municipal Water District	Los Angeles	Municipal Water	Independent
Eastern Municipal Water District	**Riverside**	**Municipal Water**	**Independent**
Elsinore Valley MWD	**Riverside**	**Municipal Water**	**Independent**
Foothill Municipal Water District	Los Angeles	Municipal Water	Independent
Golden Valley Municipal Water District	Los Angeles	Municipal Water	Independent
Hidden Valley Municipal Water District	Ventura	Municipal Water	Independent
Humboldt Bay Municipal Water District	Humboldt	Municipal Water	Independent
Inland Empire Utilities Agency	San Bernardino	Municipal Water	Independent
Lake Hemet Municipal Water District	**Riverside**	**Municipal Water**	**Independent**
Las Virgenes Municipal Water District	**Los Angeles**	**Municipal Water**	**Independent**
Marin Municipal Water District	**Marin**	**Municipal Water**	**Independent**
Mootamai Municipal Water District	San Diego	Municipal Water	Independent
MWD of Orange County	Orange	Municipal Water	Independent
North of the River MWD	Kern	Municipal Water	Independent
Olivenhain Municipal Water District	**San Diego**	**Municipal Water**	**Independent**
Otay Water District	**San Diego**	**Municipal Water**	**Independent**
Padre Dam Municipal Water District	**San Diego**	**Municipal Water**	**Independent**
Pauma Municipal Water District	San Diego	Municipal Water	Independent
Questhaven Municipal Water District	San Diego	Municipal Water	Independent
Rainbow Municipal Water District	San Diego	Municipal Water	Independent
Ramona Municipal Water District	**San Diego**	**Municipal Water**	**Independent**
Rincon Del Diablo MWD	**San Diego**	**Municipal Water**	**Independent**
San Bernardino Valley MWD	San Bernardino	Municipal Water	Independent
San Gabriel Valley MWD	Los Angeles	Municipal Water	Independent
San Luis Rey Municipal Water District	San Diego	Municipal Water	Independent

Three Valleys Municipal Water District	Los Angeles	Municipal Water	Independent
Upper San Gabriel Valley MWD	Los Angeles	Municipal Water	Independent
Valley Center MWD	**San Diego**	**Municipal Water**	**Independent**
West Basin Municipal Water District	Los Angeles	Municipal Water	Independent
Western Municipal Water District	**Riverside**	**Municipal Water**	**Independent**
Yuima Municipal Water District	San Diego	Municipal Water	Independent
One hundred Fifty-four (158)	State-wide	Nonprofit Corp	Nonprofit
Corp			
Seventeen (17)	State-wide	Parking	Dependent
Fifty-five (55)	State-wide	Perm Road Division	Dependent
Two (2)	Modoc	Pest Abatement	Dependent
Two (2)	State-wide	Pest Abatement	Independent
Three (3)	State-wide	Police Protection	Independent
Three (3)	State-wide	Public Utility	Dependent
Arbuckle Public Utility District	Colusa	Public Utility	Independent
Bodega Bay Public Utility District	Sonoma	Public Utility	Independent
Bolinas Community Public Utility	Marin	Public Utility	Independent
Bridgeport Public Utility District	Mono	Public Utility	Independent
Calaveras Public Utility District	Calaveras	Public Utility	Independent
Chester Public Utility District	Plumas	Public Utility	Independent
Clio Public Utility District	Plumas	Public Utility	Independent
Donner Summit Public Utility District	Nevada	Public Utility	Independent
Downieville Public Utility District	Sierra	Public Utility	Independent
Earlimart Public Utility District	Tulare	Public Utility	Independent
Enos Lane Public Utility District	Kern	Public Utility	Independent
Fallbrook Public Utility District	**San Diego**	**Public Utility**	**Independent**
Foresthill Public Utility District	Placer	Public Utility	Independent
Frazier Park Public Utility District	Kern	Public Utility	Independent
Georgetown Divide PUD	El Dorado	Public Utility	Independent
Heber Public Utility District	Imperial	Public Utility	Independent
Herlong Public Utility District	Lassen	Public Utility	Independent

Hopland Public Utility District	Mendocino	Public Utility	Independent
Inverness Public Utility District	Marin	Public Utility	Independent
Ivanhoe Public Utility District	Tulare	Public Utility	Independent
Johnsville Public Utility District	Plumas	Public Utility	Independent
June Lake Public Utility District	Mono	Public Utility	Independent
Kirkwood Meadows PUD	Alpine	Public Utility	Independent
Lake Oroville Area PUD	Butte	Public Utility	Independent
Lamont Public Utility District	Kern	Public Utility	Independent
Lee Vining Public Utility District	Mono	Public Utility	Independent
Mariposa Public Utility District	Mariposa	Public Utility	Independent
Markleeville Public Utility District	Alpine	Public Utility	Independent
Maxwell Public Utility District	Colusa	Public Utility	Independent
Mojave Public Utility District	Kern	Public Utility	Independent
North Tahoe Public Utility District	Placer	Public Utility	Independent
Olivehurst Public Utility District	Yuba	Public Utility	Independent
Orosi Public Utility District	Tulare	Public Utility	Independent
Pinedale Public Utility District	Fresno	Public Utility	Independent
Pixley Public Utility District	Tulare	Public Utility	Independent
Porter Vista Public Utility District	Tulare	Public Utility	Independent
Post Mountain Public Utility District	Trinity	Public Utility	Independent
River Pines Public Utility District	Amador	Public Utility	Independent
Riverdale Public Utility District	Fresno	Public Utility	Independent
Sierraville Public Utility District	Sierra	Public Utility	Independent
South Tahoe Public Utility District	**El Dorado**	**Public Utility**	**Independent**
Springville Public Utility District	Tulare	Public Utility	Independent
Stratford Public Utility District	Kings	Public Utility	Independent
Strathmore Public Utility District	Tulare	Public Utility	Independent
Tahoe City Public Utility District	Placer	Public Utility	Independent
Tranquillity Public Utility District	Fresno	Public Utility	Independent
Trinity Public Utilities District	Trinity	Public Utility	Independent
Truckee-Donner Public Utility District	Nevada	Public Utility	Independent
Union Public Utility District	Calaveras	Public Utility	Independent
Valley Springs Public Utility District	Calaveras	Public Utility	Independent
Woodville Public Utility District	Tulare	Public Utility	Independent
Forty-two (42)	State-wide	Reclamation	Dependent
One hundred Thirteen (113)	State-wide	Reclamation	Independent

Twenty-seven (27)	State-wide	Recreation & Park	Dependent
Eighty-seven (87)	State-wide	Recreation & Park	Independent
Eighteen (18)	State-wide	Resource Conserv	Dependent
Eighty-five (85)	State-wide	Resource Conserv	Independent
Three (3)	State-wide	Road Maintenance	Dependent
Fifteen (15)	State-wide	Sanitary	Dependent
Fifty-eight (58)	State-wide	Sanitary	Independent
One (1)	Solano	Sanit & Flood Cntrl	Dependent
Two (2)	State-wide	Sanit & Flood Cntrl	Independent
Seventeen (17)	State-wide	Sewer & Sewer Maint	Dependent
One (1)	Solano	Sewer & Sewer Maint	Independent
Twenty (20)	State-wide	Storm Drain & Maint	Dependent
Three (3)	Tulare	Storm Drain & Maint	Independent
Seventeen (17)	State-wide	Water Agency/Auth	Dependent
Amador Water Agency	Amador	Water Agency/Auth	Independent
Antelope Valley-East Kern Water Agency	Kern	Water Agency/Auth	Independent
Bighorn-Desert View Water Agency	San Bernardino	Water Agency/Auth	Independent
Castaic Lake Water Agency	Los Angeles	Water Agency/Auth	Independent
Desert Water Agency	**Riverside**	**Water Agency/Auth**	**Independent**
Kern County Water Agency	Kern	Water Agency/Auth	Independent
Mojave Water Agency	San Bernardino	Water Agency/Auth	Independent
Monterey Peninsula Water Mgmt Dist	Monterey	Water Agency/Authority	Independent
Ojai Basin Groundwater Mgmt Agency	Ventura	Water Agency/Authority	Independent
Orange County Water District	Orange	Water Agency/Authority	Independent
Pajaro Valley Water Management Agency	Santa Cruz	Water Agency/Authority	Independent
Placer County Water Agency	Placer	Water Agency/Authority	Independent
San Gorgonio Pass Water Agency	Riverside	Water Agency/Authority	Independent
Santa Clara Valley Water District	Santa Clara	Water Agency/Authority	Independent

One (1)	Lake	Water Conservation	Dependent
Twelve (12)	State-wide	Water Conservation	Independent
One (1)	Ventura	Water Replenishment	Dependent
One (1)	Los Angeles	Water Replenishment	Independent
Eight (8)	Kern & Kings	Water Storage	Independent

California Special District Population (N) = 5,316

Sample (n) = 65 (Bold & Highlighted)

APPENDIX B

Statistical Analysis

Social Science Statistics

Home Calculators Descriptive Statistics Merchandise Tutorials Quizzes Which Statistics Test? Contact

RQ1 Pg1

T-Test Calculator for 2 Independent Means

Success!

Explanation of results

The output of this calculator is pretty straightforward. The values of *t* and *p* appear at the bottom of the page. If the text is blue, your result is significant; if it's red, it's not. The only thing that might catch you out is the way that we've rounded the data. The data you see in front of you, apart from the *t* and *p* values at the page bottom, has been rounded to 2 significant figures. However, we did not round when actually calculating the values of *t* and *p*. This means if you try to calculate these values on the basis of the summary data provided here, you're likely going to end up with a different, less accurate, result. This is especially the case if you're dealing with numbers that are fractions of 1.

Treatment 1 (*X*)	*Diff* (*X* - *M*)	*Sq. Diff* (*X* - *M*)^2
1666.7	728.33	530467.24
1487.3	548.93	301326.14
366.1	-572.27	327490.87
578.5	-359.87	129505.11
382.9	-555.47	308544.90
1219.6	281.23	79091.34
831.5	-106.87	11420.81
1032.9	94.53	8936.26
833.3	-105.07	11039.32
637.1	-301.27	90762.52
778.8	-159.57	25462.00
589.5	-348.87	121709.01
420.9	-517.47	267773.32
315.4	-622.97	388089.36
949.0	10.63	113.04
1972.2	1033.83	1068808.23
1800.7	862.33	743616.16
750.5	-187.87	35294.45
661.8	-276.57	76489.96
1367.6	429.23	184239.95
1250.0	311.63	97114.39
431.8	-506.57	256611.32
1105.4	167.03	27899.63
673.1	-265.27	70367.21
833.4	-104.97	11018.32
1500.0	561.63	315430.30
248.9	-689.47	475366.37
787.1	-151.27	22882.06
1572.5	634.13	402123.16
1638.3	699.93	489904.55
1357.1	418.73	175336.34
891.3	-47.07	2215.41
1069.4	131.03	17169.34
772.5	-165.87	27512.25
1900.0	961.63	924735.75
603.1	-335.27	112404.75
835.4	-102.97	10602.45
956.5	18.13	328.76
867.4	-70.97	5036.48
788.4	-149.97	22490.46
558.8	-379.57	144072.00
685.2	-253.17	64094.13
553.6	-384.77	148046.55
766.7	-171.67	29469.96
	M: 938.37	SS: 8562411.96

Treatment 2 (X)	$Diff\,(X - M)$	$Sq.\ Diff\,(X - M)^2$
1342.1	264.34	69877.15
1289.6	211.84	44877.40
1718.8	641.04	410935.94
1173.6	95.84	9185.85
465.0	-612.76	375471.32
797.2	-280.56	78712.31
1437.3	359.54	129271.07
806.7	-271.06	73471.97
1078.6	0.84	0.71
1025.3	-52.46	2751.75
631.1	-446.66	199502.60
589.3	-488.46	238590.38
1422.7	344.94	118985.57
1491.7	413.94	171348.69
1500.0	422.24	178289.03
1400.8	323.04	104356.69
505.4	-572.36	327592.70
1399.2	321.44	103325.51
1031.7	-46.06	2121.26
844.8	-232.96	54269.03
682.0	-395.76	156623.72
	M: 1077.76	SS: 2849560.65

RQ1 Pg2

Significance Level:

- .01
- .05
- .10

One-tailed or two-tailed hypothesis?:

- One-tailed
- Two-tailed

Difference Scores Calculations

Treatment 1

N_1: 44
$df_1 = N - 1 = 44 - 1 = 43$
M_1: 938.37
SS_1: 8562411.96
$s^2_1 = SS_1/(N - 1) = 8562411.96/(44-1) = 199125.86$

Treatment 2

N_2: 21
$df_2 = N - 1 = 21 - 1 = 20$
M_2: 1077.76
SS_2: 2849560.65
$s^2_2 = SS_2/(N - 1) = 2849560.65/(21-1) = 142478.03$

T-value Calculation

$s^2_p = ((df_1/(df_1 + df_2)) * s^2_1) + ((df_2/(df_2 + df_2)) * s^2_2) = ((43/63) * 199125.86) + ((20/63) * 142478.03) = 181142.42$

$s^2_{M_1} = s^2_p/N_1 = 181142.42/44 = 4116.87$
$s^2_{M_2} = s^2_p/N_2 = 181142.42/21 = 8625.83$

$t = (M_1 - M_2)/\sqrt{(s^2_{M_1} + s^2_{M_2})} = -139.39/\sqrt{12742.7} = -1.23$

The *t*-value is -1.2348. The *p*-value is .22149. The result is *not* significant at $p < .05$.

Calculate T and P Values | Reset

RQ2 Pg1

T-Test Calculator for 2 Independent Means

Success!

Explanation of results

The output of this calculator is pretty straightforward. The values of *t* and *p* appear at the bottom of the page. If the text is blue, your result is significant; if it's red, it's not. The only thing that might catch you out is the way that we've rounded the data. The data you see in front of you, apart from the *t* and *p* values at the page bottom, has been rounded to 2 significant figures. However, we did not round when actually calculating the values of *t* and *p*. This means if you try to calculate these values on the basis of the summary data provided here, you're likely going to end up with a different, less accurate, result. This is especially the case if you're dealing with numbers that are fractions of 1.

Treatment 1 (*X*)	*Diff* (*X* - *M*)	*Sq. Diff* (*X* - *M*)^2
180	-140.11	19631.83
139	-181.11	32802.15
600	279.89	78336.38
243	-77.11	5946.51
269	-51.11	2612.60
361	40.89	1671.69
323	2.89	8.33
441	120.89	14613.51
530	209.89	44052.29
355	34.89	1217.06
249	-71.11	5057.15
477	156.89	24613.33
598	277.89	77220.83
407	86.89	7549.24
224	-96.11	9237.83
176	-144.11	20768.74
201	-119.11	14188.06
185	-135.11	18255.69
416	95.89	9194.19
195	-125.11	15653.42
237	-83.11	6907.88
249	-71.11	5057.15
251	-69.11	4776.69
294	-26.11	681.92
315	-5.11	26.15
123	-197.11	38853.79
405	84.89	7205.69
169	-151.11	22835.33
357	36.89	1360.60
222	-98.11	9626.29
256	-64.11	4110.56
280	-40.11	1609.10
277	-43.11	1858.79
393	72.89	5312.42
164	-156.11	24371.47
451	130.89	17131.24
400	79.89	6381.83
281	-39.11	1529.88
499	178.89	32000.33
448	127.89	16354.92
435	114.89	13198.88
117	-203.11	41255.15
550	229.89	52847.74
343	22.89	523.79
	M: 320.11	SS: 718448.43

Treatment 2 (X)	$Diff(X - M)$	$Sq.\ Diff(X - M)^2$
328	36.71	1347.94
207	-84.29	7104.08
266	-25.29	639.37
183	-108.29	11725.80
251	-40.29	1622.94
502	210.71	44400.51
324	32.71	1070.22
345	53.71	2885.22
282	-9.29	86.22
202	-89.29	7971.94
315	23.71	562.37
528	236.71	56033.65
318	26.71	713.65
341	49.71	2471.51
145	-146.29	21399.51
242	-49.29	2429.08
327	35.71	1275.51
258	-33.29	1107.94
197	-94.29	8889.80
251	-40.29	1622.94
305	13.71	188.08
	M: 291.29	SS: 175548.29

RQ2 Pg2

Significance Level:

- .01
- .05
- .10

One-tailed or two-tailed hypothesis?:

- One-tailed
- Two-tailed

Difference Scores Calculations

Treatment 1

N_1: 44
$df_1 = N - 1 = 44 - 1 = 43$
M_1: 320.11
SS_1: 718448.43
$s^2_1 = SS_1/(N - 1) = 718448.43/(44-1) = 16708.1$

Treatment 2

N_2: 21
$df_2 = N - 1 = 21 - 1 = 20$
M_2: 291.29
SS_2: 175548.29
$s^2_2 = SS_2/(N - 1) = 175548.29/(21-1) = 8777.41$

T-value Calculation

$s^2_p = ((df_1/(df_1 + df_2)) * s^2_1) + ((df_2/(df_2 + df_2)) * s^2_2) = ((43/63) * 16708.1) + ((20/63) * 8777.41) = 14190.42$

$s^2_{M_1} = s^2_p/N_1 = 14190.42/44 = 322.51$
$s^2_{M_2} = s^2_p/N_2 = 14190.42/21 = 675.73$

$t = (M_1 - M_2)/\sqrt{(s^2_{M_1} + s^2_{M_2})} = 28.83/\sqrt{998.24} = 0.91$

The t-value is 0.91242. The p-value is .365026. The result is *not* significant at $p < .05$.

Calculate T and P Values | Reset

RQ3 Pg1

T-Test Calculator for 2 Independent Means

Success!

Explanation of results

The output of this calculator is pretty straightforward. The values of *t* and *p* appear at the bottom of the page. If the text is blue, your result is significant; if it's red, it's not. The only thing that might catch you out is the way that we've rounded the data. The data you see in front of you, apart from the *t* and *p* values at the page bottom, has been rounded to 2 significant figures. However, we did not round when actually calculating the values of *t* and *p*. This means if you try to calculate these values on the basis of the summary data provided here, you're likely going to end up with a different, less accurate, result. This is especially the case if you're dealing with numbers that are fractions of 1.

Treatment 1 (*X*)	*Diff* (*X* - *M*)	*Sq. Diff* (*X* - *M*)^2
1804.77	-3950.84	15609151.07
2127.62	-3627.99	13162324.63
9393.62	3638.01	13235103.53
3055.58	-2700.03	7290171.82
5947.70	192.09	36897.87
2416.11	-3339.50	11152272.39
3053.93	-2701.68	7299084.65
6495.15	739.54	546916.72
4191.69	-1563.92	2445851.45
12596.92	6841.31	46803497.64
2322.38	-3433.23	11787080.72
6358.00	602.39	362871.52
6567.97	812.36	659925.82
6458.32	702.71	493798.79
2910.49	-2845.12	8094718.16
5176.41	-579.20	335474.75
3662.81	-2092.80	4379819.45
5235.44	-520.17	270578.72
3444.42	-2311.19	5341607.62
3131.77	-2623.84	6884545.89
3514.76	-2240.85	5021416.87
2454.09	-3301.52	10900046.32
7959.73	2204.12	4858136.96
7275.81	1520.20	2311002.51
3248.04	-2507.57	6287916.42
3617.27	-2138.34	4572505.73
12345.00	6589.39	43420036.61
8718.55	2962.94	8779002.67
4463.17	-1292.44	1670405.85
5516.47	-239.14	57188.81
5007.45	-748.16	559746.11
4547.50	-1208.11	1459534.17
10970.73	5215.12	27197457.65
10858.24	5102.63	26036814.36
2644.28	-3111.33	9680385.68
7054.70	1299.09	1687630.10
4785.88	-969.73	940379.80
5348.65	-406.96	165617.92
13645.00	7889.39	62242445.88
3057.49	-2698.12	7279861.35
6676.80	921.19	848587.67
3590.74	-2164.87	4686669.99
13452.16	7696.55	59236853.92
6143.31	387.70	150309.88
	M: 5755.61	SS: 446241646.43

Treatment 2 (X)	$Diff(X - M)$	$Sq.\ Diff(X - M)^2$
5057.12	-764.41	584329.93
3995.42	-1826.11	3334695.12
4908.34	-913.19	833924.67
3722.58	-2099.03	4405946.93
3217.52	-2604.01	6780892.88
12110.38	6288.85	39549574.43
3750.78	-2070.75	4288025.28
10545.67	4724.14	22317453.75
6102.13	280.60	78733.69
2023.02	-3798.51	14428714.40
4041.42	-1780.11	3168808.57
13578.00	7756.47	60162752.99
4570.60	-1250.93	1564837.78
8071.45	2249.92	5062118.58
4705.91	-1115.62	1244618.61
4228.61	-1592.92	2537409.30
9072.86	3251.33	10571115.80
4509.76	-1311.77	1720753.03
5992.98	171.45	29393.47
6232.99	411.46	169295.41
1814.77	-4006.76	16054163.86
	M: 5821.53	SS: 198887558.47

RQ3 Pg2

Significance Level:

- .01
- .05
- .10

One-tailed or two-tailed hypothesis?:

- One-tailed
- Two-tailed

Difference Scores Calculations

Treatment 1

N_1: 44
$df_1 = N - 1 = 44 - 1 = 43$
M_1: 5755.61
SS_1: 446241646.43
$s^2_1 = SS_1/(N - 1) = 446241646.43/(44-1) = 10377712.71$

Treatment 2

N_2: 21
$df_2 = N - 1 = 21 - 1 = 20$
M_2: 5821.53
SS_2: 198887558.47
$s^2_2 = SS_2/(N - 1) = 198887558.47/(21-1) = 9944377.92$

T-value Calculation

$s^2_p = ((df_1/(df_1 + df_2)) * s^2_1) + ((df_2/(df_2 + df_2)) * s^2_2) = ((43/63) * 10377712.71) + ((20/63) * 9944377.92) = 10240146.11$

$s^2_{M_1} = s^2_p/N_1 = 10240146.11/44 = 232730.59$
$s^2_{M_2} = s^2_p/N_2 = 10240146.11/21 = 487626.01$

$t = (M_1 - M_2)/\sqrt{(s^2_{M_1} + s^2_{M_2})} = -65.92/\sqrt{720356.6} = -0.08$

The t-value is -0.07767. The p-value is .938535. The result is not significant at $p < .05$.

Calculate T and P Values | Reset

RQ4 Pg1

T-Test Calculator for 2 Independent Means

Success!

Explanation of results

The output of this calculator is pretty straightforward. The values of *t* and *p* appear at the bottom of the page. If the text is blue, your result is significant; if it's red, it's not. The only thing that might catch you out is the way that we've rounded the data. The data you see in front of you, apart from the *t* and *p* values at the page bottom, has been rounded to 2 significant figures. However, we did not round when actually calculating the values of *t* and *p*. This means if you try to calculate these values on the basis of the summary data provided here, you're likely going to end up with a different, less accurate, result. This is especially the case if you're dealing with numbers that are fractions of 1.

Treatment 1 (*X*)	*Diff* (*X* - *M*)	*Sq. Diff* (*X* - *M*)^2
71.98	-11.96	143.14
37.52	-46.42	2155.22
112.79	28.85	832.07
63.33	-20.61	424.95
112.44	28.50	812.00
160.05	76.11	5792.07
52.37	-31.57	996.94
154.55	70.61	4985.16
60.62	-23.32	544.02
66.93	-17.01	289.49
111.63	27.69	766.50
117.68	33.74	1138.10
129.30	45.36	2057.14
58.76	-25.18	634.25
43.31	-40.63	1651.15
85.42	1.48	2.18
67.21	-16.73	280.04
41.24	-42.70	1823.66
175.00	91.06	8291.14
164.00	80.06	6408.91
72.85	-11.09	123.08
89.50	5.56	30.87
41.42	-42.52	1808.32
63.73	-20.21	408.62
69.11	-14.83	220.06
68.23	-15.71	246.94
49.88	-34.06	1160.38
76.88	-7.06	49.90
77.78	-6.16	38.00
50.96	-32.98	1087.97
71.25	-12.69	161.15
65.24	-18.70	349.85
86.27	2.33	5.41
50.83	-33.11	1096.56
85.40	1.46	2.12
71.58	-12.36	152.88
61.45	-22.49	505.99
55.01	-28.93	837.19
98.13	14.19	201.23
118.74	34.80	1210.74
147.40	63.46	4026.62
65.01	-18.93	358.51
74.10	-9.84	96.91
96.67	12.73	161.94
	M: 83.94	SS: 54369.36

RQ4 Pg2

Treatment 2 (X)	$Diff(X - M)$	$Sq.\ Diff(X - M)^2$
68.66	-3.69	13.65
61.79	-10.56	111.61
76.56	4.21	17.68
50.36	-21.99	483.77
81.69	9.34	87.15
70.65	-1.70	2.91
105.15	32.80	1075.53
65.87	-6.48	42.05
58.93	-13.42	180.22
38.82	-33.53	1124.58
90.21	17.86	318.81
94.13	21.78	474.16
77.80	5.45	29.65
114.30	41.95	1759.40
80.33	7.98	63.60
73.13	0.78	0.60
23.76	-48.59	2361.45
89.90	17.55	307.84
40.96	-31.39	985.63
51.33	-21.02	442.04
105.12	32.77	1073.56
	M: 72.35	SS: 10955.90

Significance Level:

- .01
- (•) .05
- .10

One-tailed or two-tailed hypothesis?:

- One-tailed
- (•) Two-tailed

Difference Scores Calculations

Treatment 1

N_1: 44
$df_1 = N - 1 = 44 - 1 = 43$
M_1: 83.94
SS_1: 54369.36
$s^2_1 = SS_1/(N - 1) = 54369.36/(44-1) = 1264.4$

Treatment 2

N_2: 21
$df_2 = N - 1 = 21 - 1 = 20$
M_2: 72.35
SS_2: 10955.9
$s^2_2 = SS_2/(N - 1) = 10955.9/(21-1) = 547.8$

T-value Calculation

$s^2_p = ((df_1/(df_1 + df_2)) * s^2_1) + ((df_2/(df_2 + df_2)) * s^2_2) = ((43/63) * 1264.4) + ((20/63) * 547.8) = 1036.91$

$s^2_{M_1} = s^2_p/N_1 = 1036.91/44 = 23.57$
$s^2_{M_2} = s^2_p/N_2 = 1036.91/21 = 49.38$

$t = (M_1 - M_2)/\sqrt{(s^2_{M_1} + s^2_{M_2})} = 11.59/\sqrt{72.94} = 1.36$

The *t*-value is 1.35699. The *p*-value is .179627. The result is *not* significant at $p < .05$

Calculate T and P Values | Reset

RQ5 Pg1

T-Test Calculator for 2 Independent Means

Success!

Explanation of results

The output of this calculator is pretty straightforward. The values of *t* and *p* appear at the bottom of the page. If the text is blue, your result is significant; if it's red, it's not. The only thing that might catch you out is the way that we've rounded the data. The data you see in front of you, apart from the *t* and *p* values at the page bottom, has been rounded to 2 significant figures. However, we did not round when actually calculating the values of *t* and *p*. This means if you try to calculate these values on the basis of the summary data provided here, you're likely going to end up with a different, less accurate, result. This is especially the case if you're dealing with numbers that are fractions of 1.

Treatment 1 (*X*)	*Diff* (*X* - *M*)	*Sq. Diff* (*X* - *M*)^2
16.2	6.63	43.97
9.8	0.23	0.05
5.8	-3.77	14.21
5.0	-4.57	20.88
3.0	-6.57	43.15
11.0	1.43	2.05
6.2	-3.37	11.35
5.0	-4.57	20.88
10.8	1.23	1.52
10.0	0.43	0.19
14.2	4.63	21.45
12.8	3.23	10.44
11.4	1.83	3.35
11.2	1.63	2.66
12.6	3.03	9.19
11.4	1.83	3.35
12.7	3.13	9.80
7.4	-2.17	4.70
9.8	0.23	0.05
3.6	-5.97	35.63
15.0	5.43	29.50
7.4	-2.17	4.70
11.0	1.43	2.05
4.4	-5.17	26.72
5.6	-3.97	15.75
19.4	9.83	96.65
11.4	1.83	3.35
3.6	-5.97	35.63
9.8	0.23	0.05
	M: 9.57	SS: 473.26

Treatment 2 (*X*)	*Diff* (*X* - *M*)	*Sq. Diff* (*X* - *M*)^2
17.2	5.23	27.37
8.0	-3.97	15.75
14.8	2.83	8.02
11.8	-0.17	0.03
11.0	-0.97	0.94
14.4	2.43	5.91
7.6	-4.37	19.08
14.4	2.43	5.91
12.6	0.63	0.40
18.0	6.03	36.38
4.6	-7.37	54.29
7.0	-4.97	24.69
8.2	-3.77	14.20
6.8	-5.17	26.71
21.0	9.03	81.57
12.6	0.63	0.40
22.7	10.73	115.17
5.4	-6.57	43.14
9.3	-2.67	7.12
	M: 11.97	SS: 487.08

Significance Level:

- .01
- .05
- .10

One-tailed or two-tailed hypothesis?:

- One-tailed
- Two-tailed

Difference Scores Calculations

Treatment 1

N_1: 29
$df_1 = N - 1 = 29 - 1 = 28$
M_1: 9.57
SS_1: 473.26
$s^2_1 = SS_1/(N - 1) = 473.26/(29-1) = 16.9$

Treatment 2

N_2: 19
$df_2 = N - 1 = 19 - 1 = 18$
M_2: 11.97
SS_2: 487.08
$s^2_2 = SS_2/(N - 1) = 487.08/(19-1) = 27.06$

T-value Calculation

$s^2_p = ((df_1/(df_1 + df_2)) * s^2_1) + ((df_2/(df_2 + df_2)) * s^2_2) = ((28/46) * 16.9) + ((18/46) * 27.06) = 20.88$

$s^2_{M_1} = s^2_p/N_1 = 20.88/29 = 0.72$
$s^2_{M_2} = s^2_p/N_2 = 20.88/19 = 1.1$

$t = (M_1 - M_2)/\sqrt{(s^2_{M_1} + s^2_{M_2})} = -2.4/\sqrt{1.82} = -1.78$

RQ5 Pg2

The t-value is -1.77924. The p-value is .081509. The result is not significant at $p < .05$.

Calculate T and P Values | Reset

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RQ1 Pg1

Mann-Whitney U Test Calculator

Success! The value of *U* is 362.5.

Explanation of Results

As you can no doubt see, this calculator spits out quite a lot of information. Most of it is self-explanatory, but there are a couple of things worth noting.

First, there is no standard way for the Mann-Whitney *U* test to handle tied ranks, which means if your data has tied ranks, you're going to get a different result for *U* depending on the statistics package you use (for a discussion of some of the issues this raises, see this article, for example).

Second, where the number of scores (i.e., the value of *N*) in each sample is 10 or more, you can assume that your sampling distribution is approximately normal. This means you can use a *Z*-ratio to calculate the value of *p*.

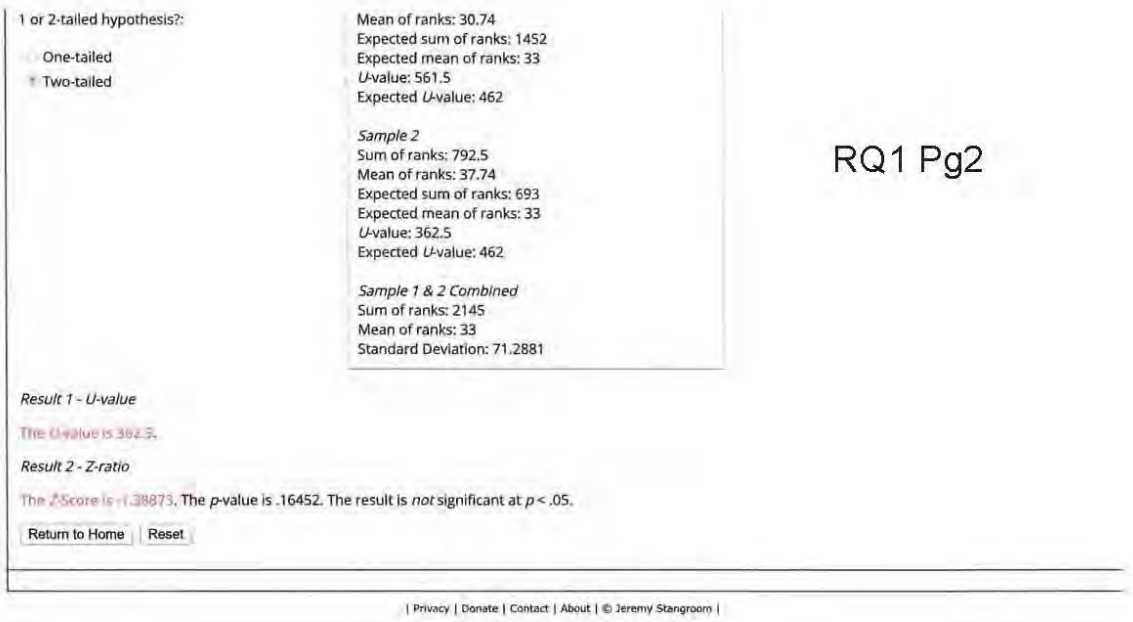
Sample 1	Sample 2	*S1 Values*	*S1 Ranks*	*S2 Values*	*S2 Ranks*
1666.7	1342.1	248.9	1	465	7
1487.3	1289.6	315.4	2	505.4	8
366.1	1718.8	366.1	3	589.3	12
578.5	1173.6	382.9	4	631.1	15
382.9	465.0	420.9	5	682	19
1219.6	797.2	431.8	6	797.2	27
831.5	1437.3	553.6	9	806.7	28
1032.9	806.7	558.8	10	844.8	33
833.3	1078.6	578.5	11	1025.3	38
637.1	1025.3	589.5	13	1031.7	39
778.8	631.1	603.1	14	1078.6	42
589.5	589.3	637.1	16	1173.6	44
420.9	1422.7	661.8	17	1289.6	47
315.4	1491.7	673.1	18	1342.1	48
949.0	1500.0	685.2	20	1399.2	51
1972.2	1400.8	750.5	21	1400.8	52
1800.7	505.4	766.7	22	1422.7	53
750.5	1399.2	772.5	23	1437.3	54
661.8	1031.7	778.8	24	1491.7	56
1367.6	844.8	787.1	25	1500	57.5
1250.0	682.0	788.4	26	1718.8	62
431.8		831.5	29		
1105.4		833.3	30		
673.1		833.4	31		
833.4		835.4	32		
1500.0		867.4	34		
248.9		891.3	35		
787.1		949	36		
1572.5		956.5	37		
1638.3		1032.9	40		
1357.1		1069.4	41		
891.3		1105.4	43		
1069.4		1219.6	45		
772.5		1250	46		
1900.0		1357.1	49		
603.1		1367.6	50		
835.4		1487.3	55		
956.5		1500	57.5		
867.4		1572.5	59		
788.4		1638.3	60		
558.8		1666.7	61		
685.2		1800.7	63		
553.6		1900	64		
766.7		1972.2	65		

Significance Level:

- 0.01
- 0.05

Result Details

Sample 1
Sum of ranks: 1352.5



1 or 2-tailed hypothesis?:

- One-tailed
- Two-tailed

Mean of ranks: 30.74
Expected sum of ranks: 1452
Expected mean of ranks: 33
U-value: 561.5
Expected *U*-value: 462

Sample 2
Sum of ranks: 792.5
Mean of ranks: 37.74
Expected sum of ranks: 693
Expected mean of ranks: 33
U-value: 362.5
Expected *U*-value: 462

Sample 1 & 2 Combined
Sum of ranks: 2145
Mean of ranks: 33
Standard Deviation: 71.2881

RQ1 Pg2

Result 1 - U-value

The U-value is 362.5.

Result 2 - Z-ratio

The Z-Score is -1.38873. The *p*-value is .16452. The result is *not* significant at $p < .05$.

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RQ2 Pg1

Mann-Whitney U Test Calculator

Success! The value of *U* is 419.5.

Explanation of Results

As you can no doubt see, this calculator spits out quite a lot of information. Most of it is self-explanatory, but there are a couple of things worth noting.

First, there is no standard way for the Mann-Whitney *U* test to handle tied ranks, which means if your data has tied ranks, you're going to get a different result for *U* depending on the statistics package you use (for a discussion of some of the issues this raises, see this article, for example).

Second, where the number of scores (i.e., the value of *N*) in each sample is 10 or more, you can assume that your sampling distribution is approximately normal. This means you can use a *Z*-ratio to calculate the value of *p*.

Sample 1	Sample 2	*S1 Values*	*S1 Ranks*	*S2 Values*	*S2 Ranks*
180	328	117	1	145	4
139	207	123	2	183	9
600	266	139	3	197	12
243	183	164	5	202	14
269	251	169	6	207	15
361	502	176	7	242	19
323	324	180	8	251	24
441	345	185	10	251	24
530	282	195	11	258	27
355	202	201	13	266	28
249	315	222	16	282	33
477	528	224	17	305	35
598	318	237	18	315	36.5
407	341	243	20	318	38
224	145	249	21.5	324	40
176	242	249	21.5	327	41
201	327	251	24	328	42
185	258	256	26	341	43
416	197	269	29	345	45
195	251	277	30	502	60
237	305	280	31	528	61
249		281	32		
251		294	34		
294		315	36.5		
315		323	39		
123		343	44		
405		355	46		
169		357	47		
357		361	48		
222		393	49		
256		400	50		
280		405	51		
277		407	52		
393		416	53		
164		435	54		
451		441	55		
400		448	56		
281		451	57		
499		477	58		
448		499	59		
435		530	62		
117		550	63		
550		598	64		
343		600	65		

Significance Level:

- 0.01
- 0.05

Result Details

Sample 1
Sum of ranks: 1494.5

1 or 2-tailed hypothesis?:

- One-tailed
- Two-tailed

Mean of ranks: 33.97
Expected sum of ranks: 1452
Expected mean of ranks: 33
U-value: 419.5
Expected *U*-value: 462

Sample 2
Sum of ranks: 650.5
Mean of ranks: 30.98
Expected sum of ranks: 693
Expected mean of ranks: 33
U-value: 504.5
Expected *U*-value: 462

Sample 1 & 2 Combined
Sum of ranks: 2145
Mean of ranks: 33
Standard Deviation: 71.2881

RQ2 Pg2

Result 1 - U-value

The *U*-value is 419.5.

Result 2 - Z-ratio

The *Z*-Score is 0.58916. The *p*-value is .5552. The result is *not* significant at $p < .05$.

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RQ3 Pg1

Mann-Whitney U Test Calculator

Success! The value of *U* is 847.

Explanation of Results

As you can no doubt see, this calculator spits out quite a lot of information. Most of it is self-explanatory, but there are a couple of things worth noting.

First, there is no standard way for the Mann-Whitney *U* test to handle tied ranks, which means if your data has tied ranks, you're going to get a different result for *U* depending on the statistics package you use (for a discussion of some of the issues this raises, see this article, for example).

Second, where the number of scores (i.e., the value of *N*) in each sample is 10 or more, you can assume that your sampling distribution is approximately normal. This means you can use a *Z*-ratio to calculate the value of *p*.

Sample 1	Sample 2	*S1 Values*	*S1 Ranks*	*S2 Values*	*S2 Ranks*
1804.77	5057.12	1804.77	1	1814.77	2
2127.62	3995.42	2127.62	4	2023.02	3
9393.62	4908.34	2322.38	5	3217.52	14
3055.58	3722.50	2416.11	6	3722.5	21
5947.70	3217.52	2454.09	7	3750.78	22
2416.11	12110.38	2644.28	8	3995.42	23
3053.93	3750.78	2910.49	9	4041.42	24
6495.15	10545.67	3053.93	10	4228.61	26
4191.69	6102.13	3055.58	11	4509.76	28
12596.92	2023.02	3057.49	12	4570.6	30
2322.38	4041.42	3131.77	13	4705.91	31
6358.00	13578.00	3248.04	15	4908.34	33
6567.97	4570.60	3444.42	16	5057.12	35
6458.32	8071.45	3514.76	17	5992.98	41
2910.49	4705.91	3590.74	18	6102.13	42
5176.41	4228.61	3617.27	19	6232.99	44
3662.81	9072.86	3662.81	20	8071.45	53
5235.44	4509.76	4191.69	25	9072.86	55
3444.42	5992.98	4463.17	27	10545.67	57
3131.77	6232.99	4547.5	29	12110.38	60
3514.76	1814.77	4785.88	32	13578	64
2454.09		5007.45	34		
7959.73		5176.41	36		
7275.81		5235.44	37		
3248.04		5348.65	38		
3617.27		5516.47	39		
12345.00		5947.7	40		
8718.55		6143.31	43		
4463.17		6358	45		
5516.47		6458.32	46		
5007.45		6495.15	47		
4547.50		6567.97	48		
10970.73		6676.8	49		
10858.24		7054.7	50		
2644.28		7275.81	51		
7054.70		7959.73	52		
4785.88		8718.55	54		
5348.65		9393.62	56		
13645.00		10858.24	58		
3057.49		10970.73	59		
6676.80		12345	61		
3590.74		12596.92	62		
13452.16		13452.16	63		
6143.31		13645	65		

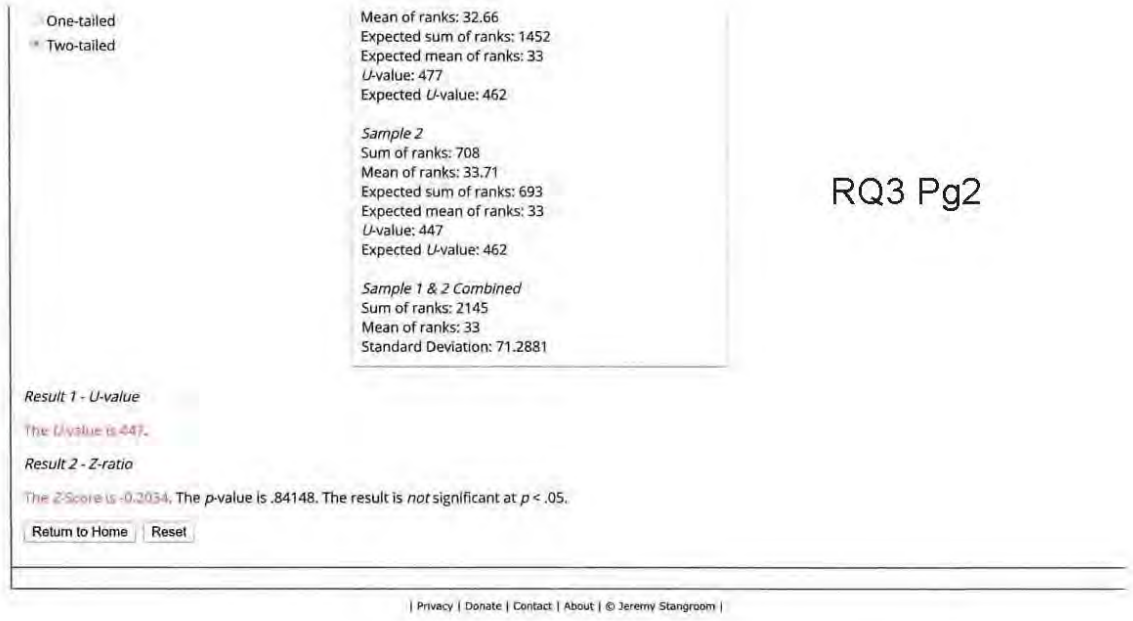
Significance Level:

- 0.01
- 0.05

1 or 2-tailed hypothesis?:

Result Details:

Sample 1
Sum of ranks: 1437


One-tailed
* Two-tailed

Mean of ranks: 32.66
Expected sum of ranks: 1452
Expected mean of ranks: 33
U-value: 477
Expected *U*-value: 462

Sample 2
Sum of ranks: 708
Mean of ranks: 33.71
Expected sum of ranks: 693
Expected mean of ranks: 33
U-value: 447
Expected *U*-value: 462

Sample 1 & 2 Combined
Sum of ranks: 2145
Mean of ranks: 33
Standard Deviation: 71.2881

RQ3 Pg2

Result 1 - U-value

The *U*-value is 447.

Result 2 - Z-ratio

The *Z*-Score is -0.2034. The *p*-value is .84148. The result is *not* significant at $p < .05$.

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RQ4 Pg1

Mann-Whitney U Test Calculator

Success! The value of *U* is 418.

Explanation of Results

As you can no doubt see, this calculator spits out quite a lot of information. Most of it is self-explanatory, but there are a couple of things worth noting.

First, there is no standard way for the Mann-Whitney *U* test to handle tied ranks, which means if your data has tied ranks, you're going to get a different result for *U* depending on the statistics package you use (for a discussion of some of the issues this raises, see this article, for example).

Second, where the number of scores (i.e., the value of *N*) in each sample is 10 or more, you can assume that your sampling distribution is approximately normal. This means you can use a *Z*-ratio to calculate the value of *p*.

Sample 1	Sample 2	*S1 Values*	*S1 Ranks*	*S2 Values*	*S2 Ranks*
71.98	68.66	37.52	2	23.76	1
37.52	61.79	41.24	5	38.82	3
112.79	76.56	41.42	6	40.96	4
63.33	50.36	43.31	7	50.36	9
112.44	81.69	49.88	8	51.33	12
160.05	70.65	50.83	10	58.93	16
52.37	105.15	50.96	11	61.79	19
154.55	65.87	52.37	13	65.87	24
60.62	58.93	55.01	14	68.66	28
66.93	38.82	58.76	15	70.65	30
111.63	90.21	60.62	17	73.13	35
117.68	94.13	61.45	18	76.56	37
129.30	77.80	63.33	20	77.8	40
58.76	114.30	63.73	21	80.33	41
43.31	80.33	65.01	22	81.69	42
85.42	73.13	65.24	23	89.9	47
67.21	23.76	66.93	25	90.21	48
41.24	89.90	67.21	26	94.13	49
175.00	40.96	68.23	27	105.12	52
164.00	51.33	69.11	29	105.15	53
72.85	105.12	71.25	31	114.3	57
89.50		71.58	32		
41.42		71.98	33		
63.73		72.85	34		
69.11		74.1	36		
68.23		76.88	38		
49.88		77.78	39		
76.88		85.4	43		
77.78		85.42	44		
50.96		86.27	45		
71.25		89.5	46		
65.24		96.67	50		
86.27		98.13	51		
50.83		111.63	54		
85.40		112.44	55		
71.58		112.79	56		
61.45		117.68	58		
55.01		118.74	59		
98.13		129.3	60		
118.74		147.4	61		
147.40		154.55	62		
65.01		160.05	63		
74.10		164	64		
96.67		175	65		

Significance Level:

- 0.01
- 0.05

Result Details

Sample 1

1 or 2-tailed hypothesis?:

- One-tailed
- Two-tailed

Sum of ranks: 1498
Mean of ranks: 34.05
Expected sum of ranks: 1452
Expected mean of ranks: 33
U-value: 416
Expected *U*-value: 462

Sample 2
Sum of ranks: 647
Mean of ranks: 30.81
Expected sum of ranks: 693
Expected mean of ranks: 33
U-value: 508
Expected *U*-value: 462

Sample 1 & 2 Combined
Sum of ranks: 2145
Mean of ranks: 33
Standard Deviation: 71.2881

RQ4 Pg2

Result 1 - U-value

The *p*-value is a tie.

Result 2 - Z-ratio

The Z-Score is 0.63825. The *p*-value is .52218. The result is *not* significant at $p < .05$.

Return to Home | Reset

RQ5 Pg1

Mann-Whitney U Test Calculator

Success! The value of *U* is 203.

Explanation of Results

As you can no doubt see, this calculator spits out quite a lot of information. Most of it is self-explanatory, but there are a couple of things worth noting.

First, there is no standard way for the Mann-Whitney *U* test to handle tied ranks, which means if your data has tied ranks, you're going to get a different result for *U* depending on the statistics package you use (for a discussion of some of the issues this raises, see this article, for example).

Second, where the number of scores (i.e., the value of *N*) in each sample is 10 or more, you can assume that your sampling distribution is approximately normal. This means you can use a *Z*-ratio to calculate the value of *p*.

Sample 1	Sample 2	*S1 Values*	*S1 Ranks*	*S2 Values*	*S2 Ranks*
16.2	17.2	3	1	4.6	5
9.8	8.0	3.6	2.5	5.4	8
5.8	14.8	3.6	2.5	6.8	12
5.0	11.8	4.4	4	7	13
3.0	11.0	5	6.5	7.6	16
11.0	14.4	5	6.5	8	17
6.2	7.6	5.6	9	8.2	18
5.0	14.4	5.8	10	9.3	19
10.8	12.6	6.2	11	11	26
10.0	18.0	7.4	14.5	11.8	32
14.2	4.6	7.4	14.5	12.6	34
12.8	7.0	9.8	21	12.6	34
11.4	8.2	9.8	21	14.4	39.5
11.2	6.8	9.8	21	14.4	39.5
12.6	21.0	10	23	14.8	41
11.4	12.6	10.8	24	17.2	44
12.7	22.7	11	26	18	45
7.4	5.4	11	26	21	47
9.8	9.3	11.2	28	22.7	48
3.6		11.4	30		
15.0		11.4	30		
7.4		11.4	30		
11.0		12.6	34		
4.4		12.7	36		
5.6		12.8	37		
19.4		14.2	38		
11.4		15	42		
3.6		16.2	43		
9.8		19.4	46		

Significance Level:

- 0.01
- * 0.05

1 or 2-tailed hypothesis?:

- One-tailed
- * Two-tailed

Result Details

Sample 1
Sum of ranks: 638
Mean of ranks: 22
Expected sum of ranks: 710.5
Expected mean of ranks: 24.5
U-value: 348
Expected *U*-value: 275.5

Sample 2
Sum of ranks: 538
Mean of ranks: 28.32
Expected sum of ranks: 465.5
Expected mean of ranks: 24.5
U-value: 203

Expected *U*-value: 275.5

Sample 1 & 2 Combined
Sum of ranks: 1176
Mean of ranks: 24.5
Standard Deviation: 47.4333

RQ5 Pg2

Result 1 - U-value

The *U*-value is 203.

Result 2 - Z-ratio

The *Z*-Score is -1.51792. The *p*-value is .12852. The result is *not* significant at $p < .05$.

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