Connecting Communities: Factors Influencing Project Implementation Success in the Broadband Technology Opportunities Program

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ABSTRACT

This dissertation explores factors that influenced key performance indicators for project implementation success in broadband infrastructure projects funded by the Broadband Technology Opportunities Program (BTOP), part of the American Recovery and Reinvestment Act of 2009 (Recovery Act). Key performance indicators for project implementation success were operationalized as finishing within the 36-month grant period (schedule), within the proposed budget (budget), and constructing the planned number of network miles (outputs). Drawing on research in policy implementation, public administration, nonprofit management, and project management, a framework was created to identify and categorize these factors as project-specific, organization-centric, physical environment, interorganizational, or legal environment (POPIL). A mixed methods approach investigated factor-indicator relationships using Ordinary Least Squares regression and other quantitative analyses of 67 BTOP-funded Comprehensive Community Infrastructure projects and a qualitative postmortem analysis of Citizens Telephone Cooperative's successful New River Valley Regional Open-Access Network (NRV-ROAN) project. Strong and significant regression equations were developed for the schedule adherence, output adherence, and overall project implementation success indicators. Deficient capacity of organizations to implement proposed projects was a significant and strong negative influence on each of these three indicators along with interorganizational relationship issue reports regarding the principal-agent relationship and relationships with other actors. The postmortem analysis included 17 participant interviews and further underscored the importance of sufficient organizational capacity and strong partnerships to enable organizations to overcome challenges they may encounter during implementation. In addition to testing the POPIL framework, this dissertation highlights the importance of alignment of goals and metrics across the legislative, programmatic, and project levels of implementation to ensure that programs and projects do not work at cross-purposes. For practitioners, the findings also emphasize that projects should be designed within an organization's capacity, and prospective partners should have the expertise and resources both to implement a project as proposed and respond to unexpected events.

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GENERAL AUDIENCE ABSTRACT

This research created and tested a framework for identifying factors that influence the ability of organizations to complete projects successfully within a planned timetable and budget. These proposed factors were categorized as project-specific, organization-centric, physical environment, relationships between organizations, or the legal environment. The framework was applied to a group of 67 broadband infrastructure projects funded through a federal stimulus grant program, the Broadband Technology Opportunities Program (BTOP), to gain an understanding of why some projects were implemented successfully while others fell short of their intended goals. The quantitative analysis found organizations that did not align projects within their existing resources and expertise to allow for unexpected challenges were more likely to experience schedule delays and fail to construct the project as proposed. This analysis also found an increase in the number of issues reported between BTOP and grant recipients led to lower success rates of project implementation. A retrospective analysis of one project, the New River Valley Regional Open-Access Network, used documents and 17 interviews with participants involved in the project's planning and completion to address the questions: What went well? What could have gone better? What should be changed in the future? Interview participants highlighted the importance of an organization's strong leadership, carefully consideration of the limitations of an organization's resources and expertise, and building strong partnerships before undertaking a project. Implications for practitioners include that programs like BTOP that are responsible for the implementation of legislative mandates should encourage a clear articulation and alignment of goals and priorities that is consistent from legislation through program evaluation and down to the measures used to track individual project's progress. While BTOP was a one-time grant program, the findings are valuable for practitioners looking to increase Internet access in communities and those looking for a model to be able to evaluate grant proposals and opportunities for partnerships. The BTOP experience is also a cautionary note for grant making organizations to consider their own resources and organizational limitations as well as those of prospective grant recipients when designing programs and selecting projects to support.

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Some of the most important relationships in my life defy easy explanations and labels. They are people who exist alongside you and become integral parts of who you are.

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Table of Contents

List of Tables

Chapter 1: Introduction

Events often draw our attention only when their paths do not lead to the results we anticipated. We dissect every action of a trip that ends with an accident in order to identify the cause. We cherry pick examples of communities that transform themselves from struggling to shining stars where results drastically surpass expectations in order to determine what magical moment led to success. We focus on the outliers that sit at the extremes of either success or failure and compare them to derive best practices. We do not tend to dissect the average trip to the grocery store that is without incident, the highway built without scandal or cost overruns, or the city with a diversified workforce that protects its fortunes against the swing from boom to bust with every shift in the economy. By concentrating on outliers, we often fail to critically examine the process, or implementation, of those that fall somewhere in between total success and complete failure.

Implementation has been described as a mysterious “black box” (Hoagwood, Atkins, & Ialongo, 2013) where inputs and their resulting outputs are known, but where the transformative process by which the former becomes the latter remains shrouded as unknown, or—more importantly—unknowable. At policy implementation analysis’s macro level view, this “black box” can obstruct our ability to observe the process that takes place within individual projects’ implementation. However, if we shift our focus to evaluate implementation also at a micro level with individual projects, the “black box” may resemble more closely an airplane’s black box that will reveal implementation’s intricate details rather than obscuring the process. The view through the lens of policy implementation may have been too broad to be able to look inside the process, but narrowly concentrating on an individual project creates its own drawbacks. Having too limited of a perspective can result in attention that overly focuses on that project’s particulars and peculiarities at the cost of being able to situate it fully within the broader landscape, which was one of the critiques by Sabatier and Mazmanian (1980) of the earliest work in policy implementation analysis. Such an intense focus can prevent observers from gaining a comprehensive understanding of the process and factors that may affect it and the anticipated outputs/outcomes.

This work bridges the gap between the macro-level policy implementation literature and the micro-level, applied project management literature to bring attention to the specific details involved in a project's implementation and situate them within a broader context to better answer the question "What factors influence project implementation success?" Building off of existing literature in policy implementation, project management, and other related studies, I propose a more comprehensive framework of hypothesized factors that fall into one or more of five categories to explain project implementation success**:** Project-specific, Organization-centric, Physical Environment, Interorganizational Relationships, or Legal Environment (POPIL). This research tests the POPIL framework in the context of capital projects funded by a federal stimulus program and dedicated to expanding broadband access across the country to understand the relationship, if any, between factors and whether a project succeeds in meeting the key performance indicators of planned outputs, schedule adherence, and budget adherence.

The dissertation applies this framework to answer the question "what factors influenced successful implementation of Comprehensive Community Infrastructure projects in the Broadband Technology Opportunities Program (BTOP)?" BTOP was one of the American Reinvestment and Recovery Act (ARRA) programs intended to lessen the digital divide by expanding access to physical infrastructure, increasing the number and availability of public computing centers, and teaching digital literacy courses. The program, administered by the

National Telecommunications & Information Administration (NTIA) within the Department of Commerce, is part of a long history stretching back to the New Deal in which non-federal agencies and businesses received federal funding to construct needed infrastructure across the country.

Stimulating Broadband and Connecting Communities

In the 1930s, the federal government recognized that there was a growing disparity between urban and rural areas in the expansion of electricity and telephone infrastructure. While nine out of ten urban areas had access to electricity, the reverse was true in rural areas where electricity was only available for one out of ten farms and other rural locations (NRECA, 2016). To address this problem, the federal government created the Rural Electrification Administration (REA) as part of the New Deal to aid small mutual and cooperative electricity providers in deploying infrastructure to high-cost areas through low-interest loans. This assistance expanded to include telephone infrastructure by 1950 where a rural/urban disparity also existed for telephone service because of the high costs per customer associated with building infrastructure in rural areas.

More than fifty years later, a similar disparity, the so-called digital divide, had emerged between urban and rural areas regarding internet access (McConnaughey, Everette, Reynolds, & Lader, 1999). As with electricity service before it, an increasing disparity in access to infrastructure coincided with a downturn in the economy in which the federal government would intervene to stimulate the economy through the American Reinvestment and Recovery Act of 2009 (Recovery Act) this time. Construction of new infrastructure was a way to provide immediate economic assistance for short-term economic recovery through the creation of construction jobs. Once the infrastructure was in place, it then would help provide the means for longer-term economic recovery as manufacturing and agriculture-based economies transformed into a knowledge-based economy.

The Recovery Act provided funds for two main programs intended to support broadband infrastructure deployment in unserved and underserved areas: the Broadband Initiatives Program administered by the Rural Utilities Service within the Department of Agriculture and the Broadband Technology Opportunities Program (BTOP) under the control of the National Telecommunications and Information Administration (NTIA) within the Department of Commerce. While the former was created as part of more general rural development efforts in Title I of the Recovery Act, BTOP was created through Title VI as a standalone stimulus program ("American Recovery and Reinvestment Act of 2009," 2009). This dissertation focuses on the Comprehensive Community Infrastructure projects funded through BTOP with an investigation into factors that led to project implementation success or failure in the program.

A brief history of the Internet. In October 1995, the United States' Federal Networking Council defined the "Internet" as "the global information system that…is logically linked together by a globally unique address space…and provides, uses or makes accessible…high level services layered on the communications and related infrastructure described herein" (NITRD, 1995). To understand how this "global information system" came to be, we must look back more than 50 years. Prior to the 1960s, information could only travel from point A to point B courtesy of signals that delivered it in a particular order and via a particular route using a direct circuit. Direct circuits were the basis of prior communications methods, such as the telegraph and telephone, and required switchboards and relay operators to ensure the signal continued uninterrupted. At the height of the Cold War and with advances in computer science, researchers began theorizing that communication between two devices could take place using discrete packets of data instead of continuous circuits. A 1965 attempt to connect a Massachusetts computer to one in California demonstrated that direct circuit connections were insufficient for handling computer-to-computer interactions. The transition from direct transmission of data to transmission of data in packets would allow more information to travel simultaneously and also opened the possibility for data to travel through distributed networks in which signals could be interrupted or redirected without the information being lost (Internet Society, 2012). The potential for continued communication, even when routes are interrupted, was extremely appealing to the federal government during the height of the Cold War amid fears of how the military would be able to communicate in the event of a nuclear attack (Sterling 1993). However, the Internet Society (2012) declared that this was not the primary driver behind networking-related innovations in the 1960s.

The US Department of Defense's Advanced Research Projects Agency (ARPA) began funding research and development into packet-based computer networking in 1967, and the first data transmission occurred in 1969 between a computer at the University of California, Los Angeles (UCLA) and a computer at the Stanford Research Institute (SRI) as the first two nodes of the original ARPANET. Additional nodes at military facilities and major research institutions joined throughout the 1970s and into the 1980s to create a distributed network of computers that could transmit packets of information through any route along a network and still travel from sender to recipient (Internet Society, 2012).

The original network expanded in 1986 to interconnect major research institutions beyond military research with funding from the National Science Foundation. The expanded network, known as NSFNET, is the origin of the core infrastructure that supports most of the Internet in the US today, and this network sent data at the maximum available speed of 56 Kbps

(Leiner, et al., 1996). The actual “World Wide Web” that defines how we maneuver on the Internet through hyperlinks (hence, the “www” portion of web addresses) became publicly available in 1991, followed by the release of the first popular web browser, Mosaic, in 1993. In the almost 25 years since the first web browser, we have seen a rapid proliferation in the scope and reach of the Internet as it integrates into and transforms our lives and society. From a niche service in the early 1990s, 48% of American adults were online by 2000, and 87% of American adults were using the Internet by 2014 (Pew Research Center, 2016).

Concurrent advancements in computer and network capabilities came along with an explosion in usage during this time. As computer processing increased and the use of computers proliferated with a growing consumer market, networks needed to be built and upgraded to keep up with demands. As network connectivity improved, people pushed computers to do more and work faster. Computers and Internet technologies appeared to be the wave of the future with a great many investors attempting to become part of the phenomenon with new businesses and investments in new technologies. Beginning in 2000, Internet users began to shift from dial-up Internet service to broadband as these higher-speed services became available. Pre-2000 Internet users were almost exclusively connecting via dial-up services, but both the actual number of Internet users and the percent of those users that connected via broadband Internet service rose rapidly after 2000. Figure 1 demonstrates the growth of broadband Internet service among American Internet users as their way to access the Internet over a period of 15 years.

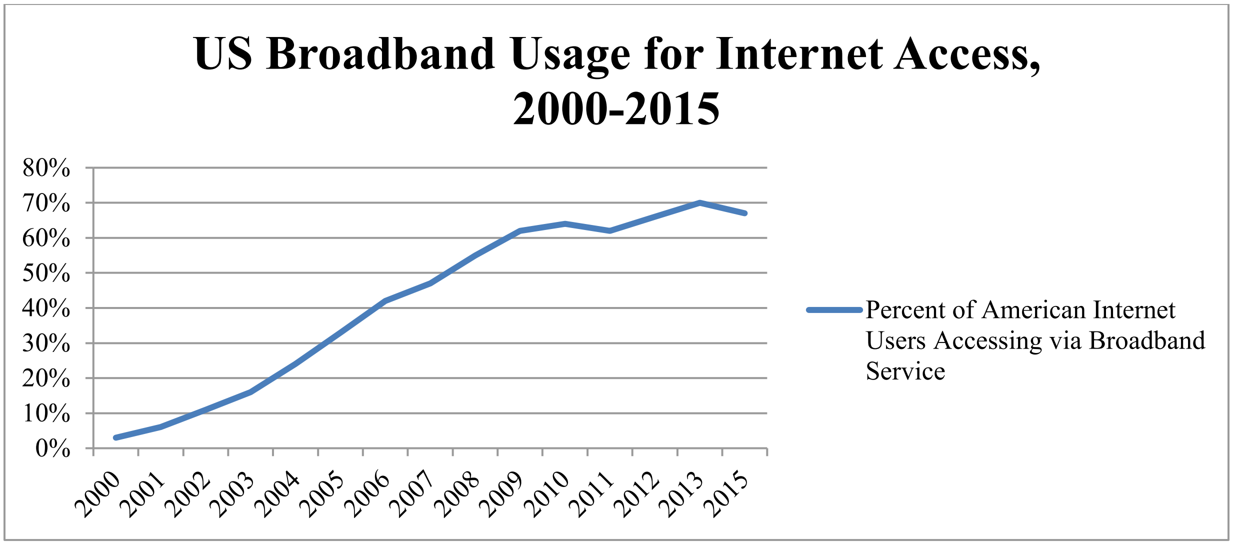

Figure 1 US Broadband Usage for Internet Access

While enterprise-level users in businesses and government agencies had been connecting to the Internet prior to this period via the faster, always-on broadband connections, most residential users during the late 1990s and into the early 2000s were still accessing the Internet via a dial-up Internet Service Provider (ISP). Speeds for this type of service were extremely low by modern standards but had the advantage of not requiring additional infrastructure investments beyond an in-home modem and a traditional phone line at the so-called "last mile" that connects individual end users to the Internet. Broadband Internet service, on the other hand, required significant investments in infrastructure upgrades to existing telephone and cable television systems or entirely new infrastructure using fiber optics for high-speed, high-capacity use.

Into the early 2000s, DSL service that utilized telephone lines or cable Internet service provided by cable television providers were the available options for broadband Internet service. In the early days of these services, the newly passed Telecommunications Act of 1996 regulated DSL and cable Internet under separate sections. Under this Act, the incumbent local exchange carriers (ILECs) were required to share their copper telephone infrastructure lines with additional telephone service providers, known as Competitive Local Exchange Carriers (CLECs), for the purposes of providing local telephone service. This led to competition in telephone service provision and a subsequent increase in competition for the provision of DSL Internet service.

While copper telephone lines were regulated under Title II of the Telecommunications Act, which classified them and their telephone company owners as "common carriers," coaxial cable television lines were regulated under the less stringent "information services" provision of the Telecommunications Act beginning in 2002. Cable companies that began to offer cable Internet service on their systems were thus at an advantage over their DSL competitors because while Internet access via copper for DSL or via coaxial for cable Internet could take place at similar speeds (at the time), cable Internet providers were not required to share their networks. The FCC had the opportunity to equalize the regulatory treatment of DSL Internet and cable Internet service provision in 2005. However, rather than shifting all broadband Internet-capable infrastructure to fall under the regulatory umbrella of Title II common carrier status, the Bush Administration's FCC reclassified DSL Internet service as an information service. This allowed the incumbent providers to restrict access to their networks, putting many of the newer competitive ISPs out of business and leaving a de facto duopoly of the ILEC and local cable television provider for a region's wireline Internet service. This protection of infrastructure providers extended to wireless broadband when the FCC classified it as an "information service" as well in 2007.

Today, we have a variety of ways to connect to the Internet: cable, DSL, and fiber optic wireline Internet connections as well as satellite, mobile, and fixed wireless services. However, not all services are universally accessible to all end users for a variety of physical, economic, or literacy-related issues, and competition for wireline service provision is still limited in most places to a cable and DSL Internet service duopoly. If fiber optics-based internet service, considered the current Holy Grail in terms of speed and capacity, is available in an area, either the telephone or the cable companies typically provide it. Knowing that they have a duopoly for service, there has been little incentive for these companies to invest in infrastructure improvements in lower density areas or to lower pricing for end users unless a threat to their hold on the market emerges. Around 2007-2010, threats to the prior status quo did emerge over broadband Internet in a number of ways: smart devices, network neutrality, Google Fiber, and the government response to the growing digital divide.

The first advancement that threatened the broadband status quo was the June 2007 release of Apple's first iPhone and the October 2008 release of the first Android-based smartphone. In the last eight years, the number of devices that connect to the Internet has exploded. It is common now to have three or more devices per person connecting to a single Internet connection: smartphone, tablet, laptop, desktop, video gaming console, etc. Smart devices have spread beyond phones and tablets to include smart thermostats, smart refrigerators, and smart cars, all of which rely on always-on connectivity to function. This creates a huge burden on the carrying capacity of local networks in which capacity must always exceed load in order to maintain a satisfactory quality of user experience.

Network Neutrality is the premise that access to the Internet should be both device and content agnostic. That is, networks should act as "dumb pipes" and relay all data at the same rate regardless of source or recipient. This premise has been subject to some nuance over the quality of experience/quality of service concerns due to network congestion as not all data packets are equally important when it comes to the quality of experience for end users and users can experience degraded services or intelligently shaped traffic can prioritize time-sensitive packet delivery. Video conferencing, for example, is much more sensitive to the speed and order of packet flow than file downloads. Video/audio streaming is situated somewhere in between the two in terms of the impact of packet flow on quality for end users as the data can be downloading ahead of video/audio playback, giving a buffer between download and playback that is not possible for real-time video conferencing. However, streaming still requires certain speeds and capacity or the excess demand relative to speed and capacity will negatively affect the quality of playback.

Advocates issue a rallying cry for net neutrality when infrastructure or service providers push to prioritize the data transmission of some services over others, typically because those services are owned by the provider or because of some financial arrangement between service and content providers. The other side is the notion of service providers "throttling" speeds for non-preferred content. This issue has attracted considerable attention in the last three Presidential elections due to high-profile cases surrounding Comcast and the ongoing case of vertical integration of content, service, and infrastructure providers. In 2015, the FCC reversed its prior rulings on treating broadband Internet service as an "information service" and reclassified it such that they could treat it as a "common carrier" telecommunications service under Title II to enforce net neutrality regulations. A June 2016 US Court of Appeals ruling upheld this decision, but policies and policy priorities can change with administration transitions.

The announcement by Google in 2010 that it would select a city to begin deploying fiber to the home and providing gigabit internet access to end users was the third and most direct *threat* to the broadband status quo. To put the magnitude of the proposed speed jump into perspective, gigabit internet speeds are 100 times faster than average wireless or DSL speeds, which tend to hover around 10 Mbps. The ongoing deployment and scaling of Google Fiber began in the two Kansas Cities and has now expanded to a number of other localities, including

Austin, Texas; Portland, Oregon; Provo, Utah; and the Research Triangle in North Carolina. The publicity and energy surrounding Google's announcement and competition spurred developments and competition in the Internet service market that extended far beyond their actual fiber deployment efforts. What Google did was to encourage people to dream of different ways of using the Internet that would take advantage of super fast, super high capacity connectivity in ways that they had not thought of before. It drove and continues to drive the demand for better and faster services to keep up with innovations.

A society divided: Understanding the digital divide. While smart devices, net neutrality discussions, and content providers' pressures on service providers were pushing forward rapid innovations in the quality of Internet service for some populations, less populated and/or less-affluent areas often did not receive similar infrastructure upgrades to enable improved access. Other populations continued to lack even the most basic access to the Internet beyond dial-up service. Infrastructure systems intended for telephone or cable television services may have been sufficient initially to satisfy our technological needs, but current and future demands for high-speed, high-capacity connectivity far surpass the capabilities of our now-aging telephone and cable systems. To remain competitive and relevant in our increasingly connected world now requires investment in next-generation infrastructure networks that enable individuals to connect to one another and transmit large amounts of information via the Internet.

However, not all individuals or communities have been able to connect to this new world even using previous-generation technologies; 1 in 4 American adults were Internet non-users at the time of the Recovery Act's passage (Pew Charitable Trust, 2013). The figures and quotes in this section reflect the state of the digital divide and internet access when the Recovery Act broadband programs began. The divide in terms of both access to and quality of broadband

Internet services particularly affected rural areas when compared to communities with higher population densities. 91 percent of households in 2011 were said to have access to wireline download speeds of greater than 3 Mbps, though as with electricity a century earlier, the percentage of homes in urban areas (98.7%) with access to these speeds far surpassed the percentage of rural homes (86.1%) with access to the same speeds (National Broadband Map, 2011).

The distinction between availability of access in urban vs. rural areas was even starker in states like Virginia, where the state is geographically large but with clustered population centers. In 2011, there was a 21 percent rural/urban gap for access to internet speeds greater than 3 Mbps in which only 78 percent of rural households had access while 99.2 percent of urban households had access to speeds of greater than 3 Mbps. This disparity persisted even in light of the flawed reporting mechanism inherent in the National Broadband Map that allowed providers to report a census block as served even if only one household in that block could receive service versus requiring that providers indicate service at the e-911 address level. The actual percentage of the population with access to wireline broadband internet service at speeds that at least meet the FCC minimum standard for counting as "broadband" was likely much lower than claimed, particularly in rural areas where census blocks tend to be much larger geographically.

Communities set apart due to lower socioeconomic status and/or lower population density had been left behind disproportionately when compared with higher-income and higher density areas. As new technologies penetrated society, those who still lacked access to older technologies fell farther behind, even if the overall gap began to close. These new divides included "available Internet bandwidth, quality of computer equipment, and the ability of users to successfully navigate the Internet to accomplish their goals" (Becker et al., 2010, p. 15). In the case of Virginia, the distinctions between urban and rural areas based on download speed grew more pronounced as at higher speed tiers, as Table 1 demonstrates (National Broadband Map, 2011, p. 7).

Table 1 2011 Internet Access Speeds by Rural/Urban Distinction

Geographic Area	>3 Mbps	>6 Mbps	>10 Mbps	>25 Mbps
Rural, Nationwide	86.1%	66.5%	55.7%	17.8%
Rural, Virginia	78.0%	73%	64%	23.2%
Urban, Nationwide	98.7%	97.2%	93.5%	58.8%
Urban, Virginia	99.2%	99.0%	98.6%	80.8%

The National Telecommunications and Information Administration labeled this chasm the "digital divide" between those with access to Internet service and those without access (McConnaughey et al., 1999). Scholars and advocates have given individuals left behind in the digital revolution with a variety of titles; digitally-divided, digitally-illiterate, informational have-nots, technology have-nots, information-disadvantaged, and informationally-poor are just a few of the terms identified in the literature. Sutinen (2009) took to task some of the terminology used to described these populations including terms like "'(previously) disadvantaged', 'marginalized,' 'excluded,' 'disabled,' 'non-privileged' or 'diverse' users, or 'have nots'" (p. 1). He suggested that we should reject the use of euphemisms to describe these targeted populations and to just to refer to the populations as "losers" instead because the implication regardless of terminology is that someone else has triumphed and they have not (Sutinen 2009).

The comments by both Stevenson (2009) and Sutinen (2009) highlighted that communities on the "losing" or "wrong" side of the divide were socially constructed as dependent populations: largely positively-constructed but considered weak and not capable of self-development and care (Schneider & Ingram, 1993). Stevenson (2009) noted that these digitally-divided individuals were:

- Likely to earn less than $15,000 per year,

- Be without a high school education,
- Were often unemployed or underemployed,
- Were located in either a city's center or a highly rural setting, and
- Were most likely to be people of color.

He argued that the demographic features of those who fall on the have-not side of the digital divide were "discursively significant in light of government discourses that, on the one hand, promote[d] access to and use of the new [Information Communication Technologies] as fundamental to life in the new economy, and on the other hand cancel[led] programs designed to ensure subsidized access for America's poor to the network" (Stevenson, 2009, p. 13).

The NTIA and other groups, including the Bill and Melinda Gates Foundation, described the digital divide in terms of access to equipment and infrastructure, as is reflected in the National Broadband Map. As a result of this categorization of *physical access* as the primary source of division, efforts to counteract the digital divide focused on increasing broadband access and the numbers of computers in libraries and other public facilities (Stevenson, 2009, pp. 4-5). Valadez and Durán (2007) argued that simplifying the digital divide down to an issue of access to physical infrastructure negated "inequalities in technology and learning" that resulted in "vast differences in opportunity, experiences, and practices" (Valadez & Durán, 2007, p. 34). These researchers contended that such a complex issue required more complex understanding and solutions than merely throwing computers at schools and public libraries to make up for lack of personal access to the Internet and other technologies because of income, education, or other factors. Instead, they believed that we must question local, state, and federal policies that implement simplistic solutions focused solely on addressing physical access to the internet and related technologies in order to try to solve what the researchers viewed as much more complex societal issues that cause the division between information "haves" and "have-nots." In contrast to the simple notion of a divide based on access to physical infrastructure, they discussed the three dimensions of access: possession, skill, and motivation. Basically, an individual must have physical access to computers and the Internet with the skills to use the technology and the willingness to integrate it into their lives (Valadez & Durán, 2007, p. 33).

Broadband Technology Opportunities Program (BTOP)

The American Reinvestment and Recovery Act of 2009 (Recovery Act) included provisions to create and fund two distinct project grant programs to target a growing divide in the availability and utilization of high-speed, high-quality internet access within and between communities across the US. It set aside $7.4 billion in stimulus funds for one-time investments via project grants to improve infrastructure, access, and digital literacy in unserved and underserved communities through these two programs. The first, the Distance Learning, Telemedicine, and Broadband Program, fell under Division A, Title I of the Recovery Act, "Agriculture, Rural Development, Food and Drug Administration, and Related Agencies," and the Rural Utilities Service (RUS) within the United States Department of Agriculture (USDA) administered the Broadband Improvements Program (BIP) to meet this goal. The second Recovery Act-funded broadband program was the Broadband Technology Opportunities Program (BTOP), created under Division B, Title VI of the Recovery Act, and is the focus of this research.

The National Telecommunications and Information Administration (NTIA) within the United States Department of Commerce developed the Broadband Technology Opportunities Program (BTOP) in consultation with the Federal Communications Commission (FCC). It was a $4.7 billion grant program to "support the deployment of broadband infrastructure, enhance and expand public computer centers, encourage sustainable adoption of broadband service, and develop and maintain a nationwide public map of broadband service capability and availability" (NTIA, 2009). Unlike the RUS, the NTIA did not have historical expertise or in-house capacity in place to design and implement from the ground up a large-scale program very rapidly. There was only a 5 month window between the passage of the Recovery Act in February 2009 and the first round of grant applications beginning July 2009, and final grant award announcements came 14 months later in September 2010 (see Appendix B). The NTIA outsourced much of the grants administration support for BTOP to the National Oceanic and Atmospheric Administration within the Department of Commerce and contractors such as Booz Allen Hamilton. More concerning for the Comprehensive Community Infrastructure projects, the Recovery Act capped administrative costs that would have allowed for careful ongoing oversight of BTOP's most expensive projects and was a source of concern during program audits by the Office of Inspector General (2011, p. 13).

The creation of the State Broadband Initiative, which awarded grants to all 50 US states, the District of Columbia, and five US territories to create an ongoing data collection mechanism for broadband availability, fulfilled the last goal of BTOP. Tracking availability of service was particularly important to understand which areas were unserved and underserved. To qualify for BTOP funds, a community must have been classified as unserved or under-served when it came to the provision of "sufficient access" to broadband internet service. The bar for "sufficient access" for BTOP was set at 768 Kbps download and 200 Kbps upload speeds. "Unserved" areas had less than 10% of their populations with ready access to terrestrial broadband service of sufficient speeds. To meet the classification of "underserved" meant terrestrial broadband access rates of below 50%, a lack of fixed or wireless broadband access of at least 3 Mbps download speeds, or broadband subscribership of 40% or less (Federal Register July 2009, 33109). However, due to the concurrent implementation of each grant program within BTOP, the NTIA did not have data available from the National Broadband Map to assist it in verifying which areas were underserved or unserved. While the NTIA awarded its grants across categories prior to the Map existing, the Map could later track over time how unserved and underserved areas became more served as well as tracking the deployment of higher-speed services across the country as demand increased and demographics shifted. Appendix A's Glossary contains further definitions of terms relevant to this research.

The first three project categories in BTOP of Comprehensive Community Infrastructure (CCI), Public Computer Centers (PCC), and Sustainable Broadband Adoption (SBA) worked together by addressing different components of the digital divide: physical access, financial availability and stopgap physical access at the community level, and digital literacy. The CCI projects were to be the first steps towards alleviating the digital divide between urban and rural areas, as they would provide the infrastructure necessary for high-speed, high-capacity, and high-quality internet connections to Community Anchor Institutions (CAIs) in areas designed as unserved or underserved. PCC grants provided funding to these CAIs for the creation of computer centers that would facilitate internet access in vulnerable populations that may not currently have personal internet connections. Lastly, SBA grants funded programs to teach digital literacy skills and perform outreach campaigns to encourage internet use among members of less-connected populations, such as the elderly, communities of color, and low-income populations. However, as with funding for the State Broadband Initiative, the concurrent deployment of each grant program within BTOP worked against making a data-driven grant award or awards that could comprehensively eliminate all facets of its digital divide. BTOP funding could help to move progress along for a variety of communities struggling with different types of divides (physical access, affordability, and literacy) but could not provide a holistic solution for a particular community within the grant period. The entirety of the 36-month grant period was needed to get the infrastructure in place and would have left no time for the establishment of Public Computing Centers or outreach and training through the Sustainable Broadband Adoption grants.

Even with these limitations, the demand for BTOP funding in each of the three categories of projects greatly exceeded available funding. The NTIA received 1,582 applications requesting a total of $29.6 billion in infrastructure projects alone. Over two rounds of grant funding with decision windows of only 3-6 months each, the NTIA (with the assistance of a team of volunteer proposal reviewers) selected 123 infrastructure projects totaling $3.48 billion for funding. BTOP received 670 applications for Public Computing Centers totaling $2.9 billion in requested funds and ultimately awarded $201 million spread over 66 projects. Lastly, there were 608 applications for digital literacy programs requesting a total $4.2 billion. They only funded 44 projects with a total of $250.7 million in grant dollars (NTIA, 2010). Across the 2,860 applications that solicited over $35 billion in award dollars, the average acceptance rate for proposals was only 8% with award rates in all three of these BTOP categories under 10%. Table 2 shows the breakdown of grants awarded in each BTOP project category. This research focuses on the Comprehensive Community Infrastructure projects.

Table 2 Broadband Technology Opportunities Program Awards

Category	Number of Grants	Award (in millions)
Comprehensive Community Infrastructure	123	$3500
Public Computer Center	66	$201
Sustainable Broadband Adoption	44	$251
State Broadband Initiative (Mapping)	56	$293
Totals	**289**	**$4245**

For various reasons, the NTIA terminated nine projects totaling $184.3 million, bringing the final tally of BTOP projects to 280 (House of Representatives Memorandum, February 25, 2013). The NTIA also suspended a certain subset of the BTOP infrastructure projects for a time to resolve conflicts that occurred following the passage of additional legislation, the Middle-Class Tax Relief and Job Creation Act of 2012, which included provisions to fund and develop a nationwide first responder wireless network. Of the projects suspended due to the 2012 legislation, most eventually finished with the use of multiple grant period extensions and project modifications. Appendix B provides an overview of the grant program's timeline beginning with the passage of the Recovery Act in February 2009 through the disposition of the last remaining delayed project in March 2017.

Comprehensive Community Infrastructure Grants. The application process for the BTOP CCI grant funding was intense in the sense of both timeline pressures to disseminate funds as rapidly as possible and the amount of competition for the awards. BTOP was part of the federal stimulus efforts and one intention was to get money flowing into communities as soon as possible. The period from initial publication in the Federal Register to the close of Round 1 funding cycle was five weeks for grant applicants to put forward fully formed proposals that were close to shovel ready in design and had already completed preliminary environmental assessment work. For Round 2 funding, which had slightly different qualifying criteria, the period from Federal Register publication to the final application deadline for Comprehensive Community Infrastructure projects was nine weeks.

In both funding rounds, the NTIA evaluated project proposals according to four categories: Project Purpose, Project Benefits, Project Viability, and Project Budget & Sustainability. However, there were noticeable differences between the two rounds in terms of which kinds of projects met program criteria, the exact components of each evaluative category, and the distribution of points among the categories. Table 3 demonstrates the differences between Round 1 and Round 2 funding guidelines and evaluation criteria. Because of the differences between project type and evaluation criteria, this study investigates the implementation of only Round 2 projects.

Table 3 CCI Grant Program Decision Matrices by Round

<table>
<tr><th>Category</th><th colspan="2">Points</th><th colspan="3">Components</th></tr>
<tr><td></td><td>Round 1</td><td>Round 2</td><td colspan="2">Round 1</td><td>Round 2</td></tr>
<tr><td>Project Purpose</td><td>30</td><td>20</td><td colspan="2">• Fits with statutory purposes
• Collaboration with other Recovery Act programs and state and federal development programs
• Enhanced service for healthcare delivery, education, and children
• Socially and economically disadvantaged small businesses</td><td>• Fits with statutory purposes
• Fits with BTOP priorities
• Potential for job creation
• Recovery Act & other governmental collaboration
• Indian tribes and socially and economically disadvantaged small businesses</td></tr>
<tr><td>Project Benefits</td><td>25</td><td>20</td><td>Last mile
• Cost effectiveness
• Performance of offered service
• Affordability of services offered
• Nondiscrimination, interconnection, and choice of service provider</td><td>Middle mile
• Impact on area
• Level of need
• Network capacity
• Nondiscrimination, interconnection, and choice of service provider
• Affordability of services</td><td>• Level of need in proposed funding area
• Impact on proposed funded service area(s)
• Network capacity & performance
• Affordability of services offered
• Nondiscrimination, interconnection, and choice of service provider</td></tr>
<tr><td>Project Viability</td><td>25</td><td>30</td><td colspan="2">• Technical feasibility
• Organizational capability
• Community involvement
• Ability to promptly start project</td><td>• Technical feasibility
• Organizational capability
• Level of community involvement</td></tr>
<tr><td>Project Budget & Sustainability</td><td>20</td><td>30</td><td colspan="2">• Reasonableness of budget
• Sustainability of the project
• Degree of matching</td><td>• Reasonableness of budget
• Sustainability of the project
• Leverage of outside resources</td></tr>
</table>

Sources: NTIA (2009; 2010a)

The Path Forward

This first chapter offered an introduction to the central question explored by the dissertation: "What factors influenced project implementation success in the Broadband

Technology Opportunities Program?" An overview of the evolution of the Internet and government programs to support its development and deployment then provided background information to situate this research in the appropriate context. The chapter outlined the Recovery Act's Broadband Technology Opportunities Program in additional detail to provide evaluation criteria for grant awards and the timelines for both the initial application period and project implementations.

Chapter 2 makes an argument for project management as micro-level policy implementation. This chapter reviews the existing literature on policy implementation and project management including a discussion of key performance indicators for project implementation success—defined as on-budget, on-schedule, and achieving intended outputs. It then introduces the POPIL framework for understanding critical success factors that potentially influence project implementation. This framework includes project-specific factors, organizational factors, physical environment factors, interorganizational relationship factors, and legal setting factors that may influence this success. The chapter concludes with a set of conceptual hypotheses for how these factors influence project implementation success.

Chapter 3 provides this study's methodology, including the identification and rationalization for the selected sample, the operationalization of the conceptual framework and dependent variables. It also detailed the research questions, hypotheses, and chosen analytical techniques to understand the relationships between POPIL framework factors and project implementation success. The evaluation had several stages. The first stage was the quantitative content analysis of documentation for the 67 projects in order to create a usable database for additional analysis. An ordinary least squares multiple linear regression uses the database to answer the research questions by testing four articulated hypotheses. This chapter also describes the qualitative project post-mortem process used to delve into one of the 67 BTOP projects: the New River Valley Regional Open-Access Network.

Chapter 4 presents the results of the quantitative analysis to determine which factors influence key performance indicators for project implementation success. It begins with an exploration of the data to determine the presence and persistence of framework factors in projects and an understanding of the distribution and frequencies of the dependent variables using descriptive statistics. The chapter presents relationships found to be significant influences of key performance indicators through either presence or persistence. Chapter 4 concludes with the ordinary least squares regression analyses conducted to test hypothesized interactions between factors on the dependent variables of Schedule Success index score, Budget Success index score, Outputs Success index score, and Overall Success index score. Models with significant and meaningful explanatory power were identified for Schedule Success, Outputs Success, and Overall Success index scores. A meta-factor of Core Organizational Capacity had the strongest influence in each of the three models with issues related to interorganizational relationships also showing significant strength across the models. The meta-factor of Property Access had a significantly negative influence on the schedule indicator score, but this influence did not carry over for other indicators.

Chapter 5 is the project postmortem analysis of Citizens Telephone Cooperative's New River Valley Regional Open-Access Network (NRV-ROAN) BTOP-funded project. Interview participants identified organizational capacity and interorganizational relationships as the strongest influences on this project that finished on-time, under-budget, and completed more than its projected number of miles. Organizational capacity in this discussion includes both technical expertise/functional capacity and the overarching organizational leadership and governance.

Interorganizational relationships had both positive and negative influences on the successful completion of the project with positive influences from strong partners like the New River Valley Network Wireless Authority and negative influences from interactions with other utility providers and principal-agent relationship project restrictions for environmental assessments and grant funds disbursement. The chapter includes a discussion on some of the identified opportunities for improvement of future programs and projects and concludes with a reflection on some of the early project results and outcomes.

Chapter 6 completes the study with an integrated discussion and conclusion chapter. It begins with an exploration of the effects of differences in goal prioritization from the Recovery Act as the authorizing legislation, the NTIA as the grant administering agency, and grant recipients as the implementing organization on perceptions and measurements of success. An evaluation of the strengths and limitations of the POPIL framework's applicability to this study follows that exploration. The evaluation emphasizes the significance and effects of organizational capacity and discusses the effects of controlling the diversity of many of the other factors in the framework. Implications of the research findings for both practice and the disciplines are explored alongside limitations of the research and resulting opportunities for future research based on this study's findings, implications, and limitations. The dissertation concludes with reflections on the importance of this research to inform efforts to resolve the larger and pressing issue of the digital divide while taking into account what organizations are capable of accomplishing.

Chapter 2: Literature Review

Approaches to Implementation Research

Implementation research across a variety of sub-fields appears largely segregated depending on the level of analysis, and there is little attention given to the ways in which the policy, program, and project levels of implementation interact with one another. This review will first highlight the interplay among the three areas of implementation followed by a review of the existing literature on the project, organizational, physical environment, interorganizational relationships, and legal (POPIL) factors comprising the resulting project implementation framework.

Policy implementation, as the name may imply, focused on an initial public policy. From a 30,000-foot view, policy (macro), program (meso), and project (micro) implementation are all stages of policy implementation. Berman (1978) suggested differing notions of macrolevel and microlevel implementation analysis in which macrolevel implementation analysis evaluates implementation effectiveness in the form of the relationship between a policy and a particular implemented program. Microlevel implementation focuses on the technical validity of whether the implemented program led to desired outcomes (Berman, 1978, p. 8). However, each level has its own set of goals, challenges, and nuances that may be contingent on success in the other two levels but are still considered distinct. The abilities and needs of a front-line bureaucrat directly implementing a given policy through interacting with the public can be very different from those of the original policy makers (O'Toole, 2004). In understanding the project-based micro-implementation, Berman (1978) noted, "effective micro-implementation is characterized by *mutual adaptation* between the project and the organizational setting" that takes into account characteristics of both project and implementing organization and the effects on the implementing organization by the project and its implementation (p. 23). Further, he noted that conflict between macro-implementation goals and micro-implementation goals introduce additional complexity to implementation evaluation and analysis (Berman, 1978, p. 27).

While all three levels deal with implementation, there has been little in the way of theoretical or empirical research overlap between the three categories. Policy implementation scholars often publish in the policy studies and public administration journals (Mazmanian & Sabatier, 2000; O'Toole, 2004; Sabatier & Mazmanian, 1980), program implementation analysis has been more likely to be found in subject matter-specific journals and other such publications (Meyers, Durlak, & Wandersman, 2012), and microlevel project implementation is often limited to project management and other technically-focused journals (Geraldi, Maylor, & Williams, 2011; Osei-Kyei & Chan, 2015). Indeed, some project management scholars have even gone so far as to declare, "Project management is not a "crossroads discipline," which would mean diluting its content and making it a receptacle or depository of what is produced elsewhere, in other disciplines. Project management exists in and for itself, with its own corpus of knowledge, concepts, organizations, methodologies, and lines of thinking" (Garel, 2013, p. 664). Project management is a narrower field of study within project implementation with "management" referring to completing a project as designed with intended outputs while project implementation success more generally can extend to include whether or not a project achieved the desired outcomes.

While many important components of public administration including leadership (Brady & Davies, 2014), organizational capacity (Barman & MacIndoe, 2012; Scheberle, 2004), and interorganizational relationships with stakeholders (Floricel, Bonneau, Aubry, & Sergi, 2014; Maylor, Vidgen, & Carver, 2008) emerge as areas of interest in the project implementation literature, studies connecting these components to an understanding of successful project implementation are not numerous in the public administration literature. This dissertation makes linkages between otherwise divided bodies of the project management, public administration, and public policy literature to provide a more holistic picture of the project implementation process and its outputs.

Project Implementation Success

Contingency theory. A growing number of researchers (Brady & Davies, 2014; Geraldi, Lee-Kelley, & Kutsch, 2010; Geraldi et al., 2011; Maylor et al., 2008) in the project management field have begun to tie the contingency theories of organizations to project implementation. These authors noted that the traditional study of project management that took a Tayloristic approach failed to fully consider the often-volatile environment in which organizations implement projects due to an assumption that a universal best practice could be derived following enough and the right kind of rigorous research (Maylor et al., 2008). Contingency theory directly addresses that projects are often highly complex in their design as well as taking place in a highly complex environment filled with highly complex individuals. These many moving parts increase the opportunities to affect an element of the process, either positively or negatively.

Project complexity has been a rich area of inquiry (Bosch-Rekveldt, Jongkind, Mooi, Bakker, & Verbraeck, 2011; Brady & Davies, 2014; Chapman, 1998; Geraldi et al., 2011; Haji-Kazemi, Andersen, & Klakegg, 2015; Maylor et al., 2008; Mazmanian & Sabatier, 2000; Nguyen, Nguyen, Le-Hoai, & Dang, 2015; Schlick, Duckwitz, & Schneider, 2013; Taroun, 2014; Vidal, Marle, & Bocquet, 2011) in the implementation and project management literature. As Mazmanian and Sabatier (2000) noted, “Identifying individually the many variables involved in implementation is an important first step in understanding its complexity…bringing the various facets of the implementation process together and depicting it as the dynamic process that it is, is complicated by the sheer number of variables involved and the fact that interaction among them continues throughout the process" (p. 119). Some researchers, such as Maylor et al. (2008) have focused on specific types of complexity, such as managerial complexity, while many of the other researchers mentioned above have focused on identifying the set of factors that make a project complex. Meyers, Durlak, et al. (2012) created their framework of factors or steps involved in implementation through a meta-synthesis of 25 other implementation frameworks, while Osei-Kyei and Chan (2015) and Geraldi et al. (2011) also evaluated factors that influenced successful project management through a systematic review of between 25 and 27 articles each.

A side effect of increasing project complexity is an increase in project risk. Across types of projects, researchers have identified engineering and construction projects as being associated with the highest levels of risk (Carvalho, Patah, & de Souza Bido, 2015; Taroun, 2014; Zwikael & Ahn, 2011). Taroun (2014) found that in the case of construction projects, risk "has traditionally been viewed as the variance of cost or duration estimation" (p. 107), while Couillard (1995) subsequently categorized risk into groups based on risk to what: technical performance, budget, and/or schedule. By creating a holistic picture of the factors that increase project complexity, risk can be better evaluated by project and organizational managers in order "to make informed decisions, to grasp the opportunities, and to control or make provision for the risks" (Chapman, 1998, p. 236). In Bosch-Rekveldt et al. (2011), the risk was incorporated as a separate factor in all three categories of technical, organizational, and environmental factors affecting project management success. Other researchers, such as Brady and Davies (2014), classified risk as a "project characteristic" rather than a management constraint, which fits with

Floricel et al. (2014) identifying risk as a component that can be controlled through contractual allocation and risk sharing in public-private partnership projects (p. 1092).

Depending on the type and severity of a factor's deviation from its anticipated or preferred state, an organization may need to modify its initial project plan. If an organization and its management are not nimble enough to have several contingency plans made to counteract any number of unanticipated events in an increasingly turbulent environment (Mason, 2007), this will likely have a negative impact on the organization's success in reaching the predetermined project management goals. Organizations benefit from having flexible contingency plans beyond those benefits derived from having highly structured backup plans because, in a complex world, one cannot predict what the exact flavor of disruption will be.

In 2011, Bosch-Rekveldt et al. developed a framework for identifying elements of project complexity that categorized elements under the umbrella terms of technical, organizational, and environmental. Their so-called TOE framework had strong similarities to another "TOE" framework coming out of the product innovation literature, which classified elements as technology/technological, organization, and environment (Baker, 2012; Fleischer & Tornatzky, 1990; Kuan & Chau, 2001). This dissertation makes refinements to the Bosch-Rekveldt et al. (2011) framework with a focus on those factors that influence the project management component of project implementation success.

Evaluating Project Implementation Success. Project implementation is the most localized form of policy implementation, and the types of journals that publish project implementation studies tend to be highly specialized in areas such as construction and project management. Even at the project implementation level, implementation success can be broken down into two broad standards: project implementation management success and overall project success. These forms of success roughly track with the two categories of a project's effects: agency outputs or policy outcomes (Scheberle, 2004).

Outputs, particularly for construction and other tangible projects, are relatively straightforward as evaluators typically can quantify them: the number of students enrolled, the number of meals served, the number of miles constructed, etc. In the project management literature, "key performance indicators" (Almahmoud, Doloi, & Panuwatwanich, 2012; Bryde, 2005; Todorović, Petrović, Mihić, Obradović, & Bushuyev, 2015; Toor & Ogunlana, 2010) are often used to measure project outputs. Outcomes are the impacts of these outputs and tend to be more subjective, transient, and difficult to measure (Mazmanian & Sabatier, 2000). The intended outcomes of these projects, as with both the broader program and originating policy, tend to focus on such goals as increasing unserved and underserved populations' Internet access for improved Quality of Life, including in healthcare, education, and employment. The specific outputs and outcomes to be measured in determining success should be customized for a particular project or type of project as "different project definitions may warrant different success criteria" (A. G. Yu, Flett, & Bowers, 2005, p. 428).

It can often take ten years or more to fully understand the overall success of a project in terms of its outcomes (Sabatier, 1991). However, implementation of projects in this study began seven years ago and the last project finished less than a year ago. As such, this dissertation focuses on the former concept of project implementation management success, though termed here as "project implementation success." The emphasis here is on the shorter-term, more easily measured key performance indicators of whether a project produced its intended outputs in the intended period while using only the predetermined amount of resources to do so. These measurements have been dismissed at times as an overly-simplistic "iron triangle" (Atkinson,

1999) assessment of success that includes goals related to budget (Carvalho et al., 2015; Diallo & Thuillier, 2005), schedule (Carvalho et al., 2015; Diallo & Thuillier, 2005), and producing intended outputs (Dvir, Raz, & Shenhar, 2003; Rodriguez-Repiso, Setchi, & Salmeron, 2007). However, other researchers have highlighted the difference between overall project success and project management success (Cooke-Davies, 2002; de Wit, 1988; Dvir et al., 2003; Scheberle, 2004; Young & Poon, 2013).

Project success and project management success are related in the broader area of project implementation success; however, success at one level does not necessarily equate to success at another (de Wit, 1988; Dvir et al., 2003). Yu et al. (2005) identified four major degrees of project implementation success: total success, qualified success, controlled failure, and total failure (p. 432). Table 4 illustrates the potential relationships between project success/failure and project management success/failure drawing from Yu et al. (2005) and their discussion of developing ways of measuring overall project success.

Table 4 Comparison Table of Project Success and Project Management Success

	Project Success	**Project Failure**
Project Management Success	**Total Success:** Project completed on/ahead of schedule, at/under budget in terms of outputs ,and produces intended benefits	**Controlled Failure:** Project is completed on/ahead of schedule or at/under budget in terms of outputs but fails to produce intended benefits
Project Management Failure	**Qualified Success:** Project experiences cost and/or schedule overruns but is still able to produce intended benefits	**Total Failure:** Project experiences cost and schedule overruns and is unable to produce intended benefits

Determining Critical Success Factors Influencing Project Implementation. While the performance indicators to measure project management success have been relatively straightforward, the project management literature is also rich in studies of those factors which influence that success (Belassi & Tukel, 1996; Belout & Gauvreau, 2004; Cooke-Davies, 2002; Durlak & DuPre, 2008; Ng & Tang, 2010; Osei-Kyei & Chan, 2015; J.-H. Yu & Kwon, 2011;

Zou, Kumaraswamy, Chung, & Wong, 2014). Rubin and Seelig (1967) conducted one of the earlier empirical studies of factors that positively influence project performance. Following their work, interest in unlocking the "black box" of project implementation began increasing in the 1970s (Melchers, 1977; Jeffrey L. Pressman & Wildavsky, 1984; Wedley & Ferrie, 1978) and into the 1980s (Gow & Morss, 1988; Pinto & Covin, 1989; Pinto & Slevin, 1987; Sabatier, 1986). Much of the work during this period created frameworks for identifying factors affecting implementation success by using single-case study, anecdotal stories, or otherwise theorizing without subsequent empirical testing. These approaches to the study of implementation left little in the way of terminology standardization, nor the ability to generalize study findings and test those factors hypothesized to influence implementation in larger-scale settings (Goggin, 1986; Pinto & Prescott, 1990, p. 307).

The study of project implementation success began to change and become more standardized and scientific in its approach with an endeavor by Jeffrey Pinto and his coauthors (Pinto, 1990; Pinto & Covin, 1989; Pinto & Mantel Jr, 1990; Pinto & Prescott, 1990; Pinto & Slevin, 1987) to create a Project Implementation Profile (PIP) as a way to systematically understand the central question, "What factors influence project implementation success?" In their works, a "project" has the following attributes: specified and limited budget, specified duration, a preordained set of goals, and a series of complex, interrelated activities (Pinto & Covin, 1989, p. 53).

Pinto (1990) created a detailed list of ten critical items for successful project implementation divided into planning and tactical categories: project mission, top management support, project schedule/plans, client consultation, personnel, technical tasks and skills, client acceptance, monitoring and feedback, communication, and troubleshooting (p. 175). In an earlier work, Pinto Pinto and Covin (1989) also included characteristics of the leadership, power and politics, environmental effects, and sense of urgency (p. 52), but later works found those factors to not be as significant in their influence on project implementation success.

Pinto and Covin (1989) noted that early work on factors affecting implementation success tended to treat implementation in a general sense with little regard for the specific details of a project. They advised that "theoreticians must descend from the level of broad generalizations to take into account the particulars of various classes of projects" (Pinto & Covin, 1989, p. 49). Conversely, they also cautioned that practitioners tended to see their projects as unique in such a way that no advice gleaned from prior projects was worth considering if such projects were not of the precise same type as their current project. As a balance between the two, the results of empirical research by Pinto and Covin (1989) suggested that there are differences among projects in terms of which factors affect what part of the implementation of a project, depending on the nature of the project. There are also commonalities in the perceived importance of particular factors among projects within a given category, such as construction. Their advice to future researchers was to "adopt a more project-specific contingency approach to the study of project implementation in organizations" (p. 59).

In evaluating projects, Diallo and Thuillier (2005) noted that "success criteria correspond to the dimensions (or measures) on which the success of the project is judged whereas success factors are key variables that explain the success of the project" (p. 238). While there has not been a shortage of studies focusing on project management success, researchers have not come to a consensus regarding an ideal categorization of "critical success factors" found to affect implementation (Belassi & Tukel, 1996; Durlak & DuPre, 2008). (Belassi & Tukel, 1996;

Cooke-Davies, 2002; Hacker & Doolen, 2007; Ng & Tang, 2010; Osei-Kyei & Chan, 2015; Pinto & Slevin, 1987; Young & Poon, 2013; J.-H. Yu & Kwon, 2011; Zou et al., 2014).

Goggin (1986) clustered independent variables affecting implementation into three groups: the form and content of the policy itself, the capacity of the organization(s) responsible for making the program work, and the qualifications of the people in charge of operations (p. 329). Similarly, Belassi and Tukel (1996) characterized four categories of critical success/failure factors in their review of the literature on implementation: factors related to the project, factors related to the project manager and team members, factors related to the organization, and factors related to the external environment (p. 143). In Durlak and DuPre (2008), the researchers identified five categories of factors affecting the implementation process: provider characteristics, characteristics of innovation/program, the delivery system (organizational capacity), support system (training and technical assistance), and community factors (pp. 337-338).

Drawing heavily on the TOE framework for project management proposed by Bosch-Rekveldt et al. (2011) with additional theoretical support from the other researchers mentioned above, the following section outlines a proposed POPIL framework as a synthesized way to understand and better articulate the critical success factors that influence project implementation. This framework differs from Bosch-Rekveldt et al.'s 2011 work in that it differentiates between the various forces in a project's external environment that can influence project implementation success.

Several project management scholars (Belout & Gauvreau, 2004; Bosch-Rekveldt et al., 2011; Bryde, 2005; Nguyen et al., 2015; Todorović et al., 2015) have pointed to the obstacles that a project's environment can create that can impede a project's successful implementation, though the definition of "environment" can vary at times. March and Simon's 1958 work was one of the earliest to emphasize how an organization's external environment influences its behavior. These well-known organizational theorists were instrumental in the movement away from a strict "organization as machine" model that had focused solely on the internal operations of an organization.

In the 1960s, other researchers began joining the stream of theory started by March and Simon's work. These later theories emphasized how organizations' behavior can be seen as their response to external stimuli and largely addressed issues of organizational decision making (Hannan & Freeman, 1977, p. 930). When an organization's external environment changes in ways that are no longer advantageous to the organization, it is forced to alter its behavior in some way or else face extinction (Tosi, 2009, pp. 94-95). Its reactions to stimuli are often referred to as "innovation" and, from solely a closed-system perspective, these changes would often appear to be random and baseless (Drazin & Schoonhoven, 1996). The introduction of external factors that are subject to change, sometimes at rapid rates, removes the notion that there is one best model of organizing.

Building on the 1979 dimensions of organizational task environments work of Howard Aldrich (2008), Dess and Beard (1984) demonstrated that the external environment in which an organization is situated has a direct impact on an organization through three dimensions: munificence, dynamism, and complexity. Munificence is defined through environmental capacity in the sense that organizations seek environments that will have enough resources to allow them the opportunity to grow (Anderson & Tushman, 2001; Andrews & Johansen, 2012; Dess & Beard, 1984). Dynamism is defined along a continuum of stability to instability as well as turbulence, both of which reflect the external environment's unpredictable changes that lead to uncertainty for members of the organization (Anderson & Tushman, 2001; Andrews, Boyne, Law, & Walker, 2008; Dess & Beard, 1984). Environmental uncertainty has been found to be a factor negatively associated with desired project outcomes (Gray, 2001). Lastly, complexity reflects a continuum of homogeneity to heterogeneity in which increases in environmental heterogeneity require higher degrees of information processing as a result of increased uncertainty compared to simpler environments (Dess & Beard, 1984, p. 56).

Vinzant and Vinzant (1996) found that "lack of capability in the external factors presents problems that are much more difficult to overcome [than internal factors]. In short, the external factors are non-substitutable conditions of successful implementation" (p. 142). One external factor noted by Vinzant and Vinzant (1996) was stimuli, defined as threats and opportunities (p. 144). Threats, opportunities, and statutory requirements can contribute to environmental dynamism, which represents a combination of instability and turbulence resulting from changes in an organization's external environment (Andrews & Johansen, 2012). At low levels, this dynamism can incite increased rates of productivity on the part of management, leading to better project outcomes. However, once the level of dynamism exceeds a certain level, the uncertainty and associated increased demand on resources to counteract that uncertainty leads to decreased performance (Andrews & Johansen, 2012, p. 179).

Project implementation success is the term chosen here to describe a focus on outputs in the sense of tangible project products as well as meeting schedule and budgetary goals. Taking cues from A. G. Yu et al. (2005), the measurement of project implementation success includes the schedule and budget goals present in project management success, but only captures the short-term, tangible benefits in the form of outputs that form a portion of overall project success.

Excluded from this success measure are the longer-term outcomes that indicate a fully successful project implementation.

The POPIL Framework

This research creates a framework for categorizing critical factors that appear to influence the success of project implementation, referred to here as the POPIL framework. In the broadest sense, the framework divides critical success factors into Internal (Project-specific or Organization-centric) or External (Physical Environment, Interorganizational Relationships, or Legal Environment) factors.

- **Project-specific factors** are the technical elements that are inherent in the design of a project, such as its scope, budget, materials selected, and target population.
- **Organization-focused factors** describe facets of the main implementing organization such as the organization's type, size, legal structure, management team, and other human resources.
- **Physical environment factors** include geology/topography, meteorology, and historical sites. These elements may take a greater or lesser part in influencing project implementation success depending on the type of project.
- **Interorganizational relationship factors** are interactions between the implementing organization and its subcontractors (if any), between the organization and its allies or competitors, between the organization and other network actors, or between an implementing organization and its principal(s) in instances where another entity holds power or financial control over the implementing organization.

- **Legal environment factors** include those legislative, regulatory, or judicial aspects at the local, state, or federal level that influences or threatens to influence the implementation of a policy.

When the factors combine, POPIL creates a more comprehensive and nuanced critical success factor framework than the TOE framework (Bosch-Rekveldt et al., 2011). POPIL constructs the foundation for a structure through which researchers could carefully evaluate factors of project complexity as they relate to project management and project implementation success. Table 5 summarizes the sources of each factor.

Table 5 POPIL Framework Factors Literature Basis

Factor	**Literature**
	Internal Factors
Project	
Scope	(Pinto, 1990; Pinto & Covin, 1989; Pinto & Prescott, 1990)
Target Population	(Ingram, Schneider, & DeLeon, 2007; Pinto, 1990; Schneider & Ingram, 1993)
Materials and Technology	(Barnett, 1990; Durlak & DuPre, 2008; Pinto, 1990; Tushman & Anderson, 1986)
Organizational	
Leadership	(Belassi & Tukel, 1996; Crosby & Bryson, 2005; Denhardt & Denhardt, 2007; Durant & Warber, 2001; Durlak & DuPre, 2008; Fredericksen & London, 2000; Goggin, 1986; Pinto & Covin, 1989; Van Slyke, 2007; Vinzant & Vinzant, 1996)
Governance	(Bosch-Rekveldt et al., 2011; Brady & Davies, 2014; Too & Weaver, 2014)
Financial Health	(Aldrich & Pfeffer, 1976; Bryce, 2000; Smith, 2006; Vinzant & Vinzant, 1996)
Experience and Organizational Age	(Amburgey, Kelly, & Barnett, 1993; Baum & Oliver, 1991; Kaufman, 1985; Mellahi & Wilkinson, 2004; Vinzant & Vinzant, 1996)
	External Factors
Physical Environment	(Bosch-Rekveldt et al., 2011; Lam, 1999; Nguyen et al., 2015; J.-H. Yu & Kwon, 2011)
Interorganizational Relationships	
Principal-Agent Relationship	(Aldrich & Pfeffer, 1976; Alexander & Nank, 2009; Denhardt & Denhardt, 2007; Khademian & Weber, 2008; Moe, 1991; Smith, 2005; Thibault & Babiak, 2009; Van Slyke, 2007; Vinzant & Vinzant, 1996; Weber, Lovrich, & Gaffney, 2007)
Relationships with Other Actors	(Baer & Feiock, 2005; Bryson, Crosby, & Stone, 2006; Himmelman, 2001; Lundin, 2007; Mischen & Jackson, 2008; O'Toole, 2000; Olander & Landin, 2005; Schroeder, 2001; Weber et al., 2007)
Legal Environment	(Aldrich, 2008; Anderson & Tushman, 2001; Andrews, Boyne, Law, & Walker, 2008; Andrews & Johansen, 2012; Belassi & Tukel, 1996; Dess & Beard, 1984; Durlak & DuPre, 2008; Pinto & Covin, 1989; Vinzant & Vinzant, 1996)

Project-specific factors. In his Project Implementation Profile, Pinto (1990) described the technical factors affecting implementation as management of specific tasks, competency of engineers and other technical staff, the functionality of technology, and understanding of project parameters by those implementing the project. In the decision to begin a new project, implementing organizations may have greater or lesser degrees of familiarity with how to handle the technical details depending on their prior experiences.

Scope. Todorović et al. (2015) defined projects as "temporary organizations, limited by a certain scope, and implemented within a certain amount of time (.p. 772). The parameters of a project play an important part in the success of a project's implementation (Pinto, 1990; Pinto & Prescott, 1990), though what features are included as part of the parameters appears to vary across the research. In some of the work on policy implementation, factors regarding the specific design and scale of a particular policy or project appear to be included in more general descriptions at the policy or project level rather than made explicit as a separate factor influencing implementation (Durlak & DuPre, 2008; Goggin, 1986).

Project scope is one area of indicators influencing project complexity in which indicators may include project size (Nguyen et al., 2015; Vidal et al., 2011), budget size (Brady & Davies, 2014; Nguyen et al., 2015), project goals (Bosch-Rekveldt et al., 2011; Durlak & DuPre, 2008; Gerardi, 2011; Nguyen et al., 2015; Osei-Kyei & Chan, 2015; Pinto & Prescott, 1988), and project type (Bosch-Rekveldt et al., 2011; Brady & Davies, 2014; Chapman, 1998; Geraldi et al., 2011). However, evaluating project complexity on the basis of project size alone would be a mistake (Bosch-Rekveldt et al., 2011), which leads to the other project-specific and other factors of the POPIL framework.

Target population. Terminologies to describe the intended end-users of a project vary across disciplines and types of projects and may vary even for the same type of projects if implemented by different types of organizations. How a project designer and implementer perceive the eventual users of the project's outputs can have an impact on the prioritization of projects and the orientation of a project's specifically identified outcomes. Terms such as “client,” “customer,” “citizen,” or “resident” may be reflective of sectoral norms of the implementing agency as nonprofit, for-profit, or governmental, but they also reveal a good deal about the intent of a project and the extent to which a project has a public or private orientation (Lucio, 2009; McLaughlin, 2009).

Identifying the ultimate end-user or primary beneficiary of a project can disclose additional nuances of a project and provide insights into the logic behind some of the decision-making that occurs in designing and implementing a project. Brady and Davies (2014) found that “type of client” was a project characteristic that affected project complexity and influenced the likelihood of project failure by extension. Schneider and Ingram (1993) categorized four types of target populations that are conceived as either powerful or weak and positively or negatively constructed: advantaged (powerful and positively constructed), contenders (powerful and negatively constructed), dependents (weak and positively constructed); and deviants (weak and negatively constructed). Some groups, such as small business owners and homeowners, are both powerful and positively constructed. Other groups are constructed as being a burden on society due to their own individual deficiencies (Katz, 2008, p. 398). Benefits to the group constructed as deserving are considered to be benefits to society as a whole while benefits to the negatively-constructed group are regarded as burdens on society as a whole (Ingram, Schneider, & DeLeon, 2007, p. 102).

In the original Project Implementation Profile, the population that is intended to be served by a project is explicitly included in two factors: client consultation and client acceptance (Pinto & Slevin, 1987). Pinto and Prescott (1988) merged the earlier PIP with accepted project lifecycle frameworks based on project managers’ questionnaire results to demonstrate that client relations should take place during all phases of project implementation in order to maximize the likelihood of implementation success: conceptualization, planning, execution, and termination. Client consultation was found to be a significant factor in implementation success during the conceptual, execution, and termination stages of the life cycle, while client acceptance was significant only in the planning stage (Pinto & Prescott, 1988, p. 15). These findings were later successfully replicated by Belout and Gauvreau (2004), which demonstrated that listening to the intended user base for a project should happen throughout the process but that convincing the intended users of the value of the project is primarily important during the design portion (Pinto & Prescott, 1988, p. 15). The intended audience or recipients of a given project often influence how a project is initially conceptualized and may play a greater or lesser role in the implementation process (Pinto, 1990; Pinto & Covin, 1989).

Materials and technology. Materials and technology have an impact on project complexity, and thus, on the likelihood of implementation success or failure (Geraldi et al., 2011). This impact can take place due to (dis)advantageous selection of the technology or materials employed during the creation of a project (Nguyen et al., 2015), availability of materials or technology during project implementation (Bosch-Rekveldt et al., 2011; Gerardi, 2011; Pinto & Prescott, 1988), or success of the technology or materials created by the project (Geraldi et al., 2011; Gerardi, 2011; Nguyen et al., 2015).

Technological complexity, such as may found in large-scale construction projects, carries considerable risk (Carvalho et al., 2015; Taroun, 2014), which relates to the degree of technological uncertainty associated with a project (Bosch-Rekveldt et al., 2011; Geraldi et al., 2011) and its perceived feasibility (Johnson, 2013). "Functionality of technology" was one of the factors in the Project Implementation Profile (Pinto, 1990) that influenced implementation success, and types of technology used in a project (Geraldi et al., 2011; Vidal et al., 2011) also fell under the umbrella of technical factors in the TOE framework (Bosch-Rekveldt et al., 2011; Nguyen et al., 2015).

Project complexity and the likelihood of project success or failure is influenced by the availability of necessary materials, and these resources are often subject to changes, which makes the project potentially even more complex (Vidal et al., 2011). Bosch-Rekveldt et al. (2011) classified availability of materials and other resources under the softer umbrella of organizational elements rather than technical elements, which included such details as goals, scope, and experience. Other researchers, such as Maylor et al. (2008), grouped together implementation success factors such as process and resources while separating resources and materials from mission objectives. Availability of materials is an area of uncertainty for a project and an aspect of implementation that contains considerable risk, particularly for capital projects. Circumstances can, and often will, arise due to unexpected events that can cause delays in receiving needed materials. Project managers must have contingency plans to mitigate the effects of these delays (Gerardi, 2011).

Instances of technological discontinuity, as may be experienced when organizations undertake a new project outside of their traditional scope or periods of rapid technological change, can lead to accelerated rates of organizational exit and/or failure (Anderson & Tushman, 2001). This results from the tight coupling of the traditional technologies in use by the organization and the assets in which they have invested. Even when organizations do elect to transition from old technology to new, there is no guarantee that they will have "plac[ed] the right bet on which variant of the new technology will become the dominant design preferred by customers" (Tushman & Anderson, 1986, p. 688). In both Barnett (1990) and Anderson and Tushman (2001), the theories of Joseph Schumpeter were invoked to explain that for technologyoriented organizations and fields, the prevailing technology serves as a benchmark by which all organizations in that industry are judged. As technologies evolve and change, those organizations that fail to keep up with the changing benchmark will find themselves at a competitive disadvantage versus their peers and be more likely to be in a position to fail (Barnett, 1990; Gerardi, 2011).

Organization-focused factors. Organizational capacity on the part of both the principal and the agent organizations has been declared a "necessary and proper topic of reasoned inquiry and integral to policymaking" (Derthick, 1990, p. 216). According to some researchers, including Mary Parker Follett and Stewart Clegg, the true measure of an organization's power is its capacity to capture and successfully utilize resources to achieve its mission(s) (Boje & Rosile, 2001; Clegg, Courpasson, & Phillips, 2006). This "ability of organizations to enact a specific task" (Barman & MacIndoe, 2012, p. 72) is multidimensional and far from easy to evaluate, and the concept is considered part of the traditional institutionalism stream in organizational theory that "emphasizes the capacity of people and organizations to construct and enact their environment" (p. 89). An exception to A noteworthy exception to this disconnect is the 2007 article in *Public Administration Review* by Bryson, Ackermann, and Eden, which discusses the role of organizational capacity in terms of core distinctive competencies to be more effective in accomplishing desired goals (p. 703).

Organizational variables considered meaningful in strengthening the organization's capacity and/or contributing to project complexity include leadership (Belout & Gauvreau, 2004; Bosch-Rekveldt et al., 2011; Brady & Davies, 2014; Chapman, 1998; Geraldi et al., 2011; Gray, 2001; Klein, Conn, & Sorra, 2001; Maylor et al., 2008; Scheberle, 2004; Young & Poon, 2013), governance (Brady & Davies, 2014; Geraldi et al., 2011; Too & Weaver, 2014), financial health

(Barman & MacIndoe, 2012; Bosch-Rekveldt et al., 2011; Fredericksen & London, 2000; Klein et al., 2001; Mazmanian & Sabatier, 2000; Park & Jayakar, 2013; Scheberle, 2004), and experience and organizational age (Geraldi et al., 2011; Mazmanian & Sabatier, 2000; Nguyen et al., 2015; Nisar, 2013; Osei-Kyei & Chan, 2015; Scheberle, 2004). These criteria align strongly with the Grantmakers for Effective Organizations' definition of organizational effectiveness: "the ability of an organization to fulfill its mission through a blend of sound management, strong governance, and a persistent rededication to achieving results" (Wing, 2004, p. 155). These criteria also reflect what Bryson, Ackermann, and Eden (2007) termed core distinctive competencies as they built on the earlier work of Philip Selznick (1957). Distinctive competencies were "particularly valuable capacit[ies] and resource[s] for organizations" that better equipped them to respond to environmental turbulence and other challenges they encountered (Bryson, Ackermann, & Eden, 2007, p. 702).

Leadership. Leadership and organizational culture are two sides of the same coin (Cheung, Wong, & Wu, 2011). If, as has been proposed in organizational theory (Cheung et al., 2011), culture is the glue holding an organization together, then leadership is responsible for shaping that culture. Project management success is dependent, in part, on strong and capable leadership (Bosch-Rekveldt et al., 2011; Brady & Davies, 2014; Gerardi, 2011; Klein et al., 2001). In a 2012 meta-synthesis of implementation frameworks, Meyers, Katz, et al. (2012) found that "all but two frameworks indicated that steps should be taken to foster a supportive climate for implementation and secure buy-in from key leaders and front-line staff in the organization/community" (p. 468).

Researchers have found that management support, defined as "willingness of top management to provide the necessary resources and authority/power for project success" (Pinto

& Prescott, 1988, p. 7), is another component related to implementation effectiveness (Belassi & Tukel, 1996; Klein et al., 2001). If there are controversies or conflicts regarding the decision to pursue a project at the level of senior management, this can cause a negative impact on the ability of a project to subsequently be implemented successfully (Gray, 2001; Too & Weaver, 2014). Young and Poon (2013) found that top management support, while not always sufficient for project implementation success, is a necessary factor in attaining success. Likewise, Geraldi et al. (2011) included senior management support as an indicator of a project's socio-political complexity.

Governance. Too and Weaver (2014) remarked, "The governance system defines the structures used by the organization, allocates rights and responsibilities within those structures and requires assurance that management is operating effectively and properly within the defined structures" (p. 1385). While legislation and regulation based on governance structure may direct an organization's behavior, there are strong linkages between an organization's governance structure and its finances. In the United States, the structure of an organization determines the available sources of revenue and what constitutes appropriate spending and is one component of organizational complexity in the TOE framework (Bosch-Rekveldt et al., 2011). Other researchers (Barman & MacIndoe, 2012; Brady & Davies, 2014; Geraldi et al., 2011) also have included governance structure as part of structural complexity in their models. Brady and Davies (2014) included governance as one of the management constraints that affected structural complexity.

One component of the TOE framework's organizational complexity category was an organization's structure (Bosch-Rekveldt et al., 2011). This component is mostly static for organizations as Gray (2001) noted that "it is unrealistic to expect that most organizations can or will structure themselves and order their operations to optimize individual project outcomes" (p. 108). While governance structure fell under the structural complexity category in Brady and Davies (2014), new or changed organizational structure was an indicator for the uncertainty complexity framework as identified from their review of 25 articles between 1996 and 2010 on the complexity of projects. As such, organizational structure is a component of project complexity that is at least marginally within an organization's control. However, changing structure can run afoul of path dependencies and may result in increased complexity (Schlick et al., 2013). Structural changes could even decrease the likelihood of project implementation success if the changes resulted in a new structure even less compatible with the implemented project.

Financial health. An organization's financial health is one aspect of organizational capacity that is essential to the overall functioning of the organization and thus its ability to successfully implement projects (Klein et al., 2001). Bosch-Rekveldt et al. (2011) included the availability of resources as an organizational element in their TOE framework of project complexity. The financial statements of an organization report its assets, liabilities, and fund balances. Financial statements for prior years are important to potential funding entities as they can reveal important information regarding the overall stability and attentiveness of organizational management to potential issues, such as the amount and nature of debt that has been taken on as compared to the overall size of the organization (Bryce, 2000). Budgets represent manifestations of an organization's strategic or project plan and indicate the priorities of an organization moving forward. They begin as projections of revenues and expenditures for particular categories of a project. Later, the expenditures and revenues planned in the initial budget can be compared to the actual expenditures and revenues recorded in the during- and post-implementation financial statements since “variances between actual and planned expenditures or receipts indicate that the organization is off course and should sound an alarm” (Bryce, 2000, p. 382).

Fiscal autonomy, defined as “the mix of resources available to an organization and the number of restrictions on the use of those resources,” was one of two dimensions defining the external factor of organizational autonomy in the research of Vinzant and Vinzant (1996, p. 143). The introduction of grant funds into an organization’s budget has the potential to greatly influence how resources are allocated within the organization and thereby reduce organizational autonomy (Smith, 2006). Because grant funds are restricted to certain uses within certain projects, if those funds greatly exceed all other fund sources, then the organization could experience mission drift in which it would stray from its core mission in an effort to conform to the requirements set by funders (Bryce, 2000). This aligns with other work on resource dependency, which stated that organizations must enter into transactions with external actors that can supply those resources they are unable to internally generate (Aldrich & Pfeffer, 1976).

Experience and organizational age. Experience as a factor of organizational capacity takes place at two levels, individual experts that are either staff or consultants (Geraldi et al., 2011; Mazmanian & Sabatier, 2000; Nisar, 2013; Osei-Kyei & Chan, 2015; Scheberle, 2004) and the organization as a whole (Geraldi et al., 2011; Todorović et al., 2015).

Both project leaders and staff need time to be able “to stay in place for significant periods of time, as opposed to being rotated from unit to unit with an agency, to develop the kinds of social relationships grounded in trust and honesty required” both within the organization and with external stakeholders (Weber, Lovrich, & Gaffney, 2007, p. 216). Continuity of leadership with low turnover among executive-level leaders and a proactive, rather than reactive, management style are two factors Vinzant and Vinzant (1996) identified as influencing implementation success.

Having the correct human resources to ensure that organizations have the necessary capacity to successfully implement a project is well established in the literature (Bosch-Rekveldt et al., 2011; McDermott, 2004; Meyers, Durlak, et al., 2012; Park & Jayakar, 2013; Scheberle, 2004). Chapman (1998) noted that high staff turnover rates can result "in a knowledge vacuum…when a member of staff departs," (p. 236) and project staff was included as one of the MODeST dimensions in the work of Maylor et al. (2008). Likewise, Belassi and Tukel (1996) found a significant relationship between project team members' technical background and implementation success.

However, other researchers (Belout & Gauvreau, 2004; Pinto & Prescott, 1988) have not found a significant relationship between personnel and project implementation success. Even in the early work on factors related to measures of project performance by Rubin and Seelig (1967), the authors failed to find a significant relationship between a project manager's experience and project performance. Belout and Gauvreau (2004) suggested that the lack of significant impact on implementation success on the part of personnel might be the result of a flaw in the survey instrument that does not capture the personnel dimension fully as opposed to the relationship not existing. They recommended that future studies investigating the relationship between implementation success and personnel involve surveying individuals associated with a project beyond the project manager, which was the approach taken in the Pinto and Prescott (1988), Belassi and Tukel (1996), and Belout and Gauvreau (2004) studies.

Institutional knowledge develops in leadership team members and can be lost with the departure of those leaders affects organizations, and organizations can develop or fail to develop expertise in a field over time as well. Todorović et al. (2015) highlighted that an important problem plaguing the success of future project implementations is "the lack of proper documentation on the results of the previous projects" (p. 781). However, the literature is mixed in its findings regarding the both the general age of an organization and its years of experience performing a particular task. On the one hand, a certain number of years of experience may be necessary to stabilize an organization and decrease its mortality risk (Baum & Oliver, 1991, p. 190). When an organization changes its practices or begins to provide new goods and services, it must begin to build experience once again. Amburgey, Kelly, and Barnett (1993) found that older organizations are more likely to survive these fundamental changes than younger organizations, possibly as a result of having more opportunities to create "modification routines needed to make further, similar changes" (pp. 54, 70). However, literature on organizational ecology points to the difficulty of successful organizational adaptation in the face of change such that an undertaken change may be maladaptive or an organization may be too embedded in its practices to change with necessary speed (Kaufman, 1985; Mellahi & Wilkinson, 2004).

Physical environment factors. Belout and Gauvreau (2004) have suggested that there are distinct differences between projects that encounter internal issues that result in implementation failure and projects that fail due to the influence of external, or environmental, factors. In Bosch-Rekveldt et al. (2011), their TOE framework's environmental factors included both the physical environment in terms of weather as well as a project's socio-political environment (p. 735). However, in the subsequent fuzzy analytic hierarchy process analysis by Nguyen et al. (2015), the "environmental" component of project complexity exclusively concerned the physical environment, including local climate, geographic conditions, and environmentally based risks. In particular, construction projects have a heightened risk associated with them because of the “significant interactions between internal and external environments” (Taroun, 2014). For example, “adverse weather could cause inefficiencies, cost overruns, and or complete suspension of construction activities” (Nguyen et al., 2015, p. 1369).

“Physical Environment” in this study specifically refers to the meteorological and geophysical environmental factors that can affect a project’s implementation. In the case of construction projects, the environment can play a significant role in their successful, or not-so-successful, implementations. Lam (1999) noted that large-scale projects generally have some form of environmental impact, which means needing to conduct impact analyses and implement additional environmental mitigation measures, both activities that add time and cost to the overall project (p. 87).

Interorganizational relationships factors. Over the past three decades, the calls for linking network theory and implementation research to take into account the impact of interorganizational relationships on implementation have grown louder with the voice of Laurence O’Toole as perhaps one of the most consistent (O’Toole, 1986, 1988, 2000; O’Toole & Montjoy, 1984; Robinson, 2006). Focusing on implementation networks that involve the detachment of implementation from those who originated the policy runs counter to the Jeffrey L Pressman and Wildavsky (1984) prescription that implementation should not be divorced from policy and that we should consider more direct means of implementation because of the complexity of joint action (pp. 143, 187). However, that prescription and the complexity of implementation through joint action does not appear to have been a deterrent for actual implementation using multiple actors (Schroeder, 2001).

This dissertation follows a more recent thread of scholarship that acknowledges that the world operates in a networked environment, so research should focus on a networked environment regardless of normative perspectives that may favor or disfavor policy implementation by multiple actors. In a top-down model of policy implementation, the vertical principal-agent relationship between agency and provider would be most important for successful implementation and the policy goals of the principal and macro-level variables should have primacy. Bottom-up policy implementation relies more on the horizontal relationships an organization has with its peers and other external stakeholders and focuses on micro-level variables (Matland, 1995). However, a networked model of policy implementation includes aspects of both top-down and bottom-up policy implementation that better embody the complex realities of implementation (Bryson, Crosby, & Stone, 2006; Schroeder, 2001).This perspective fits with what Weber et al. (2007) referred to as the "partnership capacity dimension." Such a dimension seeks to measure the development of "trust, common purpose, and mutual dependency" of federal, state, and local agencies along with voluntary and private sector organizations that are all devoted to the long-term goals and efforts to solve complex issues (Weber et al., 2007, p. 197).

Principal-agent relationship of government and third party implementers. A number of researchers have noted that using nonprofit and other non-state organizations to implement public policies is not without conflict nor should it be approached in a haphazard manner (Thibault & Babiak, 2009; Balassiano & Chandler, 2010; Campbell, 2011; DeGroff & Cargo, 2009; Mendel, 2010; Mischen & Jackson, 2008; Morçöl, 2008; Murray, Beckmann, & Hurrelmann, 2008; Schroeder, 2001; Watts, 2009). For the implementing organization, "project organizations form as autonomous self-interested actors enter a web of strategic relations or contracts to achieve pre-determined goals" through contracts with funding agencies (Floricel et al., 2014, p. 1093). For public agencies, contracting with nonprofits and investor-owned companies puts public agencies, which have traditionally been on the agent side of the principal-agent relationship, into the role of the principal in agency theory. Thibault and Babiak (2009) highlighted several challenges for the funder to grant recipient relationships include "environmental constraints; diversity in organizational aims; barriers and communication; and difficulties in developing joint models of operating, managing perceived power imbalances, building trust, and managing the logistics of working with geographically dispersed partners" (p. 117). With the exception of environmental constraints, the issues they mention boil down to two main problems that can emerge in principal-agent relationships: goal conflict and monitoring (Eisenhardt, 1989; Kirby & Davis, 1998; Wachsman, 2011).

Creating a functional relationship between a government agency and nonprofit and community organizations can be seen as building the capacity for future action by cultivating trust and relationships of mutual involvement and dependence, which Weber et al. (2007) described as vertical capacity. Vertical capacity refers to the hierarchical relationship between policymakers and policy implementers. This embodiment of the interdependency theory that links nonprofits and government can have positive or negative outcomes (Alexander & Nank, 2009). If an organization invests too heavily in the relationship to the detriment of its own capacity, then this relationship can ultimately be harmful. If, however, the organization has carefully built and maintained its organizational capacity to achieve its mission and has not recently experienced a destabilizing event, then building relationships with other organizations may serve to facilitate the organization in achieving its ultimate goals of meeting its mission, even under trying circumstances (Khademian & Weber, 2008). Inherent in this discussion is that both entities must have shared, or at least aligned, goals to reduce the potential for conflicts that would impede progress towards said goals (Brady & Davies, 2014; Geraldi et al., 2011; Lundin, 2007).

The initial principal-agent model proposed for the public sector outlined the public as the original principal, the legislature as an agent of the public but also a principal, and administrative agencies as the agent of the executive and legislative branches (Moe, 1990, p. 233). When public agencies are no longer "rowing" and performing services themselves, but are instead "steering" or "serving" (Denhardt & Denhardt, 2007), their roles become more complicated as they can become simultaneously the agent of the legislature, the principal in contractual relationships with service providers, and the leader in a governance-based system. Their responsibility shifts to monitoring performance (Todorović et al., 2015) and the use of regulations or other mechanisms to control for the risks considered inherent in a principal-agent relationship (Scott, 2008). On the part of the "agent" organization, those organizations which are financially or otherwise dependent on outside forces for necessary resources may find themselves with a much lower degree of freedom or autonomy than organizations that are more self-sufficient (Vinzant & Vinzant, 1996). "Increased monitoring might encourage better compliance by agents, but also imposes transaction costs on both parties" (Park & Jayakar, 2013, p. 513). These transaction costs include increased time and resources allocated to planning, monitoring, and recording rather than on successfully implementing a project (Sage, Dainty, & Brookes, 2014).

Relationships with other actors. In addition to the vertical relationship between principal and agent, horizontal network relations with stakeholders in the agent's external environment that can affect, positively or negatively, an organization's effectiveness to achieve its mission also affects implementation. "Stakeholders" are "any individual, group, organization, or institution that can affect or is affected by the achievement of the project's process or objectives" that can have a strong impact on project management and are a major dimension of project complexity. (Maylor et al., 2008, p. S22). Construction projects are one example known for involving numerous external stakeholders due to both their cost and impact on the physical environment (Taroun, 2014).

Horizontal capacity refers to the social capacity and institutional commitment that accompanies long-term problem management. This aspect of capacity focuses on the interdependence that develops between agencies that are forced to collaborate with one another in order to achieve results (Weber et al., 2007). Mischen and Jackson (2008) advanced that "the increased attention given to policy implementation networks suggests that many policies cannot be implemented without the involvement of other organizations" (p. 319). However, these instances of outside involvement have the potential to either bolster implementation efforts or create obstacles that the lead implementing organization will have to overcome (Olander & Landin, 2005).

Viewed in part through the Himmelman (2001) cooperation, coordination, and collaboration dimensions of organizational coalitions, relationships between implementing organizations and other network actors (or "stakeholders") vary in intensity and interconnectedness. Networking and cooperation are both positive relationships but involve less sharing of resources than the stronger ties of coordination and collaboration. Transaction Resource Theory (TRT) demonstrates some of the potential pitfalls that can lead to negative interactions rather than cooperation in rational actors: division and defection (Baer & Feiock, 2005, p. 46). According to TRT, rational actors "coordinate" their efforts only when there is a mutual benefit to doing so that outweighs benefits derived from individual action. This supposition can extend to the decision to interact with other organizations at any of Himmelman's levels of coalitions.

Division and defection occur when there are disagreements regarding which arrangement between organizations is preferred. Stakeholders may have a history of distrust due to professional competition or interpersonal issues (Diallo & Thuillier, 2005; Maylor et al., 2008), differing perspectives of how to implement projects (Nguyen et al., 2015), or conflicting interests in who, how, or whether a project is implemented (Brady & Davies, 2014; Floricel et al., 2014) that can impede project management success. These disagreements can be relatively minor and resolvable, or a case of "irreconcilable differences" in which the two actors are locked in fundamentally adversarial interactions.

Lundin (2007) posited three factors that can help to resolve division and defection in order to improve policy implementation: resource interdependence, goal congruence, and mutual trust. He found that there was a necessary interplay between mutual trust and goal congruence such that similar goals matter little without trust between organizations but, at the same time, trust has little impact on increased cooperation if there is not goal alignment (Lundin, 2007, p. 652). However, even in instances where stakeholders have goal alignment and little in the way of interpersonal or interorganizational disagreements, the sheer number and variety of stakeholders can still influence the success of project implementation (Geraldi et al., 2011; Nguyen et al., 2015).

Legal environment factors. The POPIL framework defines the legal environment as any legislative, regulatory, or judicial action that influences a project's implementation aside from those actions stemming from a direct principal-agent relationship or collaboration with executive agencies. Legislative, executive, and judicial decisions all have the ability to influence a project's implementation. Scheberle (2004) indicated that policies have "legislative, administrative, and political legac[ies] and current plotlines that determine, in large and small ways, the rate and progress of implementation" (p. 40). Several researchers (Bosch-Rekveldt et al., 2011; Brady & Davies, 2014; Geraldi et al., 2011; Nguyen et al., 2015) have placed these interactions under a larger umbrella of "socio-political" along with other interorganizational relationships in reference both to factors influencing project implementation and in more general discussions of project complexity. Geraldi et al. (2011) noted that "socio-political complexity is easy to broadly conceptualize, yet difficult to operationalize" (p. 981). With that in mind, the legal/political portion of the "socio-political" is separated here from the more nebulous interorganizational components of the social, as described in the previous section.

As noted earlier, Bosch-Rekveldt et al. (2011) categorized all external factors influencing project complexity that could lead to project failure under a single umbrella. "Political influence" is one component of the Environmental—Stakeholders factor in their study. In a more recent factor analysis stemming from the Bosch-Rekveldt et al. (2011) approach, Nguyen et al. (2015) separated "environmental" in the sense of climate and geology from the "socio-political" in terms of administrative policies and procedures as well as regulations (p. 1368). While these researchers have focused on the interplay between project complexity and political factors, Vinzant and Vinzant (1996) investigated statutory requirements as one of two dimensions of organizational autonomy (the other being fiscal requirements discussed earlier). Likewise, Barman and MacIndoe (2012) found that legal characteristics affect an organization's capacity "to enact a specific task" (p. 72).

Conceptual Hypotheses

Pinto and Covin (1989) noted that while practitioners who manage projects often felt that their project has many unique features that preclude them from comparing across projects, researchers have had the opposite tendency in that "too often academics have sought parsimony in generalizable decision rules for organizational phenomena" (p. 59). Researchers and practitioners interested in project implementation can find a middle ground where factor-indicator relationships can be identified in a generalized framework but where specifics of which factors have the strongest influence on success are likely tied to project type and implementation phase (Pinto & Covin, 1989). In keeping with that suggestion, the conceptual hypotheses organized in Table 6 give factors equal standing. Project implementation success means meeting key performance indicator goals of budget, schedule, and/or outputs. Some hypotheses are for overall project implementation success across key performance indicators while others specify a KPI subset that is marked as "Budget Success," "Schedule Success," or "Outputs Success."

Table 6 Conceptual Hypotheses

Factor	Conceptual Hypotheses Factor-Indicator Relationships
Project—Scope	CH_1 Tailored parameters directly influence project implementation success.
Project—Target Population	CH_2 The social construction of target population directly influences project implementation success. CH_3 A clear definition of the target population directly influences project implementation success.
Project—Materials and Technology	CH_4 Material availability directly influences Schedule Success. CH_5 Material choice directly influences Outputs Success.
Organization—Leadership	CH_6 Changes in organizational leadership inversely influences project implementation success.
Organization—Governance	CH_7 Change of lead organization inversely influences project implementation success. CH_8 Fiduciary responsibility concerns in the lead organization inversely influence project implementation success. CH_9 Alignment of an organization's mission to project goals directly influences project implementation success.
Organization—Financial Health	CH_{10} Organizational debt ratio inversely influences Budget Success. CH_{11} The ratio of the grant amount to the total organizational annual budget inversely influences Budget Success.
Organization—Experience and Organizational Age	CH_{12} Amount of prior experience implementing similar projects directly influences project implementation success. CH_{13} Organizational age directly influence project implementation success.
Physical Environment	CH_{14} Frequency and severity of adverse meteorological and/or geographical

	conditions encountered during implementation inversely influnece Schedule Success. CH_{15} Presence of sensitive ecological or historical/cultural locations inversely influences Schedule Success.
Interorganizational Relationships—Principal-Agent Relationships	CH_{16} Requirements by the principal on the agent in a principal-agent relationship inversely influences project implementation success. CH_{17} Interventions by the principal inversely influences Schedule Success and Outputs Success.
Interorganizational Relationships—Other Actors	CH_{18} Partnerships with other actors directly influence Budget Success and Outputs Success. CH_{19} Interactions with external stakeholders and other non-partner external actors inversely influences Schedule Success and Outputs Success.
Legal Environment	CH_{20} Government interventions and rulings regarding the projects inversely influence Schedule Success and Outputs Success.

Chapter Summary

Chapter 2 provided a review of the literature on policy implementation and project management as it relates to how to measure project success and how to evaluate projects. Based on this literature and additional works coming from the public administration, public policy, nonprofit management, and similar fields, I formed a conceptual framework to connect and identify critical success factors that may influence key performance indicators for project implementation. It expanded on prior work by Bosch-Rekveldt et al. (2011) and Nguyen et al. (2015) to include project-specific, organizational, physical environment, interorganizational, and legal factors and is termed the POPIL framework.

Project-specific factors included aspects of a project's design and focus such as its targeted population, project scope, and the materials selected for the project. Organizational factors focused on the internal dynamics of an organization as they relate to organizational capacity, or the ability of the organization to accomplish its defined goals. These factors include financial health, leadership, staffing, governance structure, and organizational age and experience. Physical environment factors may play a larger role in construction-focused projects compared to other types of projects. These factors included the meteorological and geophysical conditions such as extreme weather and terrain that can hamper project progress.

Interorganizational relationships referred to those interactions an implementing organization has with other organizations and actors in its broader environment. These can include principal-agent relationships, coordination, and competition among various actors in the same environment, socio-political legitimacy as a respected player in the field, gaining access to externally held resources, coming to consensus among project partners, and other network-based relations surrounding a project and its implementing organizations. Lastly, legal factors identified the various political forces that can enable or impede project progress. These factors covered the gamut of legislative and regulatory actions from broad federal and state laws to decisions made at the micro level by administrators in agencies specifically about a project's proposed actions.

Based on the research into these factors as part of a framework for project implementation success, a set of broad conceptual hypotheses of factor-indicator relationships was then articulated. Chapter 3 will operationalize factors, indicators, and their related hypotheses as part of the development of the overall research design for this study.

Chapter 3: Methodology

The purpose of this mixed methods research is to gain a better understanding of the critical success factors that influence project implementation as measured by key performance indicators of budget, schedule, and outputs. The study investigated if project implementation success/failure was more likely to result from inherent facets of a project, internal dynamics of an organization, interorganizational relationships, or factors in the physical environment. The decision to conduct a quantitative analysis was made in response to claims by recipients, other industry professionals, and trade publications as to the causes of BTOP project failures in terms of schedule delays, budget overruns, and projects that fell short on other key performance indicators. However, these claims have often been made using only anecdotal evidence to point fingers at Japanese tsunamis, environmental regulations, and other so-called "red tape" of government interference that made it difficult for projects to achieve their key performance indicators. By quantitatively testing the factor-indicator relationships, this study can draw conclusions of if factors identified by recipients or in trade publications actually correlated with project implementation success indicators across projects.

Not all influential factors can be easily or accurately quantified. As such, to conduct a quantitative analysis based on document analysis, particularly when reports prioritized the rapid flow of dollars over other forms of project implementation success and information was predominately self-reported, is to get a limited view of a project's overall implementation. The study created a more comprehensive and deeper understanding of factors that influenced the project's implementation and may have contributed to its relative success through qualitative postmortem analysis of interviews with multiple people from the implementing organization, their project partners, localities and other permitting bodies, end users, and two of the federal grant officers that administered the project grant,.

This chapter offers information on the purposive sample of Comprehensive Community Infrastructure projects funded by the Broadband Technology Opportunities Program selected for the quantitative analysis portion of the study and the postmortem analysis's focus on the Citizens Telephone Cooperative BTOP-funded project. The operationalized POPIL framework to prepare for the deductive quantitative analysis of projects' documents follows that section. The chapter concludes with an articulation of the research questions, presentation of test hypotheses, and an explanation of the chosen analytical techniques.

Sample

Quantitative analysis. The primary critique Goggin (1986) aimed at early waves of implementation studies was the lack of generalizability of findings because of an undesirable ratio of variables relative to cases in a study. Existing studies at that time had degrees of freedom too high to be able to analyze implementation and derive meaningful explanations. He had three main suggestions for how to combat this issue: reduce the number of independent and dependent variables, increase the number of cases, and select cases based on similarity and comparability (Goggin, 1986, p. 330). This project uses a purposive sample of 67 of 123 projects funded through a common program to evaluate whether and how identified factors influence project implementation success. While a sample size of 67 is large enough to provide statistically significant results, its specialized nature may mean that the external validity and utility of this study's findings would be limited to other grant-funded and/or construction projects. However, findings will have great utility for practitioners as well as for researchers looking to replicate the study in other settings.

Creating a homogeneous sample by selecting cases based on similarity and comparability eliminates some of the independent variables that would otherwise be included in the analysis. The American Reinvestment and Recovery Act's Broadband Technology Opportunities Program (BTOP) funded each of the 67 cases used in the quantitative portion of this study to construct middle-mile broadband infrastructure as a way of expanding Internet access in unserved and underserved areas, improve Internet access for community anchor institutions, and create jobs to aid in recovering from the Great Recession. The sample controlled for which round of funding and which funding program with all selected projects being Round 2 BTOP projects to ensure consistency in project approval criteria, the timeline for project completion, and the type of project.

To increase homogeneity in the sample further, I eliminated the seven projects suspended during implementation due to conflicts with the Middle-Class Tax Relief and Job Creation Act of 2012 from the sample. This Act provided funds to create a nationwide public safety broadband network, FirstNet, which would operate on the same frequency as these projects. Of these seven projects, two terminated, four negotiated with the new FirstNet entity, and one proceeded independently. The inclusion of these projects in the overall regression analysis had the potential to skew the analysis in favor of legal environment factors because the NTIA action because of additional federal legislation was the clear source of their implementation delays or project termination rather than aspects of the grant recipient, other organizations, or project itself. These cases all had the same clear cause for delays in their implementation: additional federal legislation was passed that would interfere with or duplicate at the national scale what the projects in question were constructing at the local, regional, or state levels. Similarly, I eliminated other projects that awarded funding under this program because they never began due to organizational or political pressures biased against the Recovery Act or publicly funded networks. I removed an additional negative outlier case from the pool due to its early grant award termination and subsequent abandonment of the organization's BTOP-funded project.

Project postmortem analysis. In addition to the quantitative portion of the study, this study also included a more in-depth project post-mortem of one case: the New River Valley Regional Open-Access Network (NRV-ROAN) constructed by Citizens Telephone Cooperative, an organization based out of Floyd, Virginia. I chose this project for a postmortem both because others pointed to it as an example of a successful project in terms of meeting program objectives and being implemented well and because I had established professional connections with the organization's leadership through my work in the region on broadband access.

Unlike a number of other states in which central state agencies administered BTOP grants, Virginia organizations implemented the nine BTOP CCI projects in Virginia at the regional or local level. Of those regional projects, four projects received Round 2 funding: $6.9 million for Rockbridge Area Network Authority, $9.2 million for Citizens Telephone Cooperative, $10 million for Mid-Atlantic Broadband Cooperative, and $22.7 million for Bristol Virginia Utilities Board. Citizens' project was the only one to meet all three key performance indicators. All three of the other Round 2 projects required extensions to complete construction, and Rockbridge additionally failed to meet the Budget or Outputs Success. As the quantitative model was better able to capture causes of delays and overruns due to the natural bias towards identifying issues that would lead to less than peak performance, a desirable project would meet the Total Success standard to fill in some of the gaps and unknowns from the model. Based on these criteria, I selected Citizens through the elimination of alternatives within the geographic and professional networking bounds, which improved my access to organizational leaders, external stakeholders. I also had a deeper understanding of this project as I observed its implementation as Citizens and its project interacted with my professional work.

Sources of information for the postmortem included researcher observations, analysis of organizational and NTIA documents, and formal interviews with community leaders, individuals associated with the local project, and NTIA officials. The post-mortem provides additional narrative support for quantitative findings and delves deeper to explore subjective variables, such as management and interorganizational relationships, which the quantitative analysis may not have captured fully.

Interview participants were selected based on their personal involvement with the Citizens' New River Valley Regional Open-Access Network (NRV-ROAN) BTOP project. While the list of participants is not exhaustive of all individuals who played a role in the implementation of the project, I selected them to be representative of the variety of roles and types of organizations involved in the project's implementation. Consultation with Citizens identified additional participants to interview regarding their roles in the overall implementation process. Taken together, these participants offer a comprehensive understanding of the project. As such, participants did not have a uniform understanding of the project. Instead, they each explained a particular facet of the project's implementation story.

From Citizens Telephone Cooperative, I interview four individuals who were essential to the successful implementation of this project. Greg Sapp is the CEO/General Manager, Dennis Reece is the COO/Assistant General Manager, Chris Bond is the Finance Manager, and Russell Janney served as the engineering construction team lead before taking over as Engineering and Outside Plant Supervisor following the previous supervisor's retirement. Charles Huff, the previous engineering supervisor, did not participate. The Citizens staff interview was a group conversation following an online information-gathering survey (Appendix J). Citizens subcontracting the engineering portion of the project to Thompson & Litton Engineering Firm, and I interviewed the T&L project manager assigned to the Citizens project, Eric Price.

Four individuals affiliated with the New River Valley Network Wireless Authority participated in interviews for this post-mortem. In the successful Round 2 grant application by Citizens, the Authority served as a collaborating partner for the project with Citizens and a major financial supporter. Kevin Byrd became the Executive Director of the PDC in 2009 and provided staff support for the Authority. Peter Huber and Tim Barnes both represented Pulaski County on the Authority board. Huber is the County Administrator, and Barnes serves as the Director of Information Technology for both the County and Pulaski County Public Schools. Bernie Cosell is a citizen member of the Authority board with a long history of involvement in the development of the Internet dating back to the 1970s. The two remaining Authority board members were unavailable for an interview.

The Virginia Tobacco Commission funded a portion of the 20% match required for the grant for the portion of the project that covered a Tobacco Commission eligible area, primarily in Floyd County. Timothy Pfohl was the grant administrator responsible for that funding and was the interim director of the Tobacco Commission when interviewed. The other matching funds came from the two localities via the wireless authority or were in-kind goods and services from Citizens.

I also interviewed individuals from both New River Community College (NRCC) and Virginia Tech, two organizations that were vocal supporters of the project and eventual customers on Citizens' network. Jack Lewis, President, and John Van Hemert, Vice President for Finance and Technology, provided NRCC's perspective on the importance of the Citizens network for the college and thoughts on what it would mean for the broader region. Lewis and Van Hemert's interview was also a joint conversation among the three of us to get a more holistic understanding of NRCC's role and perspectives on the project. Jeff Crowder, Executive Director for Strategic Initiatives in the Division of Information Technology at Virginia Tech, provided insights on the project's benefits to the region and to Virginia Tech as a CAI and on the implementation of the project from his perspective as head of another BTOP project that interconnected with the Citizens project.

To understanding issues regarding interorganizational relationships and property access, I interviewed Melissa Lance and Steve Jones. Melissa Lance from the Virginia Department of Transportation responded to my questions via email. She is VDOT's Operations Systems Manager and Fiber Optic Resource Sharing Partnership Manager for the Salem district in which Citizens implemented its project. Steve Jones is the Director of Technology for the Town of Blacksburg, one of a number of localities where the Citizens infrastructure connected the community anchor institutions but the locality was not an active partner in funding the project.

Lastly, I interviewed Scott Woods and Barbara Brown, the two federal project officers from the National Telecommunications and Information Administration who administered the grant. They are both Senior Communications Program Specialists with the NTIA. Woods served as the administrator for the majority of the grant period with Brown taking over for the last portion. Attempts to reach grant administrators at the National Oceanic and Atmospheric Administration, with which the NTIA contracted to handle some of the day-to-day administration of BTOP grants, were unsuccessful.

Table 7 lists each of the participants, their affiliated organization, and their given role at the time of this project's implementation.

Table 7 NRV-ROAN Project Interview Participants

Organization	Role	Participant
Citizens Telephone Cooperative	AGM/COO	Dennis Reece
Citizens Telephone Cooperative	GM/CEO	Greg Sapp
Citizens Telephone Cooperative	Finance Manager	Chris Bond
Citizens Telephone Cooperative	Engineering Supervisor	Russell Janney
New River Valley Network Wireless Authority/ Pulaski County Public Schools	Authority Member/ Director of Technology	Timothy Barnes
New River Valley Network Wireless Authority	Authority Member	Bernie Cosell
New River Valley Network Wireless Authority/ Pulaski County	Authority Member/ County Administrator	Peter Huber
NRV Network Wireless Authority/ New River Valley Planning District Commission	Staff Support/ Executive Director	Kevin Byrd
Virginia Tobacco Commission	Interim Executive Director/ Grants Director	Timothy Pfohl
New River Community College	President	Jack Lewis
New River Community College	Vice President for Finance and Technology	John Van Hemert
Virginia Tech	Executive Director, Strategic Initiatives, Network Infrastructure and Services	Jeff Crowder
Virginia Department of Transportation	Fiber Optic Resource Sharing Partnership Manager/ Operations Systems Manager	Melissa Lance
Town of Blacksburg	Director of Technology	Steve Jones
Thompson & Litton Engineering	Project Manager	Eric Price
National Telecommunications and Information Administration	Senior Communications Program Specialist	Barbara Brown
National Telecommunications and Information Administration	Senior Communications Program Specialist	Scott Woods

In addition to interviews, document review was also part of the post-mortem analysis. The quantitative portion of this dissertation relies on the scoring conducted by the NTIA for each of the variables/sub-areas of inquiry. However, the qualitative portion that focuses specifically on the Citizens Telephone Cooperative New River Valley Regional Open-Access Network (NRV-ROAN) project also delves into detail on documents such as the organization's IRS 990 tax forms, Citizens leadership team's resumes, financial audits, the NRV-ROAN project manual, and community input letters. Many of these documents were required as part of the initial application approval process for awarding BTOP grants.

Operationalization of Variables

The study utilizes a mixed methods approach to combine a quantitative analysis of BTOP projects' documents with a qualitative postmortem analysis of the New River Valley Regional Open-Access Network project. The approach offers an opportunity to cultivate knowledge factor-indicator relationships based on analysis of 67 comprehensive community infrastructure projects within BTOP while also conducting a single project deep dive to understand better the details of implementation that were not easily quantified or uniformly accessible across the broader subset of projects. This section of the dissertation provides information on variables operationalized based on the proposed framework for inclusion in the study and details the coding and data analysis methodologies utilized for the quantitative analysis.

As discussed in the previous chapter, critical success factors influencing project implementation sorted into the project, organizational, physical environment, interorganizational relationships, and legal (POPIL) framework categories. In this section, I first detail the operationalization of key performance indicators (KPI) for "project implementation success" by providing the equations used to create success index scores for each KPI as well as an index score for overall project implementation success. Following the discussion of project implementation success, I operationalize the POPIL framework factors for this study: project-specific, organization-focused, physical environment, interorganizational relationships, and legal environment. The independent and control variables within these categories were identified through reviewing existing literature, interviewing BTOP grant recipients, and conducting participant observation of BTOP grant recipients in a professional capacity.

Dependent variables—Key performance indicators. Pinto and Prescott (1990) noted that the success of a project's implementation is traditionally measured on the basis of adherence to schedule, adherence to budget, fulfillment of performance expectations, and whether clients are satisfied and making use of the final product (p. 311). In this study, the first three key performance indicators capture project implementation success. The quantitative portion of study excludes client use and satisfaction because a comprehensive data source that goes beyond the end of the grant period for this information is not available for all projects. More detail on satisfaction, use, and early impacts of a successfully implemented project were included in the qualitative project postmortem exploration of the Citizens Telephone Cooperative project.

For the quantitative analysis, the schedule, budget, and outputs key performance indicators are crafted as both binary variables and indices as described in more detail below based on insights drawn from goal attainment scaling (GAS), a methodology originating in the mental health field that allows for standardized comparative evaluations over time even when goals are not in agreement across projects (Royse, Thyer, Padgett, & Logan, 2006, p. 195). A composite success index score was a continuous variable to capture a comprehensive picture of project implementation.

Each KPI index had a center score of 0.00, meaning that the project implementation occurred exactly as proposed. A negative score indicated that the project fell short on a particular KPI while a positive score indicated that the project exceeded expectations in that area. The overall success index score is the sum of the three individual indices and allowed for exceptional success in some categories to balance out with failure in others. Overall project implementation success was also coded as an ordinal variable as discussed below. Additional details on the recording process for success in each KPI area follow.

Project schedule. As a time-sensitive grant program, many BTOP-funded projects were set to follow a 36 month/12 quarter timeline for implementation. Variables in this category measured how well projects achieved their Schedule Success. A binary schedule variable indicated whether a project finished within 36 months. The Schedule Success index score formed by subtracting from the twelve quarters proposed for the grant program (h_p)the number of quarters actually needed to have a complete and operational network (h_a) and then divided by the program's projected twelve quarters. This gave the percentage of deviation from program-mandated completion date. Projects finishing perfectly on time would receive an index score of 0 ($h_a = h_p$), while a resulting positive number indicates that the project completed ahead of schedule ($h_p > h_a$), and a negative number indicates that the project did not finish on time ($h_p < h_a$).

Schedule Success Index: $\boldsymbol{Y_h = \frac{h_p - h_a}{h_p}}$

Project budget. This study also measured how well BTOP projects were able to accomplish their set Budget Success. A binary variable indicated whether a project finished within 100% of its budget. The Budget Index reveals the percentage by which a project's final budget expenditures (u_a) deviated from the predicted expenditures (u_p) as stated in its original grant application. This index is calculated by subtracting from the projected total project cost (u_p) the actual total expenditures (u_a) and dividing by the projected total project cost(u_p). A score of 0 means indicates that the project's final expenditures exactly matched the budget provided in its grant application ($u_a = u_p$). A negative score indicated that actual expenditures exceeded predicted expenditures ($u_a > u_p$) while a positive score indicated that the project came in under budget ($u_a < u_p$).

Budget Success Index: $\boldsymbol{Y_u = \frac{u_p - u_a}{u_p}}$

Outputs. The Outputs Success measures captured whether or not a project fully constructed its proposed network. As all projects included in the study constructed middle-mile broadband infrastructure systems that included fiber optics cable, a project's total network miles was the selected measurement for this KPI. This measure included new network miles deployed, existing miles upgraded, and new network miles leased. The Key Performance Indicator Dashboard document, which was part of all projects' initial grant application, provided the planned network miles figure. I crosschecked this number against figures given as part of the project's environmental assessment and in their quarterly performance progress reports. In a few instances, the NTIA redacted the KPI Dashboard figures from the released application at the request of the grant recipient. For these projects, the environmental assessment or a performance progress report was the source of the planned network miles figure. I made modifications to figures to reflect the revised estimated baseline network miles only when there was a sharp distinction between planned and final due to mismeasurement or miscalculation in the original application.

An Outputs Success binary variable recorded whether a project attained at least 95% of its proposed number of miles. The 95% threshold is particular to the Outputs Success due to the minor variations that can occur between the estimated network design and final built network based on things as simple as which side of the road the cable runs or which side of a building has the connection. The Miles Index continuous variable tracks how well the final actual mileage for a project (m_a) matched the proposed network mileage (m_p) as articulated in the project's initial application. As with the other indices, a score of 0 means that the number of miles constructed exactly matched the proposed number of miles ($m_a = m_p$). A positive score indicates that the project constructed more than the predicted number of miles ($m_a > m_p$), while a negative score indicates that the project constructed fewer than the predicted number of miles ($m_a < m_p$). This reverses the order of the Budget Success and Schedule Success calculations to create a positive index score to indicate that, at least for outputs, more is better.

Outputs Success (Mileage) Index: $$\boldsymbol{Y_m = \frac{m_a - m_p}{m_p}}$$

Overall project implementation success. Overall project implementation success presents as a binary failure/success variable and a continuous index variable to reflect a composite of binary scores and indices, respectively, for the Budget Success, Schedule Success, and Outputs Success. For example, a project may have taken an extra quarter to finish but constructed more than the proposed number of network miles for less than the budgeted expenditures. Alternatively, a project may have opted to complete on time by sacrificing network miles or expending additional dollars. A project exactly meeting all goals (schedule, performance, and miles) would have a success index score of 0 ($s_a = s_p$). A positive score would indicate that the actual cumulative benefits were greater than proposed ($s_a > s_p$), while a negative score would mean that the project did not achieve benefits in at least one area that outweighed any deficiencies in other areas ($s_a < s_p$).

Success Index: $$\boldsymbol{Y_s = Y_m + Y_u + Y_h}$$

A third overall success variable was also created that categorized projects according to the criteria set out by A. G. Yu et al. (2005) to indicate the potential distinctions between project success and project management success: total success, qualified success, controlled failure, and total failure. Constructing at least 95% of planned miles indicated project success. In this criteria, meeting budgetary and schedule goals defined "project management success." Projects that met all mileage, budget, and schedule goals were total successes. They were only a qualified success if they constructed at least their proposed number of network miles but failed to meet budget and/or schedule deadlines. Controlled failure meant that the project at least met its budget and/or schedule deadlines even if it failed to complete the proposed number of network miles. Total failure indicated that the project did not deliver the proposed network, overspent its budget, and did not meet its deadline for project completion.

Independent Variables

Project-specific factors. "Project-specific factors" focused on concrete details related to a project, and these factors fell under the umbrella variable categories of scope, target population, and materials and technology. These variables were selected based on the project management literature, information gained during participant observation, an examination of qualifying criteria for the grant project, and prior studies conducted by others on factors related to the digital divide (Becker et al., 2010; Stevenson, 2009; Valadez & Durán, 2007). A content analysis of projects' initial grant applications with supplemental data pulled from their Performance Progress Reports (PPR) coded these factors.

The project scope variables included an ordinal-level variable of the project's scale and ratio level variables of square miles in the service area and planned length of the network in miles. The scale levels were local, regional, state, or multi-state. Local projects were restricted to a single locality while regional projects spanned more than one locality. A state agency often administered the state-level projects and designed them to reach a majority of the localities in a state. Finally, multi-state projects spanned at least one state border and some were on a national scale to serve community anchor institutions across the country. The number of community anchor institutions identified in the proposed service area was used as the target population variable as all projects included in the study were middle-mile infrastructure projects intended to serve these anchor institutions rather than individual end users directly.

The materials and technology category included network structure and type of technology used. Network structure identified if a project was a wireline, wireless, or hybrid network that included both types of connections. In the projects studied here, the wireline projects all used similar technology with fiber optic cable materials. For last-mile projects, wireline materials could have also included copper and coaxial cables for DSL and cable Internet services. For projects with a wireless component, technologies involved included fixed wireless, LTE, WiMAX, and microwave. Issues surrounding choice of materials and technology were included in part because of the media attention given to the issues some BTOP projects encountered with implementing their proposed technology for their networks (Williams, 2013). This category also included issue reports of materials malfunctions or delivery delays and identified changes to network structure or technology used.

Table 8 Operationalized Project-Specific Factors

Scope	Scale (local, regional, state, or multi-state)
	Planned length
	Square miles in proposed service area
Target Population	Community Anchor Institutions in service area
Materials and Technology	Type of technology
	Changes to network type
	Materials/equipment delays and performance

Organizational factors. As discussed in the literature review, both public administration and nonprofit management scholars heavily emphasize the importance of organizational capacity for an organization's ability to accomplish its stated goals. If an organization does not have the financial and human resources or appropriate latitude to operate, then it is unlikely to accomplish its goals successfully. This category includes structural factors and factor issue reports during project implementation.

The first group of organizational factors was structural factors drawn from projects' grant applications and included organizational type, sector, years of experience as a utility provider, and age. Organizational type included state agency, local government, utility provider, higher education, economic development, K-12 school system, healthcare, or American Indian tribe. Government, for-profit, and nonprofit were the three organizational sector codes. Each organizational type and sector were binary variables. Years of experience as a utility provider and organizational age were continuous variables.

Organization-focused factors reflect issue reports in projects' performance progress reports and other NTIA documents produced during implementation. These other NTIA documents included award amendments, corrective action plans, and letters of suspension/work resumption. These issue reports fell into three categories of factors: human resources, governance, and financial health. Leadership and staffing included staffing issues, changes in leadership, and fiduciary responsibility concerns. Staffing issues tended to be from either inability to hire sufficient staff at the start of the project or loss of staff members during project implementation. Grant recipients and grants officers in documenting progress also reported changes in organizational leadership. Deficient fiduciary responsibility reports included information on organizational leaders' failure to meet their responsibilities to the project, grant terms, or organization. Information on this issue emerged in corrective action plans and suspension letters and only rarely in grant recipients' performance progress reports.

Issue reports regarding governance included organizational structure changes and deficient fiduciary responsibility. Some lead organizations underwent restructuring during project implementation, such as transitioning from a utility cooperative to a different nonprofit organization, or from one type of government agency to another. Other projects experienced lead organization transfer during implementation in which the responsibility officially shifted from one organization to another.

Issue reports regarding finances included funding and accounting system difficulties that crossed over with interorganizational relationships for these grant-funded projects. BTOP grants provided up to 80% of the projected cost of the project, and recipients were required to produce the remaining 20% of the overall cost of the project. The program required that funds be spent proportionally, which proved challenging for some projects that had planned to use project income or the value of particular in-kind goods, services, and contracts to cover a portion of their match. Issue reports on a project's accounting system included changes to how projects were classified in the Automated Standard Application for Payments (ASAP) used for grant fund disbursement, concerns regarding tracking of expenditures and appropriate categorization of funds between grant and matching funds.

Table 9 Operationalized Organization-focused Factors

Human Resources	Staffing delays
	Changes in organizational leadership
	Deficient fiduciary responsibility
Experience and Organizational Age	Organizational age
	Years of experience as utility provider
	Type of organization
Financial	Total anticipated project budget
	Match percent as awarded
	Funding match reported issues
Governance	Organizational sector
	Restructuring during implementation
	Change of lead organization

Physical environment. The Recovery Act created the Broadband Technology Opportunities Program to serve unserved and underserved areas. As with electricity and telephone infrastructure deployment in the last century, these areas are overwhelmingly rural with low population density and often are mountainous or have other geographic features that increase the cost or difficulty associated with infrastructure build out (Basu & Chakraborty, 2011; Grubesic, 2003; Whitacre, 2010). Factors reporting the physical environment fall into two camps: natural and environmental regulatory. A later section on crosscutting factors covers environmental regulatory factors more deeply. Natural factors included issue reports where terrain and climate negatively affected construction work. Terrain included factors such as rock, ground and surface water, and national forests. Climate mainly captured meteorological delays in and around the project's area, such as precipitation and extreme temperatures, which negatively affected construction.

Table 10 Operationalized Physical Environment Factors

Physical Environment	
Nature	Terrain
	Local climate

Interorganizational relationships. In this research, interorganizational factors subcategories included partnerships and contracts, principal-agent relationship, and property access. Several factors in this category cross with other framework categories that include both the legal and physical environments.

Partnership factors included the number of project partners, issue reports for difficulties with partners during implementation, and issue reports for other external project coordination difficulties. Contracts factors included delays related to signing agreements with community anchor institutions or last-mile service providers, delays in signing Irrevocable Rights of Use agreements for projects to gain access to dark fiber, and delays in the Request for Proposal (RFP) process or with contractors' fulfillment of obligations.

The principal-agent relationship overlaps interorganizational relationships with the legal environment. In the case of BTOP, this relationship was primarily between grant recipients and the NTIA and extended to NOAA and Booz Allen as authorized agents managing much of the day-to-day grant management activities. Operationalized principal-agent relationship factors included issue reports for route modification, budget modification, or other award action requests, issue reports for special award conditions that restricted grant recipients' actions pending resolution, or issue reports on the NTIA's unclear guidance on appropriate courses of action.

The category of property access for these infrastructure projects as it relates to interorganizational relationships crosses with physical environment factors. Some projects already owned all the property on which they would build or upgrade infrastructure, which eliminated property access issues for them and indicates clearly that access to property was very much an issue of relationships with other actors rather than an internal issue or one solely related to the topographical, meteorological, or cultural elements of the land. However, when projects had to use land they did not own already, delays could emerge because of attempts to acquire the land outright or gain permission to use the land. Variables included under this umbrella category include private property/site access rights delays, utility make-ready delays, and railroad permit delays.

Grantees' reported difficulties in gaining access to land held by individuals or non-utility organizations were the basis for the property access factors and meta-factor. Make ready delays refer to the process in which electricity, telecommunications, and other utility providers with existing infrastructure along the planned route for the new infrastructure are required to mark, move, or otherwise "make ready" their existing infrastructure so that new infrastructure can be added along the path. Railroad permitting refers to gaining permission to pass over or under railroad tracks or otherwise gaining access to rail right of ways.

Table 11 Operationalized Interorganizational Relationships

Interorganizational Relationships	
Partnerships and Contracts	Number of project partners
	External coordination
	Signed IRU agreement
	Signed CAI agreements
	RFP/Contractor interactions
Property Access	Private property/site access rights
	Make ready process
	Railroad permit
Principal-Agent Relationship	Other Award Action Request
	Route modification approval
	Award Overlap Resolution

Legal environment. Legislation and regulations at the federal, state, and local levels can affect organizations and their projects. Telecommunications laws and regulations at all levels of government are complex in both design and implementation, and they vary across states (Andrew, 2002; Bauer, 2010; Bouckaert, van Dijk, & Verboven, 2010; Brenner, 2010; Cambini & Jiang, 2009; Cherry, 2007; Götz, 2013; Phil, 2000; Mullady, 2007). They create and fund programs and then set criteria by which areas count as eligible "unserved" or "underserved" communities as with the Broadband Technology Opportunities Program. They ban or permit organizations from certain sectors, such as municipal departments or nonprofit utility cooperatives, to provide specific types of service, such as last-mile broadband internet service to residential users as with municipal broadband restrictions found in states across the country. They impose taxes and fees taken from certain populations and for certain services to redistribute those funds for other types of users, such as the e-Rate program, or in other areas in which the unsubsidized cost-benefit analysis is not sufficiently strong to encourage private sector investments as with the Connect America Fund.

This category of factors includes four levels of government interaction variables that are solely within the legal environment: local government franchise agreements, state legislation, other state agencies, and other federal agencies. The state legislation variable included delays caused by legislation introduced to block a project specifically or municipal broadband efforts more broadly or state government shutdowns due to budget resolution failure. Other state agencies are agencies outside of transportation or environmental affairs with which interactions cause delays due to issues such as gaining Competitive Local Exchange Carrier (CLEC) status or working with the state public utility commission. Other federal agencies include interactions with federal administrative entities outside of those involved in the principal-agent relationship or environmental affairs. These include gaining FAA flight path permissions, FCC spectrum licensing, approval from Army Corps of Engineering, or interactions with the Bureau of Indian Affairs.

In this study, restricting the sample to only Round 2 BTOP Comprehensive Community Infrastructure projects controlled many of the legal environment factors. Legal environment factors that might have otherwise been included as parts of the research were instead consistent across the projects to include non-ARRA federal legislation, grant award criteria, state-level political disposition towards federally-funded and/or publicly-owned broadband infrastructure projects. For example, the sample eliminated projects affected by the Middle-Class Tax Relief and Job Creation Act of 2012, which was a federal-level legal environment factor. The grant award program criteria selected only 123 of the over 2,000 applications received for infrastructure projects under BTOP, which would imply that projects selected should have been some of the most robust proposals submitted. Of those projects selected, two were withdrawn post-award due to state legislatures opposed either to ARRA or to public agencies implementing broadband projects.

Table 12 Operationalized Legal Environment Factors

Legal Environment	
Local	Local government franchise agreements
State Government	State legislation issues
	Other state agencies issues
Federal Government	Other federal agencies issues
Tribal Authorities	Tribal authority issues

Crosscutting factors. A number of identified factors did not fit cleanly into a single category of the POPIL framework. Some degree of overlap exists for many factors, such as in legally enforceable contractual arrangements for partnerships and the NTIA as a federal agency in the role of funder. However, some factors heavily overlapped categories. The two main substantive areas with crosscutting factors were property access and environmental regulations.

Several property access factors crossed interorganizational relationships and the legal environment category boundaries for federal, state, local, and tribal agency interactions. Federal agencies needed to provide permits if a network path intersected with any federally-owned land. Permits for rights of way with state departments of transportation and local governments were also identified variables here. Lastly, "tribal authority" identifies interactions with Native American Indian tribal authorities, site access issues, and issues of tribal sovereignty that emerged during implementation.

Notably, the environmental assessment process crossed all categorical boundaries. The assessment's mitigation requirements based on the physical environment could influence a project's chosen materials or network design. Some projects changed between wireless and wireline for portions of their network based on the environmental assessment. The Finding of No Significant Impact pre-construction requirement by the NTIA in the grant agreement restricted how organizations could spend federal or matching grant funds prior to receiving the Finding of No Significant Impact (FONSI) and having the Environmental or Historical

Preservation Special Award Condition lifted. The NTIA would suspend projects due to environmental noncompliance if they failed to secure necessary permissions or conform to requirements prior to construction.

Issue reports in this area included the presence of protected species and access permits or permissions by government agencies. The endangered species factor covered protected flora and fauna as well as their identified habitats along a network's intended path. During the assessment process and subsequent project construction, grant recipients reported issues regarding communications and permissions from environmental, historical preservation, and tribal agencies. They included communication issues with the agencies, agency requirements for additional studies before making a determination, or the agencies placed restrictions on a project or denied access by a project to their covered territories.

Table 13 Crosscutting Factors

Interorganizational Relationships x Physical Environment x Legal Environment	
State Agencies	Department of Transportation permitting, SHPO communications
Local Government	Local government permitting
Native American Indian Authorities	Site access, cultural assessments
Federal	Endangered species restrictions, Federal environmental agency communications
Materials x Legal Environment x Physical Environment	
	Network type change due to EA restrictions
Organizational x Physical Environment x Interorganizational Relationships x Legal	
	Organizational spending restricted pending FONSI award
Physical Environment x Interorganizational Relationships x Legal Environment	
Principal-Agent Relationships	Finding of No Significant Impact (FONSI) granted

Quantitative Data Collection

I created a database using Excel spreadsheets to record both key performance indicators (dependent variables) and critical success factors (independent variables) for the 67 projects included in the study. Data sources included grant award documents that included the initial grant application, environmental assessments, the award and related amendments, and projects' performance progress reports. In some cases, information used to capture factors such as organizational type and age was located through a review of an organization's website, news reports, or other similar sources. A limitation of data acquisition for this study was the amount of information redacted from the publicly available files. This limitation affected how the study operationalized the POPIL framework factors as variables were recorded only when the information was available for all projects. This section covers data collection and the workarounds used if the initial data source was unavailable.

The data collection process captured several data points to generate the dependent variables: planned budget, final budget, planned mileage, final mileage, and total quarters to completion. Where possible, initial grant applications were the source for the planned budget and planned mileage data points. In some cases, the NTIA had redacted the information or information was otherwise unavailable from the application. Supplemental data sources included the Financial Assistance Award Form CD-450 for planned project budget figures and both project fact sheets and environmental assessments for planned network mileage.

Deductive coding based on the POPIL framework created the rest of the database using the following sources: grant application narratives and supplemental materials, financial documents, project quarterly and annual reports, and Special Award Conditions (SAC) and Award Amendments for changes to the original grant project. A comprehensive code list is included as Appendix C. Grant applications provided information on organizational type, sector, age, years of experience, project scale, grant match amount, the number of project partners, and proposed network structure. The variable "Months to Findings of No Significant Impact

(FONSI)" measured the length of time in months between the date on the initial Financial Assistance Award Form CD-450 and the date on the initial FONSI.

The second phase of deductive coding to collect issue reports involved careful analysis of projects' quarterly performance progress reports, Special Award Conditions, Corrective Action Plans, and suspension letters. The database initially captured issue reports at the quarter level as binary no/yes variables for presence issue reports for Quarters 1-24 before condensing into years 1-6 and total reports standardized for the length of the project. Standardization for this variable took the total number of issue reports for a given factor and divided by the number of quarters a project took to complete.

Three full database creation iterations with supplemental variable-specific rechecks refined the study's variables. For example, signed agreements was a single category that encompassed RFP/contract issues, issues with signing community anchor institutions as end users, issues with getting agreements from network providers, and issues getting local government franchise agreements in an earlier iteration of the database and later became four categories to better distinguish the types of issues involved.

The database included meta-factors of core organizational capacity and property access. The meta-factor of "Core Organizational Capacity" included Accounting System, Fiduciary Responsibility, Governance Structure, Leadership Change, and Staffing and emerged following initial relationship testing that showed high levels of multicollinearity with low frequency of factors in isolation. Organizational Capacity variables present as a raw count of related issue reports and a standardized ratio of the total number of OC issue reports out of total possible OC issue reports for the project. The "property access" variable included local government permitting, the state department of transportation's permitting processes, railroad permitting, utilities' "make ready" issues, and easements/site access.

Research Questions and Hypotheses

This research asks one overarching research question with three sub-questions. As discussed above, this study identifies project implementation success according to the Budget Success of project completion within projected budget, Schedule Success of project completion within the grant period's 12 quarters, and Outputs Success of creating a network with the proposed number of miles. I break down the overall research question into three sub-questions with associated regression hypotheses ("RH_x") used to create models to illustrate the hypothesized interactions of factors and the influence of these interactions on the indicator variable. I tested these models using ordinary least squares regression analysis to evaluate their significance and predictive power to explain variation in the identified dependent variables. These hypotheses were created using insights gathered through participant observation, best practices guides for broadband infrastructure deployment, and the POPIL framework.

I also tested the conceptual hypotheses of single factor-indicator relationships Table 6 presented in the Literature Review section. The label "CH_x" identifies these hypotheses in the results and analysis. The parameters of the data do not allow all conceptual hypotheses to be adequately operationalized and tested. Hypotheses that cannot be adequately operationalized based on the available data are not included in the quantitative analysis. Where possible and appropriate, omitted factors and relationships are included as part of the project postmortem. For conceptual hypotheses that specified a particular key performance indicator, only that specified relationship is included below. "General conceptual hypotheses" result in factor-indicator relationships tested for each indicator as well as overall project implementation success. In the reiteration of the hypotheses below, these are included only under Research Question 4 for overall project implementation success.

Research Question 1. Which factors had a significant influence on the Schedule Success of project completion within the 12 quarters specified as the grant period?

CH_4 Material availability directly influences Schedule Success.
CH_{14} Frequency and severity of adverse meteorological and/or geographical conditions encountered during implementation inversely influence Schedule Success.
CH_{15} Presence of sensitive ecological or historical/cultural locations inversely influences Schedule Success.
CH_{20} Government interventions and rulings regarding the projects inversely influence Schedule Success.
RH_1 A project has a lower Schedule Success index score based on the number of months between the grant award date and the date for the environmental assessment FONSI award or overlap special award condition resolution, the frequency of nature issue reports or property access issue reports during implementation, and if it is implemented by a government agency at the statewide level.

Research Question 2. Which factors had a significant influence on the Budget Success of project completion within proposed budget?

CH_{10} Organizational debt ratio inversely influences Budget Success.
CH_{11} The ratio of the grant amount to the total organizational annual budget inversely influences Budget Success.
CH_{18} Partnerships with other actors directly influence Budget Success.
RH_2 A project will have a lower Budget Success index score based on project scale, the number of months between the grant award date and the date for the environmental assessment FONSI award, if they had nature issue reports, overlap special award condition issue reports, and if it was a young, non-utility provider lead organization that experienced organizational capacity issues such as deficient fiduciary responsibility or leadership change during implementation.

Research Question 3. Which factors had a significant influence on the Outputs Success of successful completion of proposed network mileage?

CH_5 Choice of materials directly influences Outputs Success.
CH_{17} Interventions by the principal inversely influence Schedule Success and Outputs Success.
CH_{18} Partnerships with other actors directly influence Outputs Success.

CH_{19} Interactions with external stakeholders and other non-partner external actors inversely influence Schedule Success and Outputs Success.

CH_{20} Government interventions and rulings regarding the projects inversely influence Schedule Success and Outputs Success.

RH_3 A project will have a lower Outputs Success index score if it was implemented on a smaller scale, had more issue reports for EA/FONSI issuance or property access during implementation, and if the lead organization had fewer years of experience implementing similar projects.

Research Question 4. What factors had a significant influence on project implementation success in BTOP infrastructure projects?

CH_{16} Requirements by the principal on the agent in a principal-agent relationship inversely influence project implementation success.

CH_1 Tailored parameters directly influence project implementation success.

CH_2 Social construction of target population directly influences project implementation success.

CH_3 Clear definition of the target population directly influences project implementation success.

CH_6 Changes in organizational leadership inversely influence project implementation success.

CH_7 Change of lead organization inversely influences project implementation success.

CH_8 Fiduciary responsibility concerns in the lead organization inversely influence project implementation success.

CH_9 Alignment of an organization's mission to project goals directly influences project implementation success.

CH_{12} Amount of prior experience implementing similar projects directly influences project implementation success.

CH_{13} Organizational age directly influence project implementation success.

CH_{16} Requirements by the principal on the agent in a principal-agent relationship inversely influence project implementation success.

RH_4: Overall success index scores are lower for projects with EA/FONSI attainment issue reports, principal-agent relationship issue reports or property access issue reports during implementation.

Quantitative Analytical Techniques

With the newly created database, several analytical approaches help to gain an understanding of the trends and shapes in the independent and dependent variables using cross-tabulations, frequency tables, Q-Q plots, and other descriptive statistics. Following this section was the establishment of the likelihood of significant factor-indicator relationships in terms of both presence and persistence of factors using Welch's t-test and Mann-Whitney *U*-test for the former and Pearson and Spearman correlations for the latter. Finally, I tested models for the effects of interactions by the model's independent variable on the dependent using an ordinary least squares regression analysis. I conducted the analyses using a combination of the licensed SPSS statistical analysis software and cloud-based Intellectus Statistics version 1.01, which offered additional analytical methods beyond SPSS and narrative interpretations of its results. Where possible, I used both programs to verify the quantitative outputs and techniques were correct.

Descriptive statistics. I first used SPSS for general descriptive statistics during the initial database creation to evaluate and refine the coding process and variable creation. Frequency tables provided guidelines for the creation of binary variables to report presence and absence of particular variables.

The descriptive statistics tests also enabled the identification of potential outlier cases, which scatterplots and other basic graphing of data points further revealed. The dependent variables were standardized and visualized on a Q-Q plot for normality. Based on the results of these plots that cast doubt on the normal distribution of the dependent variables, the analysis includes nonparametric tests to act verifiers in both the correlation and t-test calculations.

Measuring effects of factors' presence and persistence on KPI scores. The study tested factor-indicator relationships for each framework factor on the effects of a factor's presence/absence and the effects of a factor's persistence on each dependent variable. Welch's t-test and Mann-Whitney *U*-tests tested the CH_x relationships against their null hypotheses for the continuous dependent variable index scores. These tests compared the difference between means of each dependent variable for groups with and without a factor issue report. Chi-Square and Kendall's tau-b correlation testing compared the presence/absence of a factor against success/failure of a KPI indicator. Kendall's tau-c correlation reported the factor presence relationship for the ordinal Project Success variable.

Presence testing. The Student's t-test is a common, often default, analytical technique for analyzing the differences between means in an independent-samples t-test. However, the test is vulnerable to nonhomogeneous variances in the samples as well as unequal sample sizes. Welch's t-test is superior in this regard, as it is robust against unequal variance and/or unequal sample sizes. Even in cases in which the Levene's test did not flag a relationship as violating the homogeneous variance assumption, Welch's was robust against unequal sample sizes. SPSS's independent-samples t-test ran this calculation following an examination of the normality of distribution of the tested variables. Relationships that violated the assumption of normality have flags in the tables, and any reportedly significant factor-indicator relationship may be questionable if the relationship appears non-normal with small sample sizes. If the sample size for one of the comparison groups was smaller than 15, that relationship is also flagged in the data. After establishing that the data do not violate the necessary assumptions for conducting the Welch's t-test, I reviewed, compared, and reported the t-score and significance levels for the "equal variances not assumed" statistics generated by SPSS. Appendix D includes the t-score and significance from Welch's t-test analysis for each selected factor-indicator relationship.

The Mann-Whitney rank-sum test for *U* also tested each relationship. This is a roughly nonparametric test that is more robust than a t-test in the case of $n<20$ subsample sizes and against unequal distribution in cases of outliers and tails because it does not rely on the distribution of variables. Instead, it evaluates differences between the mean of two samples based on a sum and rank test. The U-statistics, z-scores, and p-values from this test are included alongside the Welch's t-test results in Appendix D. The Mann-Whitney *U*-test served an additional purpose, as its calculation is the same as the "common language effect size" calculation (McGraw and Wong, 1992). Conroy (2012) promoted the use and inclusion of the Mann-Whitney statistic as a measurement of effect size. He noted that researchers have periodically rediscovered the calculation as a methodology for measuring effect size but they give it different names as additional researchers rediscover it (Conroy, 2012, 185). McGraw and Wong's 1992 term of "the common language effect size" is one example of this. The U statistic divided by the product of the population *a* sample size and the population *b* sample size as shown in the equation $\hat{p}_{a.b} = \frac{U}{n_a n_b}$ calculates this figure. The resulting number is the probability that a score from a randomly-selected population *a* project will be greater than a score drawn from population *b* and is recorded in the in-text tables for factor-indicator relationships that reject the null hypothesis under both Welch's t-test and the Mann-Whitney U-test.

Cross-tabulations with Chi-Square and Kendall's tau correlations also compared the dichotomous variables of factor issue report presence/absence and indicator success/failure. These tests provided a general understanding of the overall impact of a factor's presence on each indicator at a high level of analysis and offered additional insights into being able to reject the null hypotheses of no relationship between factor and indicator for the conceptual hypotheses. Kendall's tau-b correlations testing evaluated relationships of factor absence/presence and failure/success dichotomies. Kendall's tau-c evaluated factor absence/presence with the ordinal Project Success variable.

Persistence testing. I tested the likelihood of a non-chance relationship between factor-indicator pairs using both Pearson and Spearman's rho correlations. The combination of the two tests helped to establish the relationship's linearity and monotony. The Pearson coefficient established the relationship's overall linearity while the Spearman's rho correlation test assessed how monotonic the factor-indicator relationship was, even if the overall relationship trend was nonlinear. The analysis also assessed relationships among dependent variables and among independent variables.

Maher, Markey, and Ebert-May (2013) remind us of the importance of evaluating not only significance in correlation but also effect size. A very high correlation is between 0.9 and 1.0, highly correlated is between 0.7 and 0.9, moderately correlated is between 0.5 and 0.7, low correlation is between 0.3 and 0.5, and correlations below 0.3 have only a linear relationship. In the social sciences, Cohen (1988) created a benchmark system of relationship strength that specified relationships as of low strength with a correlation coefficient of .12-29, medium strength at .3-.49, and strong with a coefficient greater than .5. These were proposed as suggestions rather than a rigid structure, and researchers since then have offered critiques that the thresholds as too high for much of the research outside of controlled experimental environments (Paterson, Harms, Steel, & Credé, 2016, p. 11). Paterson, et al. (2016), revised these measurement thresholds for effect size to be more reflective of standard effect sizes in the social sciences based on their meta-analysis of 250 meta-analyses in the organizational behavior/human resources literature conducted over 30 years. According to Paterson, et.al (2016), an alternative ranking system of first quartile effect size of 0-.12, second quartile effect size of .12-.19, third quartile effect size of .2-.3, and fourth quartile effect sizes as greater than .31 would allow better cross-study comparisons based on actual effect sizes reported in prior studies (Paterson, et al., 2016, p. 77). This study uses the quartiles specified by Paterson, et al. (2016) for evaluating effect size and highlights any correlation effect sizes that would fall in the fourth quartile as stronger than 75% of the effect size in comparable studies.

Ordinary Least Squares (OLS) regression analysis. Having captured information on the effect size and likelihood of a non-chance relationship between factors and indicators, I moved to conducting the multiple linear regression analyses for the research hypotheses identified for each of the four identified dependent variables: Schedule Success, Budget Success, Outputs Success, and Overall Success. After these analyses, I tested interactions among the other factor-indicator relationships hypothesized in the original overall framework and found to be significant with a meaningful effect size in the correlation and independent-samples calculations. For some analyses, the Backward Stepwise method systematically removed non-significant variables from the equation to strengthen the model's predictive ability.

The models were evaluated for their significance and effect size based on the ANOVA significance level, individual factor coefficient p-values, adjusted R^2 score, and the approximate normal distribution of the regression residuals evaluated using residual statistics, histograms with normal curves, and Normal Q-Q Plots.

Qualitative Analytical Techniques

Qualitative research in this dissertation took the form of a project postmortem, or retrospective analysis, of Citizens Telephone Cooperative's New River Valley Regional Open Access Network BTOP project. The primary data sources for this retrospective analysis were the 17 participants interviewed including Citizens staff, project partners, community anchor institutions, federal program officers, and other external stakeholders as described in the Sample section. Other sources included the grant application and attachments, environmental assessments, special award conditions, environmental assessment, performance progress reports, the project manual, Citizens' website, organization tax forms and audits, and local news articles on this project or Citizens more generally.

A project postmortem, or project retrospective for those in favor of a less morbid term, is an essential component to include upon project completion to capture lessons learned from project implementation. This allows the implementation to be an iterative process with lessons informing and improving subsequent project implementations. At its core, a postmortem answers three questions (Martinelli & Milosevic, 2016, p. 367): What went well? What could have gone better? What should be different next time? These three questions shaped the focus of the participant interviews, as discussed further below.

The postmortem began with a document review process to gain a firm understanding of the inputs and outputs associated with the project and to begin identifying common themes and items of note that emerged in the progress report documentation during implementation. This provided a starting point and identified areas of focus for further exploration and conversations with interview participants.

Alongside the document analysis, I conducted interviews with 12 participants in person, four over the phone or via Skype video chat, and one individual answered my questions via email between September 2014 and April 2015. With participants' permission, each interview was recorded digitally and later transcribed using the Transcribe Me transcription company. Participants received copies of the interview transcripts and instructed to indicate if any sections needed correction or redaction/non-attribution. Each participant signed an IRB-approved consent form that they received in advance of the interview, and each indicated on that form that they would allow me to use their name and organizational affiliations in this work. Interviews lasted between 15 minutes and an hour and a half depending on the participants' degree of involvement with the project and whether it was a solo or group interview. The general interview script for participants of each organizational type is included as Appendix J. The

Citizens staff interview was first in order to gather the broadest perspective on the project implementation. Questions evolved throughout the interview process with later interviewees asked to clarify their roles or experiences in interactions or events identified by prior interviewees.

The postmortem analysis relied heavily on the participant interviews. Participants offered insights and context to the project that were not available in the available documentation. The goal of the participant interviews was to assemble a holistic picture of this project's implementation rather than engage a random sample of participants from across projects for generalizability. Of particular interest in this portion of the study was the identification of factors with a positive influence on the key performance indicators since the quantitative analysis did not capture them as readily. As such, the transcripts were incredibly important data sources that I mined for information. Document analysis primarily offered supplemental technical information and guided conversations during the interviews. The postmortem analysis initially organizes findings according to the framework factors and the postmortem questions and then synthesizes them into broader topics and insights. The qualitative findings section presents the background and technical information the NRV-ROAN project and Citizens Telephone Cooperative before presenting findings organized by the three overarching questions.

Chapter Summary

This chapter provided information on the methodology used in the study, including the identification and rationalization for the selected sample and the operationalization of the dependent variables and conceptual framework. It then detailed the research questions and hypotheses tested in this study of the relationships between POPIL framework factors and key performance indicators of project implementation success. The study focused on 67 projects funded through the Broadband Technology Opportunities Program and evaluated the factors that led to project implementation success in terms of schedule variance, budget, and network mileage. The investigative process included several stages. The first stage was the quantitative document analysis from the 67 projects in order to create a usable database for additional analysis. I then used descriptive statistics, Pearson and Spearman correlation coefficients, and t-tests and *U*-tests to conduct a preliminary evaluation of factor-indicator relationships and inform the ordinary least squares regression analysis conducted on the four continuous dependent variables to determine factor-indicator relationships. The chapter then described the project postmortem or retrospective format used for the qualitative data analysis portion of the study. The document analysis and interview process were described with an explanation of the bias towards identifying factors that positively influenced project implementation success for the Citizens project to fill any gaps left in the operationalization of the framework factors due to source and coding limitations.

The next chapter provides results of the quantitative data analysis conducted to test the hypothesized factor-indicator relationships and the hypothesized influence of interactions between independent variables. The project postmortem findings on Citizens Telephone Cooperative's New River Valley Regional Open-Access Network BTOP project follow the quantitative analysis. The postmortem offers additional insights into factors such as nuances of organizational leadership and project partnerships included but not fully explored in the quantitative analysis.

Chapter 4: Quantitative Analysis Results

This study investigates which factors from the proposed POPIL framework influence key performance indicators of schedule, budget, and outputs for project implementation success: project-specific, organizational, physical environment, interorganizational, and legal. To test the influence of these factors, the study focuses on infrastructure projects funded through the Broadband Technology Opportunities Program. Using the SPSS statistical analysis software, ordinary least squares (OLS) multiple linear regression tests the hypothesized factor-indicator relationships, described in the previous chapter. This research can positively influence the design and implementation of future broadband infrastructure projects by identifying which factors have the strongest influence on project implementation success. The quantitative analysis finds that organizational capacity has the strongest influence on project implementation success in terms of both finishing on time and producing intended outputs.

Understanding the Presence and Persistence of POPIL Framework Factors

This section provides general information on the percent of projects with issue reports for each area and the mean raw and standardized frequencies of these issue reports for projects with at least one issue report for the factor during implementation. The standardized mean frequencies control the influence of projects that exceeded the grant period by reporting the percent of total quarters in which there were issue reports rather than the total number of issue reports. The latter measurement could skew a chosen factor's influence on the Budget and Outputs Successes as projects finishing in more quarters would have a higher potential number of quarters in which to report issues.

Project-specific factors. As described in prior chapters of this dissertation, project-specific factors are factors identified as part of the project design rather than inherent in the organization implementing the project or any factors imposed from outside of the project or organization. In this work, fixed factors present at the beginning of the project include project scope and type of technology selected. Variables that emerged during project implementation include delays related to materials delivered and change of technology type. The tables below provide information on these project-specific factors.

Project scale was one measure of project scope. As Table 14 shows, more than two out of three projects in the program took place at the regional level.

Table 14 Project Scale Frequency Table

Scale	Frequency	Percent of Projects
Local	4	6.0
Regional	44	65.7
State	16	23.9
Multi-state	3	4.5
Total	67	100.0

Because states vary significantly in size and density, additional measures of planned length of network, service area square miles, and the number of community anchor institutions in the target area also captured the overall size of a project. Project service areas ranged from only three square miles to spanning the entire country in the case of the University Corporation for Advanced Internet Development's United States Unified Community Anchor Network (US UCAN). US UCAN was the only multi-state project in the top five projects for most square miles. While the overall mean for square miles was 69,095, removing outliers like US UCAN gave a trimmed mean of 9,914 square miles. Likewise, the 5% trimmed mean for the number of community anchor institutions was roughly 400 versus the unadjusted 3,781 institutions. Table 25 in Appendix D provides these and other descriptive statistics on projects' scopes in this study.

For technology type, this variable first captures the type of network proposed in the grant application: wireline, wireless, and hybrid. Wireline middle-mile networks are fiber optics-based networks while wireless networks involve any technology that transmits data over the air and via towers. Hybrid networks incorporated both fiber and one or more forms of wireless technology in their construction. The variable "Technology Change" recorded issue reports related to a project's decision to change technology from their initial grant application. Table 15 summarizes technology type and issue reports of changing technology type during implementation.

Table 15 Declared Technology Type at Grant Application and Technology Change Delays

Technology Type	Frequency	Technology Change
Wireless	2	1
Wireline	49	0
Hybrid	16	5

Materials and equipment-related issue reports create the other in this category. This included delays in delivery of materials, equipment not performing as anticipated, and manufacturers pulling their equipment from the market. Overall, 68.7% of projects reported issues related to materials in at least one project quarter of implementation with 10.4% of projects reporting issues with materials for more than a year of their project's implementation. Two projects reported issues related to project materials in nine quarters of the project's implementation. Table 17 at the end of this section provides additional figures for the average number of reports for Materials and Equipment and Changes to Technology as well as the average standardized percent of total project quarters in which there were issue reports for projects reporting issues.

Organization-centric factors. Grant applications, special award conditions, performance progress reports, award amendments, and NTIA/NOAA disciplinary materials, such as corrective action plans and suspension letters, provided source material for coding organization-centric factors. These factors included organizational details and issues such as human resources, governance structure, experience, and finances.

The grant application provided information regarding the lead organization such as sector affiliation, organizational type, its age, and years of experience as a utility provider. Table 16 provides a cross-tabulation of lead organization type and sector affiliation by the project in this study. As a note, this table reports by project and not by the organization, so the two for-profit providers, Contact Network and Silver Star Telephone Company, that each had 2 projects awarded in this round of funding are included twice.

Table 16 Project Lead Organization Type and Sector Cross-Tabulation

Organization Type	Organization Sector			Total
	For-Profit	Government	Nonprofit	
Contractor/Consultant	1	0	0	1
Economic Development	0	2	1	3
Healthcare	0	0	2	2
Higher Education	0	5	2	7
Indian Tribe	0	3	0	3
K-12 System	0	1	0	1
Local Government	0	5	0	5
State Agency	0	7	0	7
Utility Provider	23	3	12	38
Total	24	26	17	67

Organizational age and years of experience providing utility services varied widely across projects with a range of 222 years for the former and 120 years for the latter. The mean age for grant recipients was 56 years while the median was only 30 years, indicating the effects of local governments and Native American Indian tribes on age. For Round 2 grant recipients that were utility providers, they had an average of 28.1 years of experience. Table 26 in Appendix D provides descriptive statistics for age and years of experience. There were 36 grant recipients (38 projects) operating primarily as utility providers, and 47 of the 65 recipients (49 of the 67 projects) had more than five years of experience providing utility service.

From the performance progress reports, special award conditions, and award amendments, grant project's lead implementing organization issues reports included human resources, governance, and financial considerations. Of the sampled projects, 22 reported no organization-focused issues during implementation related to the lead organization while three projects had more than 20 issue reports during implementation. Issue reports include both unique issues reported in a quarter and issues that persisted over more than one quarter. Difficulties securing or confirming in-kind or cash matching funds for the grant resulted in issue reports for 27 projects. Table 17 provides details on the presence and persistence of organizational factor issue reports including the core organizational capacity meta-factor that combines the Accounting System, Fiduciary Responsibility, Governance Structure, Leadership Change, and Staffing factors. Approximately 40% of grant recipients had at least one core organizational capacity issue report during implementation.

Physical environment factors. The database coding structure for factors related to the physical environment category focuses on issue reports for geological and meteorological phenomena. "Crosscutting factors" at the end of this section includes other environment-related factors. Natural factors included terrain and climate with reports most frequent during the third year of the grant period when nearly all projects were in the construction phase.

Grant recipients for 45 projects reported climate-related issues ranging from wildfires to hurricanes or just persistent rain that did not allow construction crews to operate. More than one project based in the Northeast mentioned Hurricanes Irene in 2011 and Sandy in 2012, and Mid-Atlantic projects mentioned the unusual straight-wind derecho that came through in June 2012. Terrain-related issues, often due to unexpected rock encounters, were reported in 23 projects. Oconee County's progress report reflected the frustration that many projects felt when its narrative stated, "Rock, rock, rock...continues to be an issue for this project," after they had reported delays for more than a year straight from ongoing rock encounters (Oconee County PPR Q1Y2013, p. 2).

Interorganizational relationships. Issue reports dealing primarily with interorganizational relationships ran the gamut from non-governmental property access issues to issues with partners and contracts. Principal-agent relationship issues dealing with grant administration were also included as a subcategory of factors under the interorganizational umbrella. Non-governmental site access issues were common and affected 52 of the 67 sampled projects. This category included landowner disputes, utility provider "make ready" processes for pole attachment, and railroad permitting delays and costs. Issues in this area tended to be recurrent or take multiple quarters to resolve as both the raw count mean and standardized mean frequency adjusted for project duration demonstrate in Table 17.

The second grouping of factors within the broader framework category of interorganizational relationships was partnerships and contracts. Across the sampled projects, only 16 projects did not report any issues with partnerships and contracts during project implementation. Grant recipients were more likely to report issues with RFPs and contracts during the first year of the grant period while other issues in this grouping were more likely to be reported during the subsequent two years of the grant period.

The third category of interorganizational relationships included in this study, principal-agent relationship, was the largest. When the tally of principal-agent relationship issue reports includes "crosscutting factors" with facets of the principal-agent relationship, every project in the sample had at least one principal-agent relationship issue report, and 36% of projects had more than 10 reports in this category. The most common cause of issue reports in this study was the NTIA's requirement that grant recipients must submit every modification to the approved network route, no matter how small, and await NTIA approval (62 projects). Some route modification approvals took more than three months to attain, during which time projects could not continue construction in that area. Issue reports on approval of route modifications occurred in more than half of Year 2 quarters for nine projects, and 17 projects had route modification issue reports in more than half of Year 3.

Grant recipients for 30 projects reported issues with “Other Award Action Requests” in which any non-route changes to the grant or project, such as reallocating line item funds or adding sub-recipients to the project, needed NTIA approval prior to implementation. Only three of the 25 projects reporting Overlap Special Award Conditions had the SACs persist beyond the first year. These SACs prevent projects from getting the green light to construct their network and have funds disbursed for construction related expenses prior to resolution of overlapping service areas between ARRA-funded broadband projects.

Legal environment factors. The last category of factors in the POPIL framework is the legal environment. This category covers legislative and regulatory activities that do not substantially overlap with other framework categories. Issue reports with other federal agencies were the most common legal environment factors, and 30% of projects reported them. A number of these issues pertained to the need for FCC licenses for wireless projects. Issue reports for state legislation were the least common.

Cross-sector factors from POPIL framework. Overall, the framework proved useful for identifying and categorizing issue reports for BTOP projects. However, several factors took place at the intersection of the categories, particularly factors pertaining to environmental regulations or property access issues.

The NTIA required that 62 of the 67 projects assess the anticipated environmental impact of their project and these assessments needed NTIA approval and issuance of a Finding of No Significant Impact (FONSI) before they could commence with construction activities. This process took a minimum of 5 months for affected projects and a maximum of 19 months with an average time to initial FONSI of 9.5 months. Fifty-five projects reported issues with the environmental assessment process and the wait for the FONSI certification that allowed work to begin. The NTIA imposed supplemental post-FONSI environmental special award conditions on 21 projects to force compliance with various ecological or cultural restrictions placed on the project. The NTIA also suspended three projects during implementation on the grounds of environmental noncompliance.

Conducting the environmental assessment to get the NTIA to issue a FONSI required communications and approvals from other government agencies, including State Historical Preservation Offices (SHPO), federal environmental agencies, and tribal authorities. A Property Access meta-factor included the local government permits, DOT permits, railroad permits, utility provider make ready process, site access, and environmental permits issue reports. Grant recipients in 84% of projects reported at least one Property Access issue during implementation.

Finally, failure to comply with the terms of the grant agreement was grounds for NTIA disciplinary action. These disciplinary actions are symptomatic of other factors rather than serving as factors by themselves, but the figures are enlightening. The NTIA issued at least one Corrective Action Plan to 11 projects during the grant period and suspended six of these projects. Cited reasons ranged from core organizational capacity issues to environmental noncompliance.

Table 17 compares issue report frequencies across the framework categories. The next section of this chapter shifts the analytical focus to explore the calculated dependent variables used to evaluate project implementation success in the sampled BTOP projects prior to factor-indicator relationship testing.

Table 17 Issue Report Frequency by POPIL Framework Category

Issue Report Area	Percent of Projects	Issue Reports Mean Frequency When Present	Mean Percent of Quarters if Present
Project-specific Factors			
Materials and Equipment	67%**	2.83	20.9%
Technology Change	9%	1.83	11.2%
Organization-focused Factors			
Staffing	21%	2.07	13.2%
Leadership Change	12%	1.75	10.3%
Governance Structure	13%	2.11	13.0%
Accounting System	19%	2.23	12.8%
Deficient Fiduciary Responsibility	13%	2.33	12.8%
Core Organizational Capacity (Meta)	40%	4.15	5.0%
Grant Matching Portion	40%	2.52	17.3%
Physical Environment Factors			
Climate	67%**	3.00	21.2%
Terrain	34%	2.35	17.0%
Interorganizational Relationship Factors			
Property/Site Access	46%	3.74	26.7%
Make Ready/Pole Attachments	51%*	5.38	38.2%
Railroad Permitting	34%	3.00	22.3%
RFP/Contract Fulfillment	48%	2.72	18.9%
Partners Interactions	16%	3.27	23.1%
External Project Coordination	33%	3.18	21.1%
Sign CAI Agreements	22%	3.08	23.1%
Sign IRU Agreements	25%	2.13	19.4%
Route Modification Approval	93%**	3.9	28.0%
Other Award Action Request	45%	2.17	14.2%
Overlap Special Award Condition	37%	3.4	24.0%
Legal Environment Factors			
Local Government Franchising	12%	4.5	33.8%
Other Federal Agencies	30%	2.65	18.3%
Other State Agencies	19%	2.08	14.5%
State Legislation	9%	2.0	16.7%
Crosscutting Factors			
Environmental Permitting	27%	2.11	15.2%
Federal Environmental Agencies	43%	2.38	16.0%
State Historical Preservation Office	49%	1.76	12.1%
Environmental Assessment/FONSI	82%**	3.6	26.4%
DOT Permitting	55%	3.19	23.4%
Local Government Permitting	42%	3.00	22.8%
Tribal Authorities	28%	3.21	19.6%
Property Access (Meta)	84%**	10.25	12.3%
NTIA Disciplinary Actions			
Corrective Action Plan	16%		
Project Suspension	9%		

* Issue reported in more than 50% of projects
** Issue reported in more than 66% of projects

Measuring Project Implementation Success

As mentioned in the previous chapter, three key performance indicators of budget, schedule, and outputs as well as a composite measure of overall success measured project implementation success. Binary variables of failure/success also expressed project implementation success by performance indicator. Binary Output and Binary Budget indicated whether a project deployed at least 95% of its intended miles and/or finished within 100% of its intended budget, respectively. The acceptable value for Outputs Success allows a 5% negative variance to allow network mileage variations because of route optimization rather than a failure to perform as well as anticipated. Binary Schedule is if the project finished within the original grant period. Binary Success indicates success in all three KPI measurements. Table 18 provides information on the observed frequencies of these binary variables.

Table 18 Binary Dependent Variable Frequencies

	Output	Schedule	Budget	Overall
Fail	19	44	22	55
Achieve	48	23	45	12
Total	67	67	67	67

The 2x2 grid in Table 19 demonstrates raw count and percent of total projects for the Project Success ordinal dependent variable that measures project implementation success ranked to prioritize achieving intended outputs over the other performance indicators. Total Success indicated a project finished within all acceptable parameters while Qualified Success indicated that the project had an acceptable Outputs Success but failed to meet one or both of its Budget Success and Schedule Success goals. Controlled Failure indicated that the project met Budget Success and/or Schedule Success but not the Outputs Success. Complete Failure meant that a project met none of the KPIs.

Table 19 Project Success Frequencies

Total Success (All Positive KPI) 12 projects (17.9%)	Controlled Failure (Positive Budget and/or Schedule Success) 12 projects (17.9%)
Qualified Success (Positive Outputs with Negative Budget and/or Schedule Success) 37 projects (55.2%)	Total Failure (All Negative KPI) 6 projects (9%)

While budget, schedule, and key performance indicators combine to create a holistic understanding of project implementation success, these three sub-measures do not correlate with one another using either Pearson or Spearman's Rho correlation equations as shown in Appendix F. For the relationship between the overall success index score and the individual indicator index scores, success has a strong monotonic and linear relationship with the Schedule Index and Output Index variables. Its relationship with the Budget Index is significantly monotonic but non-linear. The next section explores factor-indicator relationship correlations.

Influence of Factor Presence and Persistence on Factor-Indicator Relationships

This section reports the results of an investigation into two dimensions of the identified factor-indicator relationships: factor presence and factor persistence. Testing for factor presence investigates whether we can reject the null hypothesis that the distributions of populations with and without issue reports for a factor are equal for a dependent variable. Testing for factor persistence evaluates whether we can reject the null hypothesis of no relationship between issue report frequency and an indicator score.

Testing. Welch's unequal variance t-test and the nonparametric Mann-Whitney *U*-test calculated the inter-subgroup difference of means to determine potential significance and effect size of the tested factor-indicator relationships. The SPSS calculation of the nonparametric Independent-Samples Mann-Whitney *U*-test includes a suggested decision of whether to retain or reject the null hypothesis that "the distribution of the *continuous dependent variable* is the same across categories of the *dichotomous independent variable*." Appendix D contains tables, organized by performance indicator variable, of the Welch's t-test and Mann-Whitney U-test scores and p-values with highlighted rows for those factor-indicator relationships that rejected the null hypothesis for both tests of equal distribution of means across comparison groups. Crosstabs with Chi-Square tests and Kendall's tau correlations evaluated the distribution of factor presence/absence with indicator success/failure and with the project success ordinal variable to determine significant factor-indicator relationships. Full tables of the Chi-Square tests and Kendall's tau correlations are available in Appendix G. This chapter focuses on the statistically significant factor-indicator relationships in which the null hypothesis is rejected.

Alongside the dichotomous variable testing, I also tested continuous fixed factor variables and issue report persistence variables to determine the likelihood of non-chance relationships between them and the indicator index scores using both Pearson's and Spearman's rho analytical methods for computing correlation coefficients. The Pearson coefficient reports the degree of linearity between two variables while Spearman's rho correlation coefficients capture to what extent the relationship is monotonic regardless of linearity. Spearman's rho correlations also evaluate the relationships with the project success ordinal variable identified in Table 19. Significant results from these tests are identified below for each framework factor category. Appendix F contains complete correlation tables sorted by framework category.

Project-specific factors. Fixed project-specific factors included planned network miles, square miles in the intended service area, and community anchor institutions identified in the intended service area. Project-specific factors evaluated for presence and persistence include issue reports for technology changes during implementation and issues regarding materials and equipment delays and malfunctions.

Findings. The identified tests found no significant factor-indicator relationships based on the presence or absence of issue reports. The tables in Appendix F shows a significantly monotonic relationship of moderately negative effect between Planned Network Length and both the Schedule Success index score (rho= -.268; p=.028) and the Overall Success index score(rho= -.266; p=.03). The calculations did not find any significant linear relationships and no other significantly monotonic relationships.

Organization-centric factors. The influence of organizational factors on key performance indicators and overall project success were evaluated for both presence and persistence. This study evaluated fixed factors in the organizational category of lead organization's type, sector, age, and years of experience based on information in the original grant applications and organizational factor issue reports submitted during project implementation.

Findings: Presence. For the fixed organizational factors, Chi-Square tests and Kendall's tau correlation testing rejected the null hypotheses of no relationships for the binary Utility Provider-Budget Success (tau-b= -.270; p=.017) and Broadband Provider-Overall Success (tau-b= -.232; p=.017) relationships. Spearman's rho correlation testing found significant direct relationships for Lead Organization Age with the Overall Success index score (rho=.328; p=.007), Outputs index score (rho=.333; p=.000), and the ordinal Project Success variable (rho=.280; p=.022). Pearson Correlation also found strong and direct relationships of Age with Overall Success (r=.354; p=.003) and Outputs (r=.381; p=.001) index scores.

Chi-Square tests and Kendall's tau correlation testing also rejected the null hypotheses for the binary Matching Funds presence variable with binary Schedule Success (tau-b= -.374; p=.000) and Overall Success (tau-b= -.229; p=.003), and ordinal Project Success (tau-c= -.265;

p=.022) variables. The tests also rejected null hypotheses for relationships of the binary meta-factor Core Organizational Capacity with the binary variables of Outputs Success (tau-b= -.319; p=.003), Schedule Success (tau-b= -.315; p=.002), and Overall Success (tau-b= -.229; p=.003) and with the ordinal Project Success dependent variable (tau-c= -.460; p<.001). Appendix G contains full tables of results from the Chi-Square tests and Kendall's tau correlation testing.

The Welch's t-test and Mann Whitney U-test also evaluated factor presence relationships with the dependent index scores to reject or fail to reject the null hypothesis of equal distribution of means between projects reporting issues and projects not reporting issues. Testing found several significant factor-indicator relationships, with the presence of Matching Funds issue reports having the strongest effect on both Schedule Success (z=-3.29; p=.001) and Overall Success (z=-2.199; p=.028) index scores. There were also highly significant relationships between the Core Organizational Capacity meta-factor and both Schedule Success (z=-3.435; p=.001) and Overall Success (z=-3.042; p=.002) index scores, though the effect size was lower than Matching Funds' effect on these scores. Some sub-factors within the meta-factor were significant for the Outputs index score, but the overall meta-factor was not significant (z=-1.393; p=.163). Full charts of these results are available in Appendix E.

Findings: Persistence. Both Pearson and Spearman's rho correlation testing evaluate the effects of organizational factor issue reports' persistence on the KPI index scores. No issue reports factors significantly correlated with the Budget Success. The Core Organizational Capacity meta-factor had a significant and strong negative correlation with the ordinal Project Success variable (rho= -.449; p >.001). The meta-factor also had a very strong negative relationship with the Overall Success index score based on both Pearson's Correlation (r= -.527; p<.001) and Spearman's rho (rho= -.413; p=.001) correlations, but Staffing was not significantly correlated using either measure. Staffing had a strong and significant correlation only to the Schedule Success index score (r= -.320; rho= -.339; p<.01).

Matching Funds issue reports were negatively correlated at a significance of .05 or stronger to Overall Success (r= -.333; rho= -.284), Schedule (r= -.31; rho= -.382), and Outputs (r= -.276) index scores. Full Pearson and Spearman's rho correlation tables are available in Appendix F.

Physical environment factors. A combination of independent-samples means comparisons and correlation calculations evaluated the influence of physical environment factors' presence and persistence on key performance indicators and overall project success. This section focuses only on the nature-based issue reports for climate and terrain.

Findings. In evaluating the influence of nature factors, only Terrain was significant for presence or persistence. Using Spearman's rho correlations, the factor had a weak negative relationship with the Schedule Success index (rho= -.244; p=.047) and the Budget Success index (rho= -.243; p=.048) scores. Both relationships were significant using Mann-Whitney *U*-test, and the Terrain-Budget Success relationship was significant using Welch's t-test, as shown in Appendix E. The Terrain-Schedule Success relationship was also significant using Kendall's tau correlation, as shown in Appendix G.

Interorganizational relationship factors. The study evaluates Interorganizational Relationship factor-indicator relationships that include the fixed factor of number of project partners and implementation issue reports. The study also explores the principal-agent relationship factors of overlap special award conditions, route modification requests, and other award action requests in this section.

Findings: Presence. The presence of External Project Coordination issue reports had a negative influence on the Binary Outputs indicator of if projects completed their planned mileage (tau-b= -.225; p=.040). This presence also had a negative influence on the Overall Success index score (*z*=-3.298; p=.001) and the Schedule Success index score (*z*=-3.28; p=.001) based on Welch's t-test and Mann-Whitney *U*-test. However, the variable did not significantly influence relative success or failure of the Outputs index score (*z*=-1.542; p=.123). The presence of RFP/Contractor issue reports also had a significantly negative effect on the ordinal Project Success indicator (tau-c= -.302; p=.012) and the binary Outputs variable (tau-b= -.234; p=.029). The presence of issue reports for Site Access (tau-b= -.279; p=.007) and for Utility Make Ready (tau-b= -.293; p=.011) each had significant negative relationships with the binary Schedule Success variable.

No principal-agent relationship factors were significant using Chi-Square and Kendall's tau correlations to evaluate the influence of issue absence/presence on indicator failure/success. However, the Overlap SAC-Overall Success index score (*z*=-2.087; p=.037) relationship and the Other Award Action Request-Schedule Success (*z*=-2.79; p=.005) and Other Award Action Request-Budget Success (*z*=-2.05; p=.04) relationships had meaningful effect sizes and significance when evaluated using Welch's t-test and Mann-Whitney *U*-test.

Findings: Persistence. Interorganizational factors were also evaluated for the influence of their persistence on project success and the individual key performance indicators using Pearson's and Spearman's rho correlation calculations. The Request for Proposal (RFP)/Contractor standardized issue reports variable had a significant inverse relationship of moderate strength (rho= -.272; p=.02) with the ordinal Project Success variable. No other interorganizational factor had a significant relationship with this indicator.

Eight interorganizational relationship issue reports variables had effect sizes on indicator index scores above the 75th percentile of research effect sizes according to Paterson et al.'s criteria (2016). The Standardized Other Award Action Requests-Schedule Success index relationship was the strongest in the Interorganizational Relationship category and was both inverse linear (r=-.491; p<.001) and monotonic (rho= -.375; p=.002). Other Award Action Requests was the only significant standardized issue reports variable among the three principal-agent relationship variables, and had an inverse linear (r= -.353; p=.003) relationship with the Overall Success index score.

Interorganizational Relationships was the first category in which there was a significant difference between correlations for raw count issue reports and standardized issue reports. Strong relationships emerged from the other two principal-agent relationships when the raw counts of issue reports for both Overlap SAC and Route Modification Requests were included. The Raw Count Overlap SAC variable had strong inverse and monotonic relationships with the Overall Success index score (r= -.332; p=.006; rho= -.289; p=.018) and the Schedule Success index score (r= -.316; p= .009; rho= -.242; p=.048). The Raw Count Route Modification Request variable had strong inverse linear (r= -.355; p=.003) relationships with the Overall Success index score and a strong inverse linear(r= -.422; p=.000) and monotonic (rho= -.303; p=.013) relationship with the Schedule Success index score. These and other correlation calculations are included in Appendix F.

Legal environment factors. This category includes Legal Environment issue reports that do not notably cross cut category boundaries: interactions with other federal agencies, interactions with other state agencies, state legislative actions, local government franchise agreements, and interactions with or other issues involving tribal authority.

Findings: Presence. The only absence/presence binary variable in this category that was significant in its influence on the continuous index scores was State Legislation on Schedule Success (*t*=-3.411; p=.001) in Welch's t-test. However, this result is questionable as the sample size of six projects can reduce the accuracy of Welch's t-test, as the failure to reject the null hypothesis by any of the other presence testing reflects. Chi-Square tests and Kendall's tau correlations found significant inverse relationships of weak to moderate strength for Local Government Franchise Agreements and the binary Overall Success (tau-b= -.086; p=.009) and Schedule Success (tau-b= -.164; p=.002) variables and a significant but weak direct relationship with the binary Outputs Success (tau-b= .135; p=.004) variable. A sample size of between seven and nine projects, rather than the minimum of 15 projects needed for a Welch's t-test, explains the weakness of the State Legislation and Local Government Franchise Agreements relationships.

Findings: Persistence. Of the Legal Environment variables, the Raw Count for Other Federal Agency issue reports and the Standardized Tribal Relations issue reports were the two significant variables. The Raw Count for Other Federal Agency Issue Reports variable had a strong inverse (r=-.311; p=.01) relationship on Schedule Success that is the strongest in this category. The Standardized Tribal Relations variable had a very strong linear relationship with the Schedule Success index score, but was not significantly monotonic. It had a weaker correlation the Overall Success index score (*r*=-.279; p=.022). These and other correlation test results are available in Appendix F.

Cross-cutting factors. Some issues reported in the study had components that fell into multiple framework categories. Category boundaries blurred most often in this study around the areas of property access and environmental regulation. These factors were number of months to complete initial Environmental Assessment/ Findings of No Significant Impact (FONSI) issued by NTIA and issue reports related to Department of Transportation Permitting, Environmental Permitting, State Historical Preservation Offices (SHPO), Federal Environmental Agencies, Local Government Permitting, and the Environmental Assessment/FONSI process. This section also includes a meta-factor of Property Access comprised of issue reports for Local Government Permitting; DOT permitting, Railroad Permitting, Utility Make Ready, Site Access, and Environmental Permitting.

Findings: Presence. The presence issue reports for SHPO (tau-b= -.318; p=.003), Federal Environmental Agencies (tau-b= -.236; p=.030), and the meta-factor Property Access (tau-b= -.192; p=.045) had significant inverse relationships with the binary Schedule Success variable. The binary SHPO variable also had a significant inverse relationship with the ordinal Project Success variable (tau-c= -.253; p=.036). In evaluating the influence of binary presence variables on the continuous index scores, SHPO also had a significant inverse relationship (z=-3.48; p=.001) with Schedule Success, as did the meta-factor Property Access (z=-2.539; p=.011). Environmental Permitting had a significant inverse relationship (z=-2.08; p=.038) with the Outputs Success index score.

Findings: Persistence. Of the crosscutting factors identified, Standardized SHPO issue reports was the only significant relationship with the ordinal Project Success variable (rho=-.260; p=.034). The effects of SHPO on the Schedule Success index was the strongest of relationships in this area for both the standardized issue reports variable (rho= -.390; p=.001) and the raw count issue reports variable (rho= -.483; p<.001).

As with Legal Environment factors, the standardized variable for percent of grant quarters reporting an issue was not significant for several factor-indicator relationships, but relationships became significant upon using the raw counts of issue reports. After the Raw Count SHPO variable identified in the preceding paragraph, another strong raw count issue reports factor was the Federal Environmental Agency towards both Overall Success (r=-.445; p<.001) and Schedule Success (r= -.425; p<.001). The Raw Count Property Access meta-factor is inversely correlated with the Schedule Success index score in a linear (r=-.275; p=.024) and monotonic (rho= -.442; p<.001) relationship. However, this meta-factor had little predictive ability for the other scores. Appendix F includes these and other correlation tables.

Summary. Overall, a large number of factors had some level of significant relationship with one of the success indicator variables. Table 20 provides an overview of all significant factor-indicator relationships and their directionality. Directionality indicates whether the presence or persistence of the factor relates to the presence or an increase in the indicator or if there is an inverse relationship in which the presence or an increase in the factor relates to the absence or a decrease the indicator score. Overwhelmingly, these were inverse relationships. Organizational age was the only factor with a direct relationship with more than one indicator variable.

Table 20 Significant Factor-Indicator Relationships with Directionality

Variable	Overall Success	Schedule Success	Budget Success	Outputs Success	Project Success (ordinal)
Network Length	Inverse	Inverse			
Core Organizational Capacity (Meta)	Inverse	Inverse		Inverse	Inverse
Matching Funds	Inverse	Inverse		Inverse	Inverse
Planned Project Cost		Inverse			
Utility Provider			Inverse		
Broadband Provider	Inverse				
Organizational Age	Direct			Direct	Direct
Terrain		Inverse	Inverse		
External Project Coordination	Inverse	Inverse		Inverse	
Overlap SAC	Inverse	Inverse		Inverse	
RFP/Contractors	Inverse	Inverse		Inverse	Inverse
Local Government Franchising	Inverse	Inverse		Direct	
Other Federal Agencies	Inverse	Inverse			
Tribal Authority/Relations	Inverse	Inverse			
Environmental Permitting	Inverse			Inverse	
Months to FONSI Issuance	Inverse	Inverse			
FONSI Issue Reports	Inverse	Inverse			
Site Access		Inverse			
Other Award Action Requests		Inverse	Inverse		
Make Ready Issues		Inverse			
Route Modifications		Inverse			
Historical Preservation		Inverse			Inverse
Federal Environmental Agencies		Inverse		Inverse	
Property Access		Inverse			
State Legislation			Direct		
Protected Species			Direct		

Ordinary Least Squares Regression Analysis

As introduced in the Methods chapter, the study formed around four research questions and the associated factor-indicator relationship hypotheses. This section builds and tests regression equations based on these hypotheses and tests interactions of factors identified as significant with large effect sizes in the previous section.

Schedule Success key performance indicator. The first investigation was to answer the question, "Which factors had a significant influence on the Schedule Success of project completion within the 12 quarters specified as the grant period?" This study tests the factor interactions articulated in RH_1 hypothesized to result in a lower Schedule Success index score.

RH_1: A project has a lower Schedule Success index score based on the number of months between the grant award date and the date for the environmental assessment FONSI award or overlap special award condition resolution, the frequency of nature issue reports or property access issue reports during implementation, and if it is implemented by a government agency at the statewide level.

Findings. The initial test of the model revealed it was significant at .002 with an adjusted R Square of .210. This indicated that the chosen factors explained 20% of the Schedule Success index score variance. Significant variables in the model were Project Scale (p=.015) and Raw Count of Overlap SAC Issue Reports (p=.040). Appendix H contains the results of the model testing and demonstrates the deviation between the actual value and the model-predicted value in Figure 10.

Subsequent modifications to the model refined it using insights from the conceptual hypothesis testing in the previous section. Those factors with significant and strong effects on the Schedule Success index score were tested for inclusion in the revised model. After verifying that the newly introduced variables did not present multicollinearity concerns, these modifications yielded a regression equation that confirmed portions of the initial RH_1 and introduced additional support for rejecting conceptual hypotheses 6-9, 16, and 18-20. Significant factors in the model and their associated conceptual hypotheses were core organizational capacity issues reports (CH_6-CH_8), whether a lead organization was a utility provider (CH_9), issues with grant award action requests (C_{16}-C_{17}), successful management of Request for

Proposal process and contractor relations (C_{18}-C_{19}), property access issues (C_{19}), external project coordination (C_{18}), number of project partners (CH_{18}), and tribal authority and relations (CH_{20}).

Table 21 shows the final regression model for the Schedule Success index score, which includes a combination of fixed factors, raw and standardized issue report quarters, and both meta-factors. The new model has an adjusted R^2 of .648, indicating that it explains approximately 65% of the overall variation of the Schedule Success index score. Figure 2is a scatterplot with the line of best fit, and Figure 3 offers a normal Q-Q plot of the unstandardized residuals from the regression model to demonstrate the goodness of fit for the model. The final Schedule Success index score regression equation is:

$$\hat{y} = 116 - 1.873(\mathit{OrgCapacityMeta}) - .652(\mathit{StandAwardRequest}) + .284(\mathit{StandRFP}) \\ - .447(\mathit{StandTribalAuth}) - .144(\mathit{StandExtProjCoord}) - .567(\mathit{PropAccessMeta}) \\ - .065(\mathit{YesUtilityProvider}) - .003(\mathit{NumPartners}) + \varepsilon$$

Table 21 Factor-Schedule Success Index Regression Analysis Final Model

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
Model 2	B	Std. Error	Beta	t	Sig.
(Constant)	.116	.040		2.933	.005**
Core Organizational Capacity Meta-factor Standardized Reports	-1.873	.377	-.408	-4.969	.000**
External Project Coordination Issue Presence	-.144	.041	-.322	-3.537	.001**
Tribal Relations Standardized Reports	-.447	.136	-.272	-3.287	.002**
Other Award Action Requests Standardized Reports	-.652	.194	-.272	-3.351	.001**
Property Access Meta-factor Standardized Reports	-.567	.167	-.252	-3.393	.001**
RFP/Contractor Standardized Reports	.284	.148	.167	1.921	.060
Utility Provider	-.065	.033	-.151	-1.964	.054
Number of Project Partners	-.003	.001	-.145	-1.871	.066

Dependent Variable: Schedule Index
* Significance level <.05
** Significance level <.01

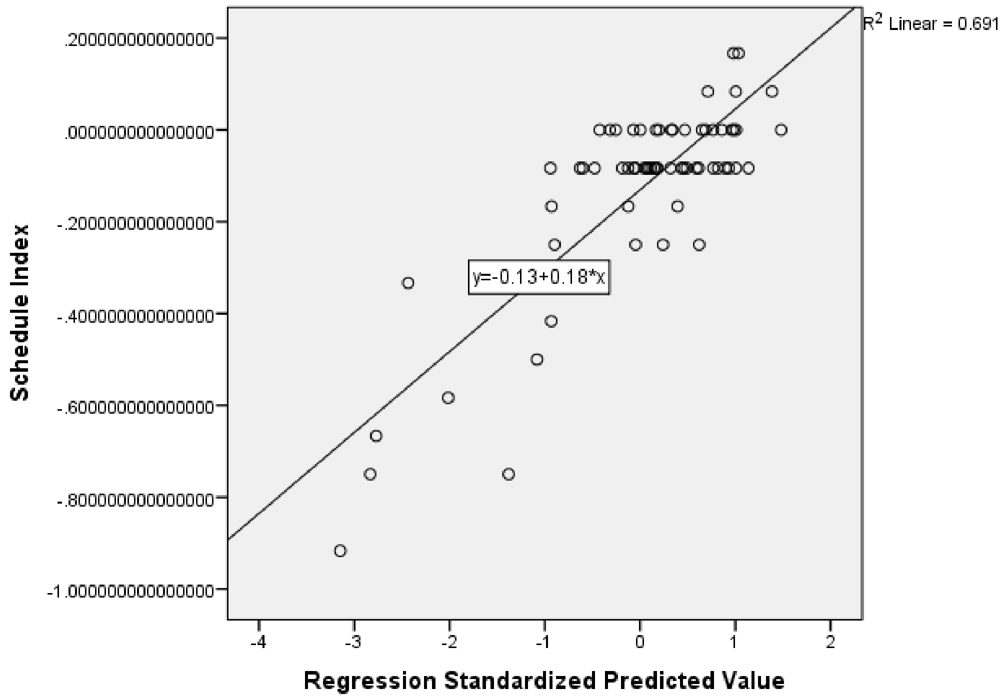

Figure 2 Regression Scatterplot Standardized Predicted Value-Schedule Success Index

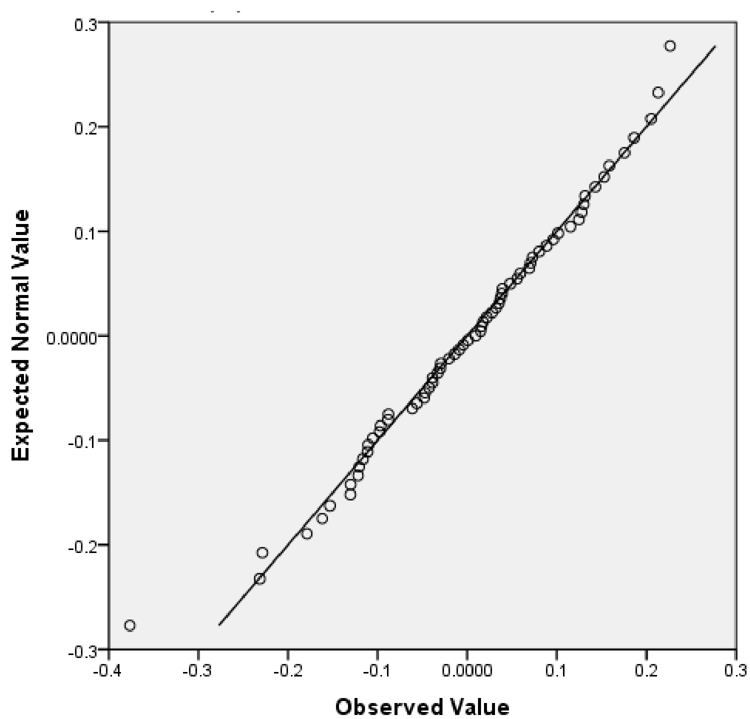

Figure 3 Normal Q-Q Plot of Unstandardized Residual Factor-Schedule Success Regression

Budget Success key performance indicator. The second investigation focused on answering the question, "Which factors had a significant influence on the Budget Success of project completion within proposed budget?" This study tested the factor interactions articulated in RH_2 hypothesized to influence the Budget Success index score.

RH_2: A project will have a lower Budget Success index score based on project scale, number of months between the grant award date and the date for the environmental assessment FONSI issuance, if they had nature-related issue reports, overlap special award condition issue reports, and if it was a young, non-utility provider lead organization that experienced organizational capacity issues such as deficient fiduciary responsibility or leadership change during implementation.

Findings. The initial hypothesis created a model with an adjusted R^2 of -0.17 at a significance level of .558, as shown in Appendix H.

Following this initial hypothesis model, subsequent modifications to strengthen the predictive power of the model based on factor-indicator relationships found to be significant in the previous section created a weak (adjusted R^2=.136) but significant model (p=.007). The model had similar significance and predictive strength for both the ordinary least squares regression and for a binary logistic regression for factors determining if a project finishes within their set budget.

Table 22 shows the final OLS regression model for the Budget Success index score, which includes only factor presence variables. Figure 4 is a scatterplot with the line of best fit, and Figure 5 offers a normal Q-Q plot of the unstandardized residuals from the regression model to demonstrate the goodness of fit for the model. The only factors found to be significant were the presence of Other Award Action Requests (CH_{16}), Terrain Issues (CH_{14}), and State Legislation

Issues (CH_{20}). Of these three, the presence of Terrain Issues had a moderate negative influence (-.236) on the Budget Index while the presence of Other Award Action Request issue reports (.295) and State Legislation issue reports (.231) each had moderate positive influences on variations in the Budget Success index score. The final unstandardized Budget Index regression equation was

$$\hat{y} = -.003 + .046(\mathit{AAR\_Presence}) - .038(\mathit{TerrainPresence}) + .063(\mathit{StateLegislativePresence}) + \varepsilon$$

Table 22 Factor-Budget Success Index Regression Analysis Final Model

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
Model 2	B	Std. Error	Beta	t	Sig.
(Constant)	-.003	.014		-.198	.844
Other Award Action Request Report Presence	.046	.018	.295	2.535	.014*
Terrain Report Presence	-.038	.019	-.236	-2.060	.044*
State Legislation Report Presence	.063	.032	.231	1.988	.051
Dependent Variable: Budget Index * Significance level <.05					

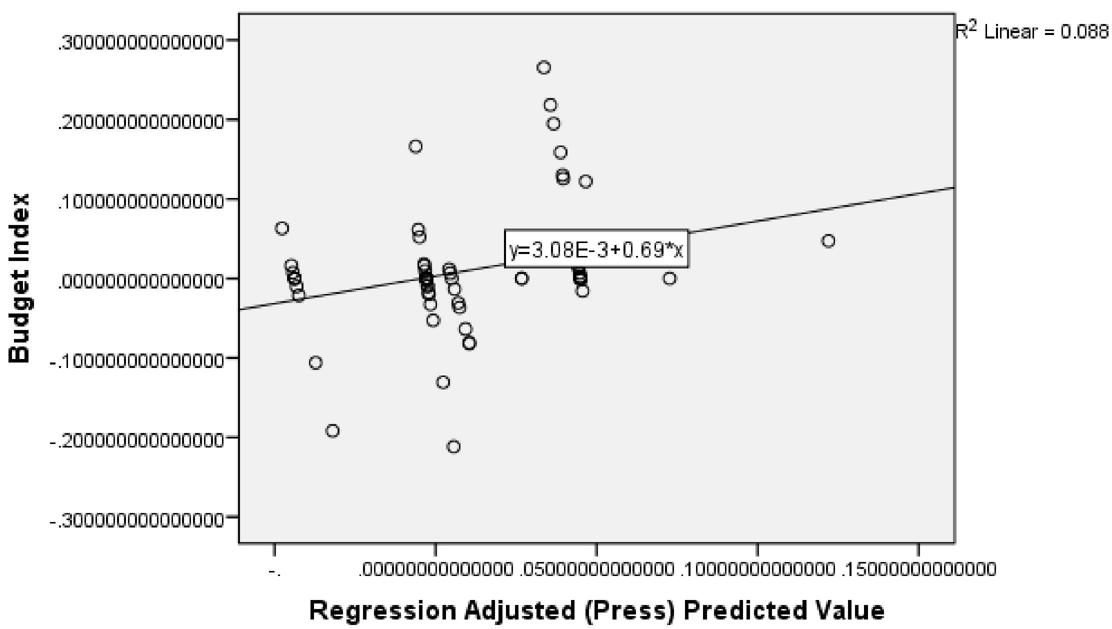

Figure 4 Scatterplot of Predicted Value-Budget Success Index Final Regression Model

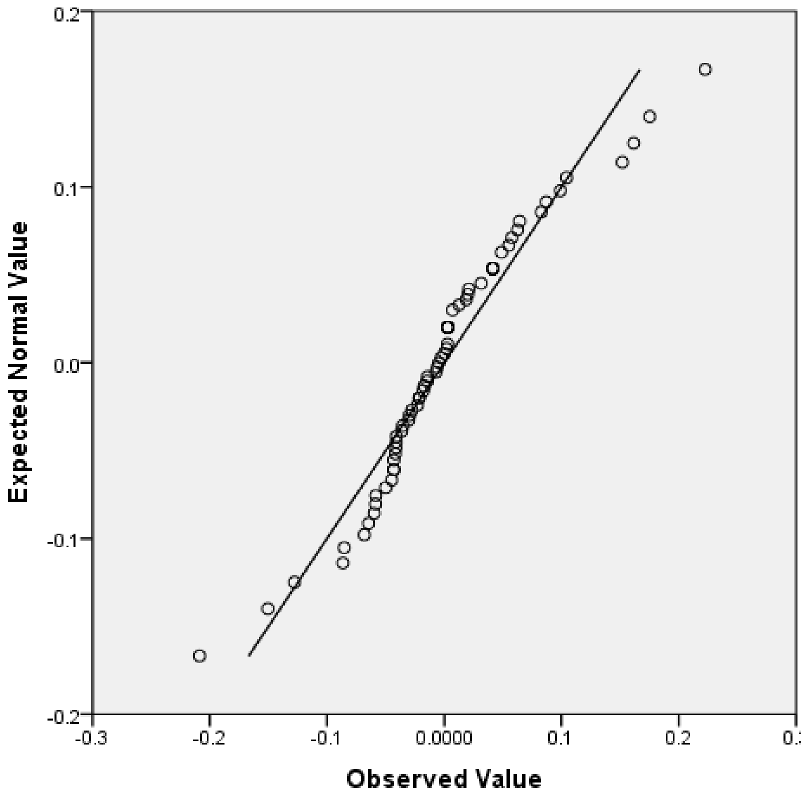

Figure 5 Q-Q Plot of Unstandardized Residuals Factor-Budget Index Final Regression Model

Outputs Success key performance indicator. The third regression analysis investigated the question, "Which factors had a significant influence on the Outputs Success of successful completion of proposed network mileage?" This study tests the factor interactions articulated in RH_3 and hypothesized to lower the Outputs Success index score.

RH_3: A project will have a lower Output Success index score if it was implemented on a smaller scale, had more issue reports for EA/FONSI issuance or property access during implementation, and if the lead organization had fewer years of experience implementing similar projects.

Findings. Using Ordinary Least Squares regression, the factors hypothesized in RH_3 resulted in an adjusted R^2 of .029 with a significance of .215. This model is depicted in Appendix H and illustrated in Figure 15.

Based on the factor-indicator relationships revealed as significant in the conceptual hypotheses testing, a new model was tested. The new model included lead organizational age instead of years of experience, site access standardized reports instead of the property access meta-factor, the presence of environmental permitting reports, the number of quarters to resolve project overlap reports in Year 1 of the grant, and core organizational capacity standardized reports. The final regression model is presented in Table 23 and is significant at the .000 level with an adjusted R^2 of .302. The model had similar significance and predictive strength for both the ordinary least squares regression and for a test binary logistic regression based on whether projects built at least 95% of their planned miles. This model both over- and underestimates the ratio of miles built over network mileage proposed with the line of best fit on the regression predicted values scatterplot (Figure 6) and variation in the regression residuals from the normal curve on the Q-Q Plot (Figure 7). The final regression equation for the Outputs Success index score is

$$\hat{y} = -.02 - 1.194(\textit{OrgCapacityMeta}) + .001(\textit{OrgAge}) + .231(\textit{StandSiteAccess}) - .024(\textit{Y1OverlapSAC}) - .12(\textit{StandEnvPermit}) + \varepsilon$$

Table 23 Factor-Outputs Index Regression Analysis Final Model

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.020	.045		-.454	.651
Lead Organizational Age	.001	.000	.358	3.378	.001**
Organizational Capacity Standardized Reports	-1.194	.548	-.235	-2.179	.033*
Site Access Standardized Issue Reports	.231	.138	.175	1.675	.099
Environmental Permitting Issue Report Presence	-.120	.056	-.228	-2.121	.038*
Y1 Overlap Special Award Condition Raw Count Reports	-.024	.015	-.168	-1.594	.116
Dependent Variable: Output Index * Significance level <.05 ** Significance level <.01					

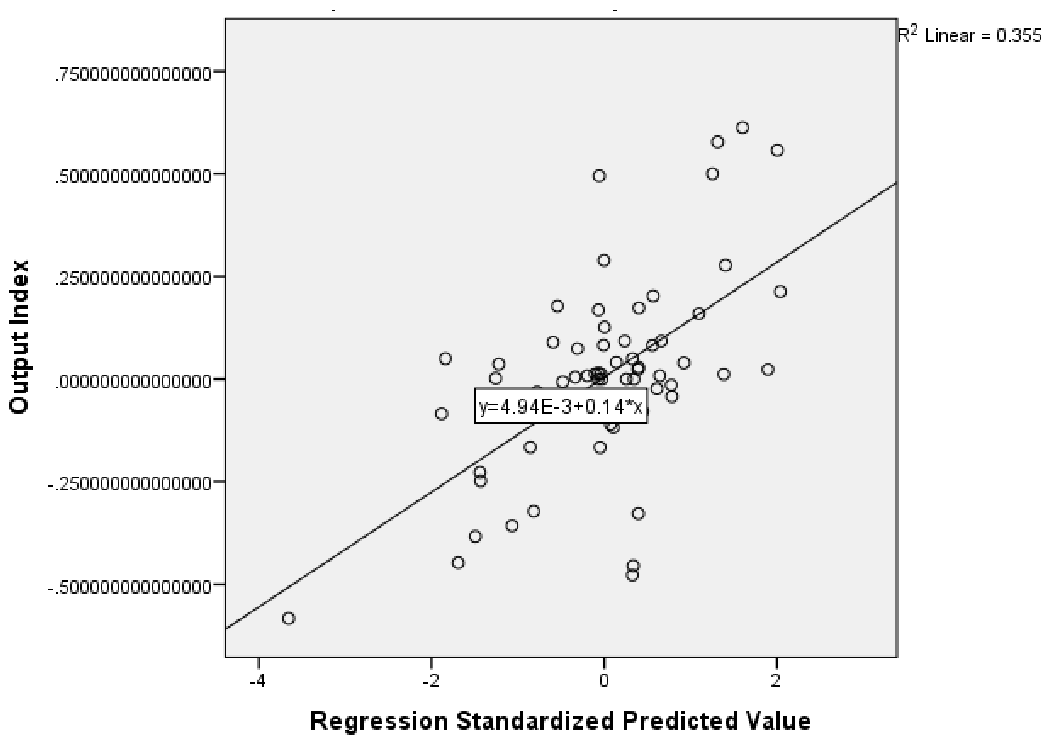

Figure 6 Regression Scatterplot Standardized Predicted Value-Outputs Success Index

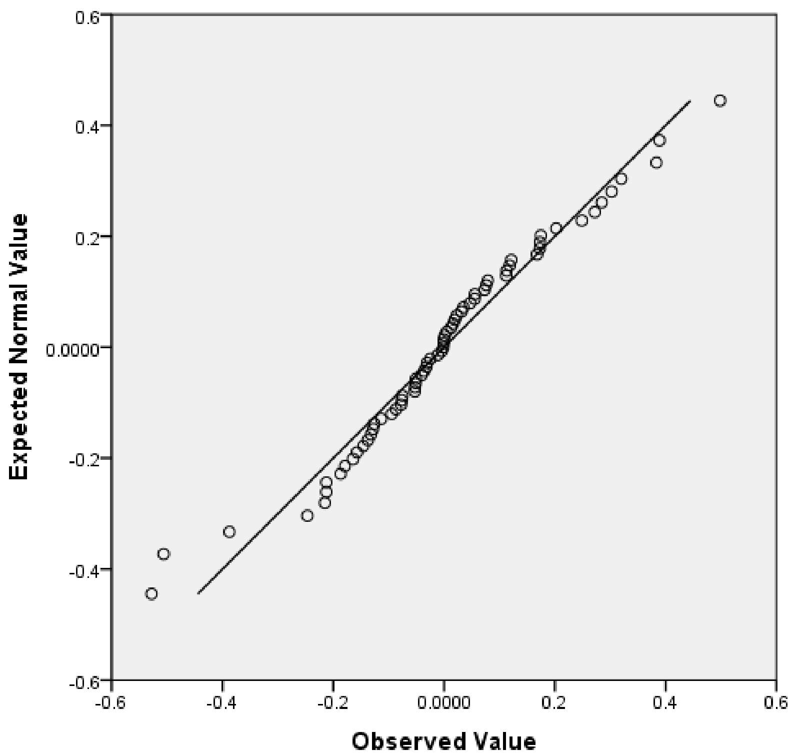

Figure 7 Normal Q-Q Plot of Factor-Outputs Score Regression Unstandardized Residuals

Overall Success. Overall Success, as defined by projects that finished on time and on its budget, and constructed the planned number of miles, was the final area of investigation in this study and held the question, "Which factors had a significant influence on project implementation success in BTOP infrastructure projects?" This study tests the hypothesized interactions of factors articulated in RH_4 resulting in a lower Success index score.

RH_4: Overall project implementation success index scores will be lower for projects with EA/FONSI attainment issue reports, principal-agent relationship issue reports or property access issue reports during implementation.

Findings. The factor-overall success score relationship was tested first with the Ordinary Least Squares regression using a model containing the factors identified in the research hypothesis. The model, shown in Appendix H, was significant at .013 with an adjusted R^2 of .142.

Based on the results of the conceptual framework hypothesis testing, this model was modified to remove property access, route modification, and environmental assessment factors. The new model adds core organizational capacity standardized reports, State Historical Preservation Office raw counts, and lead organizational age. The resulting model, shown in Table 24, is significant at .000 and has an adjusted R^2 of .478.

Figure 8 demonstrates the goodness of fit for the model by comparing the actual Overall Success index score and the model-predicted value. Figure 9 demonstrates the normal distribution of the regression residuals to result from the difference between the predicted values and actual values for the Overall Success index score. The final regression equation for the Overall Success index score is

$$\hat{y} = .54 - 2.283(OrgCapacityMeta) + .002(OrgAge) - .038(TotalOverlapSAC) - .828(StandAwardRequest) - .049(TotalSHPO) + \varepsilon$$

Table 24 Factor-Overall Success Index Regression Analysis Final Model

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.025	.054		-.463	.645
Organizational Capacity Stand. Reports	-2.189	.841	-.284	-2.604	.012*
Lead Organizational Age	.002	.001	.335	3.604	.001**
Environmental Permitting Issue Presence	-.247	.073	-.310	-3.367	.001**
Total Overlap SAC Raw Count	-.035	.017	-.189	-2.058	.040*
Total SHPO Raw Count	-.058	.031	-.199	-1.874	.066
Dependent Variable: Success Index * Significance level <.05 ** Significance level <.01					

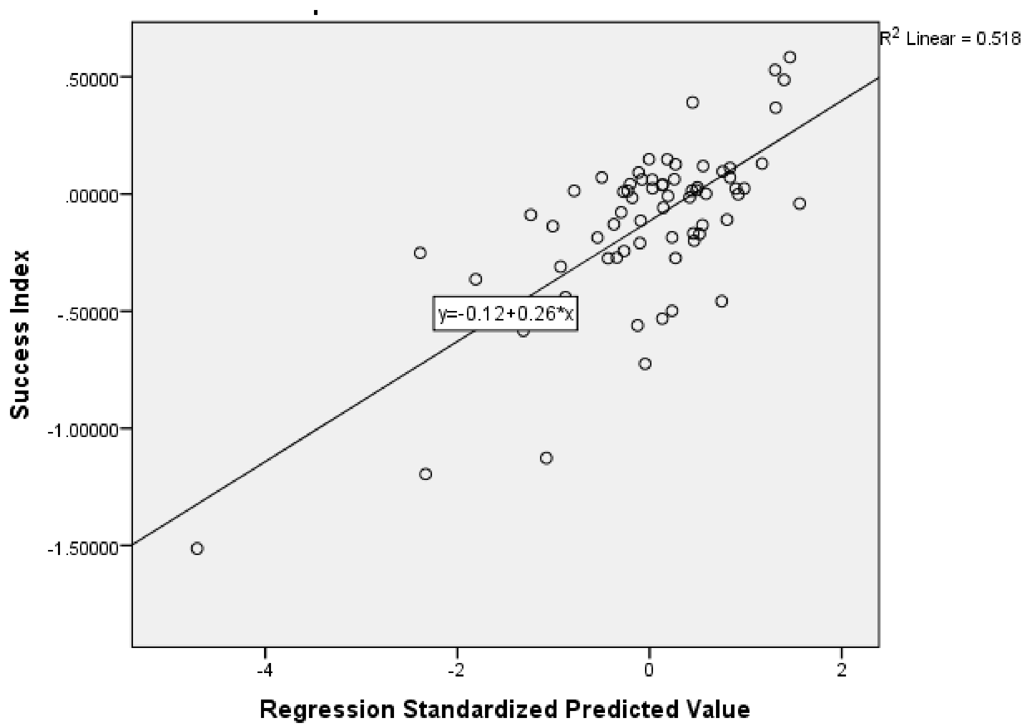

Figure 8 Regression Scatterplot Predicted Value-Overall Success Index

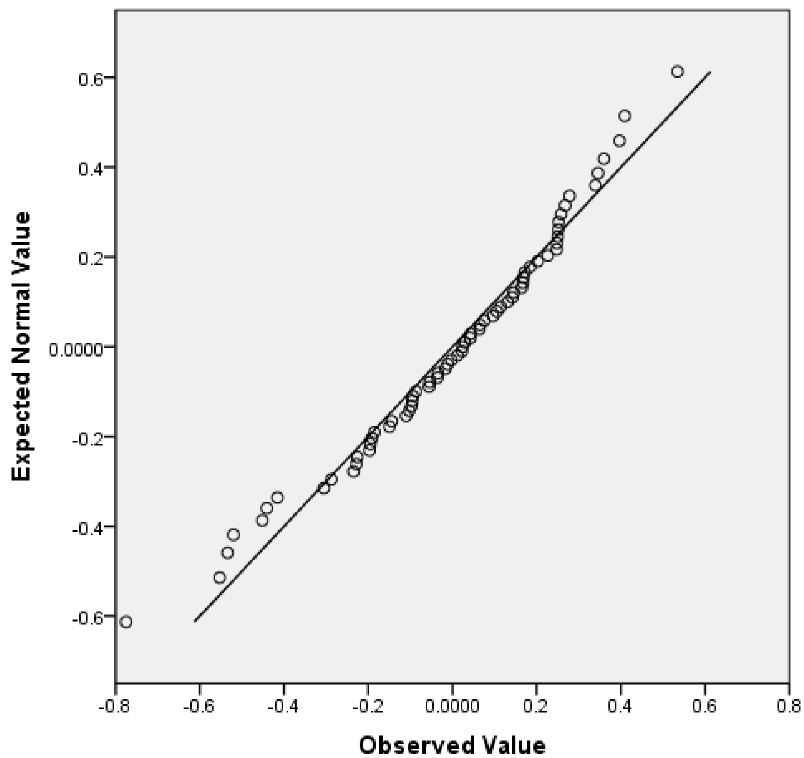

Figure 9 Factor-Success Index Normal Q-Q plot of Regression Unstandardized Residual

Hypothesis Testing Conclusions. The regression analyses to explore project implementation success and its subcategories of schedule, budget, and outputs failed to reject any of the four null research hypotheses for both statistical significance and explanatory power. The initial models for Factors-Schedule Success and Factors-Overall Success were statistically significant but had extremely low R^2, indicating low ability for a project to explain the variance of the dependent variable based on the model.

However, new models created using the significant findings from the "Influence of Factor Presence and Persistence on Factor-Indicator Relationships" had greater explanatory power for their associated dependent variable. These models offered additional insights into the factor interactions that influence project implementation and provided grounds to reject the null hypotheses of no influence of factors on the index scores for the organizational capacity, organizational age, organizational expertise principal-agent relationship, and property access variables.

The organizational capacity meta-factor served as an aggregate of the narrower organizational concerns of leadership change, governance structures, and fiduciary responsibility. Notably, the meta-factor of core organizational capacity emerged as a significant factor in each of the successful models except for its predicted influence on Budget Success index score. While the Budget Success index score had a statistically significant model, its low adjusted R^2 indicates that its explanatory and predictive powers are low. Based on the low number of significant relationships involving Budget Success across all selected tests, I reached the conclusion that variables available in the database were not able to predict Budget Success in absence of other success variables. However, the Overall Success measures help to identify factors that work in concert with one another to lead to success across indicators, including Budget. The implications of this distinction will be discussed more in Chapter 6.

The final regression equations created by the analyses of the three variables follow.

Schedule Success Index
$\hat{y}=$ 116-1.873(*OrgCapacityMeta*) -.652(*StandAwardRequest*) +.284(*StandRFP*) -.447(*StandTribalAuth*) -.144(*StandExtProjCoord*) -.567(*PropAccessMeta*) -.065(*YesUtilityProvider*)-.003(*NumPartners*) + ε

Budget Success Index
$\hat{y}=$ -.003+.046(*AAR_Presence*) -.038(*TerrainPresence*) + .063(*StateLegislativePresence*) + ε

Outputs Success Index
$\hat{y}=$ -.02 -1.194(*OrgCapacityMeta*) +.001(*OrgAge*) +.231(*StandSiteAccess*) -.024(*Y1OverlapSAC*) -.12(*StandEnvPermit*) + ε

Overall Success Index
$\hat{y}=$ .54-2.283(*OrgCapacityMeta*) +.002(*OrgAge*) -.038(*TotalOverlapSAC*) -.828(*StandAwardRequest*) -.049(*TotalSHPO*) + ε

Chapter Summary

Chapter 4 presented the results of the quantitative analysis to determine which factors influenced key performance indicators for project implementation success for 67 Round 2 BTOP projects investigated in this study. The chapter began by exploring the data to determine framework factors' presence and persistence in projects and to gain an understanding of the distribution and frequencies of the dependent variables using descriptive statistics. From there, I evaluated the influence of factor presence and persistence on the dependent variables through a combination of independent-samples comparisons of means using Welch's t-test and the Mann-Whitney U-test plus correlations using Pearson's, Spearman's rho, and Kendall's tau methods. The section "Influence of Factor Presence and Persistence on Factor-Indicator Relationships" organized these findings by framework category and reported the significant relationships that rejected null hypotheses for the conceptual hypotheses.

Chapter 4 then focused on the ordinary least squares (OLS) regression analyses conducted to test the hypothesized influence of factor interactions on the dependent variables of Schedule Success index score, Budget Success index score, Outputs Success index score, and Overall Success index score. The analysis identified a statistically significant model with low explanatory power for predicting the Budget Success index score. The Schedule Success, Outputs Success, and Overall Success index scores had models with significant explanatory power. The meta-factor of Core Organizational Capacity had the strongest influence in each of the three models with issues related to interorganizational relationships also showing significant strength across the models. Issue reports regarding Requests for Proposals and contractors' fulfillment of responsibilities had a significantly positive relationship with the schedule indicator score. All other significant interorganizational relationship factors had negative influences on the indicator scores, though effect sizes of these relationships varied.

Property Access was a crosscutting meta-factor created to incorporate a variety of access-to-property issue reports at the intersection of interorganizational relationships and physical environment factors. These were issues often reported by grant recipients and referenced by other service providers as causes of project delays. The meta-factor had a significant inverse relationship on the Schedule Success index score, but this influence did not carry over for other indicators. One of its component factors, Site Access, had a significant direct influence on the Outputs Success index score. Another component factor, Environmental Permitting, had a significant inverse relationship with both Outputs Success and Overall Success index scores. The mixture of direct and inverse relationships for factors and non-schedule performance indicators may mean that while property access issues cause delays in the progress of a project, they do not necessarily result in a permanent setback in project success.

The chapter concluded with a summary of the OLS regression modeling and significant findings. Full tables for each of the presence and persistence influence tests are available in Appendices 5-7, and initial regression models that were not significant can be located in Appendix H.

Chapter 5 will present the results of the project postmortem conducted on Citizens Telephone Cooperative's New River Valley Regional Open-Access Network, which explores the influence of organizational leadership and capacity in more depth and identifies additional factors that can positively influence project implementation success.

Chapter 5: Project Postmortem Findings

This dissertation investigates the relationships of critical success factors to key performance indicators in determining project implementation success. The previous chapter provided a quantitative analysis of the 67 Round 2 BTOP projects selected to test the hypothesized factor-indicator relationships presented in Chapter 2. It found that organizational capacity issues were the most significant and strongest influences on projects failing to achieve project implementation success overall and specifically in meeting schedule and output goals. However, the materials reviewed for the quantitative analysis were more likely to include negative factors than positive. This qualitative exploration of one of these 12 projects that achieved complete success supplements those findings.

This chapter provides a project postmortem, or retrospective, on the implementation of one of the 67 BTOP projects included in the study, Citizens Telephone Cooperative's New River Valley Regional Open-Access Network (NRV-ROAN). As introduced in the Methods chapter, a postmortem analysis of a project sets out to answer three key questions: what was done well, what could have been done better, and what should be changed for next time. An overview of the project's technical details and profile of its lead implementing organization, Citizens Telephone Cooperative (Citizens) begins the chapter followed by a summary of information from the document review process and a presentation of interview participants' insights organized according to the three guiding questions and the POPIL framework. The chapter concludes with an exploration of some of the early project results in the community.

Postmortem Rationale

The quantitative results in the previous chapter emphasized negative relationships between factors and indicators: as the number of reports in areas identified as significant rose, the corresponding index score declined. Information for non-events or otherwise business-as-usual events that would indicate a project was proceeding perfectly as planned would not be available to code and analyze on a program-wide scale. As a result, the coded data also emphasized issue reports in which there were negative impacts on project baseline attainment.

The quantitative model was better able to capture causes of delays and overruns due to a natural bias towards identifying or hypothesizing issues that would lead to less than peak performance, so a qualitative analysis of a Total Success project would offer the best opportunity to fill some of the gaps and strengthen the ability to predict success in projects. I selected Citizens' NRV-ROAN project to explore as a Total Success project from the broader quantitative analysis sample and for which I had both geographic and professional networking access to organizational leaders and the project's external stakeholders.

Project Background and Specifics

A primary objective of BTOP was to increase physical access to high-speed, high-quality broadband infrastructure. At the program's inception, Virginia had a rural/urban digital divide 10% greater than the national digital divide. Ninety-nine percent of urban Virginians had physical access to infrastructure providing Internet speed of 3 Mbps or faster while only 78% of rural citizens had access at or faster than that speed in June 2010. Nationwide, 86% of rural residents had access to broadband-level speeds compared with 98.7% of urban residents. The divide becomes even more meaningful at higher speeds; only 23% of rural Virginians had access to speeds at or above 50 Mbps while 81% of urban residents have access to the same speeds. Nationwide, 15.2% of rural residents and 54.8% of urban residents had access to at least 50 Mbps service in 2010 (National Broadband Map, 2010, p. 8).

Around 2003, the New River Valley Planning District Commission had recognized a growing need for internet connectivity to address the urban-rural digital divide and began regional planning efforts to build additional infrastructure (K. Byrd, personal communication, October 15, 2014). Between 2004 and 2009, the region has tried various approaches to making the transition from planning to actual network construction, including a 50% matching grant from the US Economic Development Administration, but they could not put together the necessary finances to do so. The PDC's telecommunications committee led to the formation of the New River Valley Network Wireless Authority by Pulaski County and Giles County in 2008, which submitted a Round 1 BTOP grant application for a small network in the two localities. As proposed, the Authority would act as the project manager and would own the finished network, but Citizens Telephone Cooperative would construct and operate the network as the experienced partner. This proposal did not receive funding, and the NTIA gave feedback that "the authority doesn't have experience in that role. It was really just an organization there to help move money. It wasn't really an operational organization' (K. Byrd, p.c., 2014).

Following the Round 1 rejection, Citizens designed and submitted the NRV-ROAN proposal for Round 2 funding (see Appendix B for a timeline of BTOP events) of an 186-mile fiber-optics network in which Citizens would construct, own, and operate the network and the Authority would act as a funding partner. The proposal expanded on the Authority's failed proposal and would provide new or improved internet connectivity to regional community anchor institutions and interconnect with other networks for data transport service across seven counties and two cities in the New River and Roanoke Valleys region of Virginia. The network not only covered the area from the limited-scope Round 1 proposal but also provided a key network linkage between and with two other BTOP projects, Bristol Virginia Utilities, and

Virginia Tech Foundation/Mid-Atlantic Broadband Cooperative. Appendix E illustrates the network and its interconnections with other open-access middle-mile networks.

The total estimated cost for the approved project was $11,560,803 with a BTOP grant covering $9,237,760. A combination of in-kind engineering and other services from Citizens, a $396,622 grant from the Tobacco Commission to cover the portion in the two counties eligible for TC funding, and $830,000 from a combination of Pulaski County and Giles County via the New River Valley Network Wireless Authority covered the $2,323,043 required for the grant's 20% match.

The grant award period began on August 1, 2010, for a grant period that would end July 31, 2013. Citizens completed NRV-ROAN on July 17, 2013, with a formal completion announcement made on July 31, 2013, and the final project budget was 4% under budget at $11,093,477 with 100% of the proposed miles completed. This made Citizens' project the only Total Success Round 2 project in Virginia. As a note, the Citizens press release from August 14, 2013, formally announcing the completion of the network indicates a total network mileage of 200 miles, a figure repeated by Citizens staff during their interview in September 2014, though this figure did not appear in performance progress reports or the final annual report. If the revised mileage were accurate without alteration to the final reported budget figure, this would mean that the Citizens project exceeded its composite project implementation success benchmark by 11.6%.

Citizens Telephone Cooperative History and Overview

Citizens Telephone Cooperative is a small telecommunications provider that serves as the Incumbent Local Exchange Carrier (ILEC) for telephone service in rural Floyd County, Virginia. Citizens, and other cooperatives like it, formed specifically because for-profit service providers, which was AT&T ("Ma Bell") for telephone service, did not see an acceptable return on investment for providing services in rural areas. This meant that rural areas had the choice to go without service or determine a way to provide for themselves, and rural communities across the country pooled their resources to form mutually owned utility cooperatives to deploy and operate their own infrastructure. Citizens traces its history back to the 1914 formation of Citizens Mutual Telephone Company, and it became Citizens Telephone Cooperative following a merger with two other local telephone mutual companies in 1954. This coincided with a surge of telephone cooperatives on a national scale that followed a 1949 amendment to the Rural Electrification Act of 1936 to make federal subsidies available for the construction and maintenance of rural telephone service networks through the Rural Electrification Administration's long-term, low-interest loan program. The expansion opened up small telephone service providers' access to the capital required to expand and maintain rural telephone service networks, which were deteriorating in many areas without enough funding to repair and upgrade as needed.

In 1994, Citizens Telephone Cooperative's service offering expanded to include dial-up internet service in Floyd County, and it had added DSL and cable internet service in its ILEC footprint and selected other areas at the time of its BTOP grant application. Leading up to the BTOP grant proposal, Citizens had constructed a 246-mile regional open-access network that would expand to 448 miles by the BTOP-funded project.

Financials and network assets. In the telecommunications world, Citizens is a small fish in a very large pond. Citizens had total assets of $15.13 million with total current (non-plant, non-investment) assets of $6.64 million for the calendar year ending December 2009 according to financial documents submitted as part of its BTOP grant application. To give a sense of comparison, the 2009 value of Citizens' total assets is 0.146% of Verizon's 2009 $10.358 billion net income and 0.007% of Verizon's 2009 $227.25 billion total assets (MarketWatch, 2013). Citizens' debt ratio as of December 2009 was 0.643 with $9.7 million in current, long-term, and other liabilities. The BTOP grant project both stretched the operational and financial capacity of Citizens for the implementation period and contributed to the $15.7 million increase in Citizens' total reported assets between December 2009 and December 2013 as reported on their 990 IRS tax forms.

As a tax-exempt cooperative, Citizens remains member-owned and is required to generate at least 85-percent of its income from its members in order to maintain its IRS tax status as a nonprofit 501(c)(12) organization. This has, at times, restricted its growth opportunities or led to the formation of wholly owned, for-profit subsidiary organizations to complete activities outside of its core service footprint and activities. Citizens formed a for-profit subsidiary, Citizens Cablevision, in 2004 to allow Citizens to offer cable television programming and expand geographically beyond its traditional footprint and service offerings without endangering its core business or its income ratio.

Citizens used Cablevision to qualify for an $11.5 million loan from the Rural Utilities Service (RUS), which was the successor to the older REA, to build a cable television and broadband service in neighboring Wythe County in 2004. However, due to a combination of market forces and federal loan process delays of 18 months, Cablevision was unable to get the necessary customer base to recoup the investment and repay the loan after a rival provider began offering services in the area. This was a blow to Citizens, but a subsidiary handled the loan rather than the parent company and insulated the core cooperative was insulated from the damage. The loan situation did not negatively affect the cooperative's ability to apply for and win BTOP grant funding.

While many organizations jump at the opportunity for "free" funding that does not require repayment, grants programs like BTOP and the Tobacco Commission are attractive for cooperatives in particular as the 85% member-generated income calculation does not include grants in the 15% of allowable non-member income. Citizens has made significant use of this attractive grant funding for its regional open-access network beginning with an FY2006 $3.7 million Tobacco Commission grant for construction of a 222-mile network (completed 2008). It then received a supplemental $1.8 million grant award in FY2009 for a 24-mile network expansion and interconnection with Bristol Virginia Utilities' network.

With the successful completion of its BTOP network, Citizens' full regional open-access network grew to 448-miles and directly interconnects with other regional networks including Mid-Atlantic Broadband Communities and Bristol Virginia Utilities. It also joined with other regional networks to form Lit Networks, a high-capacity data transport system spanning the Commonwealth and linking with internet backbone interconnection points in Northern Virginia and Atlanta (Lit Networks, 2014). The total network took an investment of $22 million including $14.8 million in grant funding and expanded incrementally over a period of 7 years to be feasible for an organization of Citizens' size that is also actively providing last-mile residential telecommunications services to 95% of residents in its rural ILEC service area.

Having provided an overview of both the NRV-ROAN project and its lead implementing organization, Citizens Telephone Cooperative, the next section focuses on answering the questions:

- What went well?

- What could have gone better?
- What should happen differently next time?

I organize the findings from the document analysis and participant interviews according to these questions and categorize them using the POPIL framework when appropriate.

What Went Well? Positive Influences on Project Implementation Success

The postmortem project analysis began by gaining an understanding of what went well during the project implementation process. With a firm grasp on the scope of the project and background information on Citizens as outlined above, I created a detailed analysis of the organization and the implementation of its NRV-ROAN project using document review and participant interviews. This analysis informs our understanding of how POPIL framework factors can positively influence project implementation success. Assessments of the NRV-ROAN's implementation process by Citizens staff, local project partners, and federal program grant officers all revealed the importance of an organization's technical expertise and functional capacity, organizational leadership, and interorganizational relationships in exceeding the baseline measures for project implementation success.

Technical expertise and functional capacity. The two NTIA program officers interviewed, Barbara Brown and Scott Woods, emphasized that, in their experience working with roughly 20 projects each, the BTOP projects implemented by established organizations with telecommunications experience were less likely to encounter difficulties during implementation than new organizations or organizations without telecommunications experience. Brown (personal communication, 2015) explained her perspective by saying "I think Citizens proved themselves to be such a good partner because they had such strong industry experience. Actually, their success highlighted why they were a good recipient in that way and why some of the other recipients that we gave to struggled. So it was a good counterpoint." With nearly 100 years of telecommunications experience, "[Citizens] didn't have to set anything new up, it was just a merge of activity into their existing operations, which made that ease of operation, that ease of transition easier to manage" (Woods p.c., 2014). Timothy Pfohl, interim executive director of the Virginia Tobacco Commission at the time, also noted that investing in broadband projects could be "a little bit risky money to some extent, but I think you try to minimize that risk by going with organizations like Citizens Telephone that has a long track record doing some things like this" (p.c., 2014).

Citizens' in-house expertise rather than a reliance on outside consultants gave an advantage over some of the other BTOP-funded infrastructure projects in terms of both having existing cultivated relationships with stakeholder groups as well as having the technical expertise to be able to properly evaluate vendor and contractor claims (Woods, p.c., 2014). In talking about the distinctions between new and established providers, Brown (p.c., 2015) shared that "[new organizations, of course, brought in their experts, their subject matter experts, their engineers, and their technical people, but it was harder. It's a bigger learning curve. Generally speaking, the ones that had experience did better." New organizations and non-telecommunications organizations both lost valuable time to completion with ordering new equipment, hiring new staff, building the right kinds of relationships, or otherwise acquiring the expertise necessary to complete the project effectively. Eric Price, the project manager from the Thompson & Litton engineering firm, explained that working with Citizens was very efficient because "they knew what they wanted…working with them made things a whole lot easier on us, because a lot of times, it's up to us to determine what the client needs—what are your needs, long-term goals" (Price, p.c., 2015).

As an existing telecommunications provider, no one questioned if Citizens had the necessary technical expertise and capacity to build and operate a telecommunications network. Many of the insights on the value of Citizens' experience were reflections on the differences between the failed Round 1 proposal by the Wireless Authority and Citizens' successful Round 2 proposal. Bernie Cosell, vice chair of the Wireless Authority, reflected on the rejection of the Wireless Authority's Round 1 proposal versus the successful Round 2 proposal by Citizens,

> It was not an unreasonable turn down, because we made a mistake…which is that our plan was basically very pie-in-the-sky, "Why don't we connect this thing up and it'll be all good." They weren't impressed. We didn't have anything that looked like a business plan. We didn't have anything that looked like an estimate of return on investments, or any of that kind of stuff, or how we were going to pay for it. We just thought it was a good thing. (Cosell, p.c., 2014)

Kevin Byrd, executive director of the New River Valley Planning District Commission, echoed Cosell's assessment, "The feedback that we received from the Feds on that one was the authority doesn't have experience in that role, it was really just an organization there to help move money. It wasn't really an operational organization. The hindsight is fantastic. We were disappointed at first, but in hindsight, it was great that they made that decision" (Byrd, p.c., 2014).

Jeff Crowder, who was involved in the neighboring Round 1 BTOP project managed by the Virginia Tech Foundation, shared that he had recommended Citizens be the lead organization on the NRV-ROAN project after the failed Round 1 project proposal by the Wireless Authority. He believed that at the time, "Citizens was *the* entity involved with the project who did have the capacity to implement it and make it a success" and that they were well aware of some of the regional challenges, such as terrain, that projects would encounter because of their work in the region (Crowder, p.c., 2014). Crowder's assessment appears to have been accurate in the actual implementation of the grant, as Cosell commented on the Citizens' planning and implementation process saying, "I actually thought they were wonderful to work with. They basically took the ball and just started running. They invested their own money in it, in advance of the grant providing income. I can't imagine a project like that working any more smoothly than that one did. I really can't" (Cosell, p.c., 2014).

Citizens staff also attributed its implementation success in part to its previous experiences in constructing similar types of networks that helped the cooperative develop the capacity to be successful in similar future projects. Dennis Reece, Citizens' COO, noted that,

> Looking back on it, it helped… [that] we'd already finished a similar fiber project back in 2007. So we'd already done some open access [fiber projects], and we had already done some grants—either partial grants or full grants—to make some of this happen. We already had a business development team that was already working in these areas that was just dedicated to focusing on bigger business customers and dealing with anchor institutions and that's who they focus[ed] on. (Reece, p.c., 2014)

The business development team Reece mentions was an extremely important aspect of the process to help bring about full project success that includes desired outcomes and not just outputs. Securing contracts with community anchor institutions and other end-users was essential to ensuring the long-range financial sustainability of networks and the organizations operating them after the initial capital investments end.

Organizational leadership. Interview participants from external stakeholder groups spoke highly of any interactions they had with Citizens management and that the organizational leadership "far exceeded expectations" (Byrd, p.c., 2014). The value that the Citizens leadership team brought to project implementation success aligns closely with the organization's technical expertise and functional capacity. One part of the organizational leadership component was the expertise that individual leaders brought to the table and the relationships they personally cultivated.

Citizens Telephone Cooperative appears to have low turnover at the management level, which has allowed the organization to develop deep connections in the community and institutional knowledge. While the engineering supervisor for the project retired during project implementation after a 28-year career with Citizens, his replacement, Russell Janney, took over with 20 years of service with Citizens already. Janney's work focused on the actual construction portion of the project including interactions with various entities to gain permits along the route for construction and worked with the engineering firm, Thompson & Litton. The other three leadership team members I interviewed demonstrated a similar pattern of long tenures and promotion from within the organization. Greg Sapp became its CEO and General Manager in 2008 after 15 years of service at Citizens. He provided high-level management and guidance for the project. Also in 2008, Dennis Reece assumed the role of Citizens' Assistant General Manager and Chief Operation Officer after 12 years of service. Reece was the primary point of contact for the project in working with partners, federal program officers, and other external stakeholders during implementation. Lastly, Citizens' Controller/Finance Manager, Chris Bond, had 12 years of service at Citizens at the time of grant application. He handled the budgeting, reporting, and verifying regulatory compliance.

The Citizens leadership team is invested in the continued success of the both the organization and the community as long-time, if not lifelong, residents of the region. This connection to the community extends to an organizational level as the continued successes of cooperatives like Citizens tie closely to continued successes in their home community where their member-customers are located. For a cooperative, its customers are its members, and its members are residents of the community in which they are located. On the priorities of cooperatives and the importance of established ties, Pfohl (personal communication, 2014) further reflected that Citizens' sense of accountability to its members, funders, and communities gives "a little more of a security blanket [for a funder] that you're dealing with someone that is there for the right reasons and right objectives and will be accountable for these things."

Several participants spoke highly of Citizens, both the organization as a whole and its leadership team. Barbara Brown assessed Citizens by saying

> They had a good organizational structure. They were extremely confident industry professionals. Just personally, they were very warm and collegial people who always look for sort of a win-win. They were just high-caliber professionals who were able to give of themselves and really were doing the project to better their constituents and their stakeholders. They were very open and candid and sharing in that way and that helped the whole organization. (p.c., 2015)

Brown even noted that as part of their dedication to service, they even gave significant technical assistance as pro bono aid to another project that experienced many problems during its BTOP implementation.

Interorganizational relationships. As in Barbara Brown's quote at the end of the previous paragraph, comments that reference Citizens exceptional interorganizational relationships often illustrated the strength and quality of Citizens' organizational leadership. Price (p.c., 2015) noted, "It was really the partnership that made the project such a success" when talking about the working relationship between Citizens and Thompson & Litton for the construction of the network. The very existence of the NRV-ROAN project was because of Citizens' involvement in improving and expanding regional broadband efforts, even when the benefit to their core service area would not be direct or immediately apparent. Several of the interview participants cited regionalism as being essential to the success of both this project and others while both the Citizens staff and Jeff Crowder with the Virginia Tech Foundation BTOP project discussed the importance of inter-project synergies for both implementation and long-term success.

If it wasn't for regional partnerships, we'd be... Interview participants from the localities, the Wireless Authority, Citizens staff, and the planning district commission all spoke of the importance of broad regional partnerships and goal alignment in achieving implementation success for this project and for attaining broader regional goals. Citizens had higher levels of success because of the regional support they received, particularly from Pulaski and Giles Counties, as manifested in the formation of the Wireless Authority and from the New River Valley Planning District Commission. Local area interview participants noted Pulaski County as "an early adopter for regionalism" and pushed to prioritize broadband projects (Byrd, p.c., 2014). Pulaski also provided the largest amount of cash matching funds with $600,000 of the $830,000 attributed to the Wireless Authority. Citizens' Dennis Reece explained

> In my opinion, it was the persistence of Pulaski County and Pulaski County Schools…driving for something better that made a lot of this happen. They did not want to be a service provider but knew that there needed to be better broadband in the region and were willing to partner to make that happen. They did their own cost analysis and came up with a [return on investment] of less than three years based on their [financial]

> commitment for just the cost savings alone that they were going to get and then, not only that, they were going to get better service. (Reece, p.c., 2014)

When I asked the two Pulaski County interview recipients about their commitment, Peter Huber, Pulaski County Supervisor, described a rich history of regionalism. For them, the New River Valley Network Wireless Authority, formed in 2008, was just the latest in a long range of inter-locality cooperation and collaboration efforts that ranged from water authorities and landfills to regional jails (Huber, p.c., 2014). The county recognized that as a small locality, working together across county and city lines was the only way to get the economies of scale to secure the services and infrastructure they need for their residents and to be competitive economically. Tim Barnes, the Director of Information Technology for both Pulaski County and the Pulaski County School System, further elaborated, "$600,000 to some bigger counties may not be a lot of money, but a place like Pulaski County, it is a lot. But we're reaping benefits from it that are hard to monetize... Why are we the biggest champions? Probably because we saw the benefit from the schools, for the community, for economic development. It was just a win-win across the board" (Barnes, p.c., 2014).

Inter-project synergies. One of the strengths that aided the NRV-ROAN project from winning the grant award through project implementation success was the connection it and Citizens had with other neighboring BTOP projects (Crowder, p.c., 2014). As shown in Appendix I, the project interconnected with two other BTOP projects in three locations: Bristol Virginia Utilities' Southwest Virginia Middle Mile Project in Wytheville, Virginia and the Virginia Tech Foundation/Mid-Atlantic Broadband Cooperative's Allegheny Fiber: Extending Virginia's Open Access Fiber Backbone to the Ridge and Valley in Blacksburg, Virginia and Bonsack, Virginia. By doing so, Jeff Crowder noted, "We wind up with a regional ring infrastructure that's much more useful than just a point-to-point [network]" (p.c., 2014). Previous Tobacco Commission-funded projects had made additional interconnections with the BVU and MBC networks. This regional network of networks became much larger and more robust than any single network could be, and facilitated the creation of a broader partnership agreement with several BTOP recipients and similar organizations, Lit Networks, that "gives [them] really a presence from Georgia through Northern Virginia" (Sapp, p.c., 2014). Chris Bond, Citizens' Finance Manager, explained,

> I think with our regional project because we tied in with some other regional projects that were going on from successful organizations or entities, it helped in the success of our project. Because BVU had a successful project. Mid-Atlantic Broadband had been successful in these types of projects and had proven success there. We had success with our tobacco commission projects. The Virginia Tech Foundation was definitely a—always a good player to have on your side. I think that the way the regional networks kind of meshed together really helped. (Bond, p.c., 2014)

In addition to the physical network connections between these projects, Citizens also worked closely with the Allegheny Fiber project to get faster access to the fiber-optic cabling they needed at lower cost by doing joint purchases (Bond, p.c., 2014). This move also helped Citizens avoid some of the delivery delays that other projects experienced due to the Japanese earthquake and tsunami that decimated several of the main cabling manufacturing plants at a time when the concurrent BTOP construction projects across the country caused greatly increased demand for materials. In this instance, the interorganizational relationship had a direct positive impact on the project-specific factor of materials and equipment delivery delays and other issues, such as equipment not performing as expected.

What Could Have Gone Better? Negative Influences on Project Implementation Success

While the Citizens project was a success in terms of meeting or exceeding all key performance indicator measures, implementation did not happen without hurdles that the organization needed to overcome. Issues mentioned by the Citizens staff and other interview recipients fell broadly into the categories of principal-agent relationship, local government difficulties, materials availability, and issues with other providers.

Principal-agent relationships. While the federal program officers spoke highly of Citizens as an organization and the project implementation, the officers and Citizens staff, among others, did mention several issues related to the interactions with or regulations of BTOP officers either specifically for the Citizens project or for projects in general. These issues included the grant's reimbursement-only status, grant reporting, and the environmental assessment process.

Reimbursement-only grant payments. A frustration that Citizens staff expressed during their interview was that grant fund disbursement happened on a reimbursement-only basis. The Special Award Condition for "Reimbursement-only Policy for Award Payments" applied to Citizen's grant stated,

> Due to the lack of sufficient credit history of your organization through the credit reporting agency Dun & Bradstreet (D&B), you will not be permitted to draw down funds through the Department of Treasury's Automated Standard Application for Payment (ASAP) system until authorized. You must submit a request to seek advancements or reimbursement for payment. After the initial request, all subsequent requests must cover expenses incurred. The recipient may submit a request at most monthly, or at least quarterly. (NTIA, Special Award Conditions, p. 6)

This status at grant onset was unusual among BTOP projects for projects from established providers. The status was typically a sanction issued against projects that displayed deficient fiduciary responsibility and/or poor accounting practices. When asked about this discrepancy between Citizens and other projects, Barbara Brown from the NTIA was initially puzzled but felt that Citizens' lack of prior federal grant experience may have been the initial rationale for the restriction (Brown, p.c., 2015).

The reimbursement-only status was extremely frustrating for Citizens staff as the practical implication of this SAC was that vendors and contractors needed to both deliver goods or contracted services and issue invoices to Citizens for those goods and services and then Citizens paid all expenses before applying for fund reimbursement from BTOP. Baseline grant expenditures were $4.8 million for Year 1, $4.3 million for Year 2, and $1.4 million for Year 3. Unexpectedly being required to fund these expenditures up front put a great deal of strain on an organization with pre-grant operating revenues of only $5.6 million annually (Citizens 2009 Income Statement). Chris Bond described the situation it put Citizens in, "We had to pay out a lot of money at one time, close to $1 million. And then you do a draw down and it was supposed to be there the next day and it is 2 or 3 days. After about a week, you have to call somebody. You know, a million dollars for us hurts for reimbursement. That happened to us several times. It got to be frustrating" (Bond, p.c., 2014). Kevin Byrd from the Planning District Commission and the Wireless Authority reflected from the perspective of a project partner how Citizens handled the financial strain,

> I know that there were times where…you could tell that they were getting nervous because they had to—I can't remember the line of credit, but you can tell that their financial capacity was being stretched. Not to the point that it was unduly stressed for

them… They continued to move. It was more like an honest project management discussion of, "We're hoping the Feds will reimburse us soon because we've got a lot of money out there." (Byrd, p.c., 2014)

Environmental assessment process. The environmental assessment special award condition that the NTIA applied to 62 of the 67 projects, including NRV-ROAN, prohibited any construction activities or other expenditures related to the construction of the network prior to the completion of an extensive environmental assessment of the proposed network path. The EA process associated with BTOP was considered more complicated than most other assessments for similar types of projects. As the executive director of the planning district commission that often produced environmental assessments for these types of projects, Kevin Byrd shared, k'

> We do a lot of those for projects, whether it's water and sewer or whatever it may be, we do a lot of them. This one was tough; we see it a lot of times where there's not necessarily an appreciation for the area in which you're going in. For example, if you're going into a right of way, it's already disturbed. … [The EA process] did cost a lot of time, and I don't know if it, the Federal investment, was really worthwhile to put that much time and energy into that. I could see the environmental assessments in places that had never been disturbed before, but particularly when you're in a right of way, it seems like they should lessen that environmental protocol. (Byrd, p.c., 2014).

The NTIA put out a 13-page guidance document that spelled out the format and requirements of the EA, including which pieces of legislation and administrative offices needed to be specifically addressed and contacted, respectively. Offices included State Historical Preservation Offices (SHPO), Tribal Historical Preservation Offices, US Fish and Wildlife Service, Environmental Protection Agency, the Army Corps of Engineers, Department of Natural

Resources, Department of Environmental Quality, and the National Oceanic and Atmospheric Administration, among others. In particular, formal consultations with the Fish and Wildlife Service and the SHPOs had to be completed with the agencies' conclusions included in the submitted document (NTIA, August 2010, p. 6). The submitted assessment needed to cover and be approved for the entire project route, so projects could not begin construction on one portion of the network while other portions were still being assessed.

Upon submission of the Environmental Assessment to the NTIA, the NTIA staff would review the EA and issue Findings of No Significant Impact (FONSI). The FONSI would release the project to begin construction. It could also put into place a new environmental special award condition that would require additional actions to mitigate the environmental effects of network construction, such as time of year restrictions for the federal Migratory Bird Treaty Act or the requirement for an on-site archeologist in case any items of historical or cultural significance were unearthed.

Securing the Finding of No Significant Impact (FONSI) took up valuable time out of the overall grant period for many projects. The initial environmental assessment in the case of the Citizens project took 11 months with additional environmental delays later on in implementation surrounding a route modification. Steve Jones, Director of Technology for the Town of Blacksburg, observed the Citizens staff during project implementation and the environmental assessment process, and had the following insights to share,

> The one thing I do remember hearing them say, over and over again, how complicated—and this is an opportunity [that] I hope you get in your report—where the Federal Government can help these broadband projects cross waterways: creeks, and ponds, and

> wetlands. The oversight on that is almost over the top. And for a small company like Citizens, it's almost unmanageable. (Jones, personal communication, 2014)

Scott Woods, the NTIA federal program officer, also shared his thoughts on Citizens' environmental assessment process as the project's largest challenge,

> That was the biggest inhibitor of success for that team. They had a very good management team. They had a very good field staff and project team. They just needed approval to be able to go and do what they knew how to do, which is build a network. The longer the environmental assessment took the more it impacted them in terms of their build-out time to be able to do it. Looking back, that was the biggest sort of inhibitor to their success. (Woods, p.c., 2014).

Several other interview participants, including Citizens staff and project partners, repeated this sentiment.

NTIA officials acknowledged that across the board, BTOP projects' environmental assessment process was flawed and had cascading effects. Scott Woods reflected, "We underestimated both the program [and the recipients] how long that environmental assessment approval would take. So where recipients would normally have a three-year window in some cases that was condensed to two years or some even less than two years once the environmental approval was received" (S. Woods, p.c., 2014). Regarding the extensive environmental assessment process, Barbara Brown noted across the program that "many times people sign up to do their project not understanding the full hurdle there. And even the location and involvement of tribal lands, or of other historic properties, or other environmental hazards or issues. It really was something that became a roadblock to a lot of our early successes" (Brown, p.c., 2015).

Grant reporting. The combination of the reimbursement-only status of the grant and the environmental assessment restrictions had cascading effects from an administrative standpoint. As mentioned, the projects that were restricted from much of the use of grant funds prior to receiving FONSI approval were still expected to reach the 2/3 completion mark by the end of Year 2. Performance metrics evaluated grant progress based on the percentage of the overall grant award funding drawn down for identified activity categories as opposed to the actual completion of project activities. For Citizens, the combination of its reimbursement-only status and an 11-month delay on the environmental assessment approval meant they had only 13 months remaining to put out requests for proposals (RFPs), evaluate and hire subcontractors, order and receive materials, complete enough construction, and receive and pay invoices from vendors and contractors for goods and services rendered totaling $7.75 million in order to avoid negative administrative consequences. As a company with annual pre-grant operating revenues of $5.67 million in 2009, $7.75 million was an extremely large amount of money that they would have needed to pay in a very short period for a cooperative the size of Citizens.

Beyond stretching Citizens' financial capacity, their reimbursement-only status had cascading effects on the overall grants management process that led to increased administrative demands on both Citizens and the federal grants administrators (Reece, p.c., 2014). Grant recipients that failed to successfully meet the 2/3 completion requirement were subject to a Performance Improvement Plan (PIP) and additional administrative oversight that consumed resources both at the federal level and of the recipients. Recipients were subjected to similarly increased oversight if they were found to be out of alignment with their baseline projections. For most projects, baseline projections were submitted for when a percentage of activities would be completed, not a percentage of grant funding drawn down from ASAP. The NTIA's preference for tracking by dollars expended as an indicator of project progress was unknown to grant recipients, including Citizens, when the initial baseline progress estimates were submitted at the start of the grant. Newly revised baseline progress plans were submitted, but the discrepancy makes it difficult in a number of other cases to determine if projects were still performing to the ends but with a change of success measurement versus projects that experienced actual substantive changes to the project parameters over the life of the grant project. From a researcher perspective, this created issues in the interpretation of the Outputs Success score. For projects, failure to both meet baseline projections and the 2/3 substantive completion requirement led to more significant ramifications in terms of increased administrative oversight.

Citizens and other organizations in a similar situation of a delayed start due to FONSI issuance, lower than expected project costs, and a reimbursement-only status at onset were subjected to heightened administrative scrutiny with additional phone calls, site visits, and biweekly progress tracking alongside projects experiencing actual problems and would fail to meet their projected KPIs. This was because the projects like NRV-ROAN retained the appearance of insufficient progress due to the built-in timeline gaps between when activities took place and the funding drawdown. Grant funding drawdowns often happened up to six months after activities were completed, which made it difficult for Citizens and other projects in similar circumstances to be able to demonstrate substantial project progress that would allow them to request a change of award status. Citizens staff expressed frustration at the increased administrative costs in terms of both money and time at a time in the project in which they needed to apply maximum effort to on-time completion,

> When we hit the 2-year mark, we did have to go through and submit a Performance Improvement Plan due to that very fact [of reimbursement-only status]. We hit the mark

as far as construction being met. We were 2/3 done at that point. We were over 2/3 done, completed in the construction phase. But we were only probably 50% of that on the reimbursement part if that. So we, even though we had met the construction goal, had to go through and submit a PIP and when we asked about it, they told us that other companies had spent 2/3 of the money and if it was the reverse situation and they had only done 50% of the work, they would not have had to go through that. It did not make sense to us at all. (Reece, p.c., 2014).

The frustration increased further because there were alternative metrics available on the progress reports that would have more accurately reflected project progress by reporting plant built out through network miles, wireless towers, points of presence, etc. that, from Citizens' perspective, "really should have been the project progress because that's what the project was…the build out. Not the dollars spent" (Bond, p.c., 2014).

When the federal program officers were questioned about the disconnect and linkage of progress to funds expended, Barbara Brown shared,

> The reason that it was linked to the funding is because it's hard to make universal assumptions across such a wide range of infrastructure projects. So that was a tangible way of measuring if sufficient progress had been made… It was just a way of providing high-level oversight. When you get down into the granularity of how each project is doing…it's up to the project manager to determine if they're really on target or not. There had to be some universal rules…That might not be the answer you want but it's—there has to be a way to roll it up, right? That's why we tied it to numbers. (Brown, p.c., 2015).

Brown (p.c. 2015) also noted the issues that came along with many of the other measurement strategies used across grants for progress, such as inconsistent measurements of community anchor institutions "served." The reporting by recipients for this measure varied from a CAI being "served" if a fiber line was within 2 miles of the location to a CAI only being "served" if they actively purchased service on the network. Over the course of the grant period, the NTIA imposed changes to attempt to standardize the assessment criteria for these types of measurements. While the revised measurements helped to align and compare projects from across the program, it had drawbacks in being able to track progress over time or compare against the original baseline projections.

Scott Woods also noted that the program office was aware that the performance progress reports were insufficient for tracking real project progress. They worked around this issue by creating "a much stricter schedule and reporting mechanism to actually track progress" using Performance Improvement Plans with revised baseline progress milestones and additional attention given to the details of the project. PIPs were required of projects that were not meeting their stated progress milestones in the first year of the grant and/or did not meet the 2/3 substantial completion requirement. The so-called PIPs included "a separate almost really true mitigation report or detailed progress report [with] some of these goals, objectives, and progress that didn't necessarily translate or could be captured into the quarterly reported progress. We couldn't capture that accurately on those reports" (Woods, p.c., 2014).

Local governments. Looking external to the principal-agent relationship, interactions with local governments also had the potential to influence the implementation of NRV-ROAN negatively. While partnerships with local governments and the effects of regionalism were cited as positive influences on project implementation success in the previous section, not all interactions with partners and other localities went smoothly. Securing project buy-in and construction permits from non-Authority localities and difficulties with partner follow through on financial commitments were some of the issues Citizens encountered during project implementation.

Non-authority localities. NRV-ROAN was designed to provide open-access fiber connections to every eligible and accessible community anchor institution in the New River Valley, including local government offices and public K-12 schools. However, with the tight grant proposal turnaround time, convincing the localities to buy into the project by becoming part of the Wireless Authority or otherwise contributing to the upfront capital costs was difficult. Officials in Radford City and Montgomery County did not fully understand the concept of a middle-mile fiber network or the return on investment from an upfront capital contribution in to get speeds up to 1,000 times faster in their school systems for a lower monthly cost than they were currently paying. The City of Radford did join the Wireless Authority in 2012 with an $11,137 contribution to the project cost in return for discounted service pricing. The issues of a tight timeframe and lack of full understanding for what the project would do in Montgomery County were exacerbated by the need to onboard a new county administrator, Craig Meadows, who had started in October 2009 and did not have the necessary background knowledge to be an advocate for county participation, and the unexpected capital costs of a new Blacksburg High School. The high school's gym roof had collapsed from structural deficiencies strained by significant snow accumulation the month prior to the Citizens grant proposal deadline. Finding the $600,000 Citizens asked as a match for a project that County officials did not fully understand was not a priority for the County at the time (Jones, p.c., 2014). However, the project ultimately has connected the local schools and other government buildings outside of Blacksburg town limits in the County, but the monthly charges for the service are significantly higher than in neighboring Pulaski County that contributed to the initial match amount as an early adopter.

In addition to securing matching funds, an additional obstacle mentioned by Citizens was the issue of local government permitting in its construction through the Town of Blacksburg. A blanket policy for underground utility permitting that did not take into account differences between types of construction led to daily permit requirements, which included strict restrictions that allowed construction for an identified 250-foot section of the route per day. Each permit also had a separate application with associated application fees (Sapp, p.c., 2014). This stood in sharp contrast to their agreement with Virginia Department of Transportation (VDOT), which issued a single overarching permit for the entire route and construction period in return for 2 strands of fiber along the entire route and 12 strands along the more valuable interstate right of way (M. Lance, personal communication, 2015). While VDOT imposed restrictions on acceptable hours for construction and traffic management, daily length or location restrictions were not part of the arrangement.

Steve Jones, Blacksburg's Director of Technology, shared the following insights on the rationale behind Blacksburg's construction permitting process at the time of Citizens' project implementation after Dennis Reece from Citizens sat down with Town staff:

> How [Blacksburg's permitting process] got there are several things, and it goes back years, but part of it is—I guess it worked zealously to protect our right-of-way, which we probably should. And maybe we were a little over the top on it sometimes. So, that's one aspect. The second aspect is you have a department that has been dinged on customer service for being "business friendly." And they don't get, in the sense, that they see their job as enforcement and protection, as opposed to partnering. Because there

could be a little more give and take, and that is what Dennis' input gave us. (Jones, p.c., 2014)

Citizens used its interorganizational connections to have lasting change in removing identified obstacles for future projects. After the project was completed, Reece met with Jones and other Town staff to discuss how to update Town policies and procedures appropriately to have interactions that are more mutually beneficial in the future. Citizens' recommendations in these meetings largely fit within the best practices for planning processes as they relate to broadband infrastructure projects: work at all levels of administration within a local government to not only enact new policies that rectify prior issues but also convey the importance of projects and proper use of policies particularly at the front-level bureaucrat. Reece's suggestions also led to the creation of a "Policy Considerations for Telecommunications Deployment" document by Virginia's Center for Innovative Technology (2012) that was shared with localities around the state interested in how to improve broadband deployment in their areas.

Dangers of transparency and partner's financial commitment. The Broadband Technology Opportunities Program was lauded along with other Recovery Act programs as having unprecedented levels of transparency. However, a side effect of this transparency was that the inner workings of projects and their plans were not just available to the citizen-funders and researchers, but also to grant recipients' competitors. They were alerted to the identified paths and community anchor institutions that would be required for successful project completion and knew that they had a year or more after the announcement to secure arrangements while BTOP projects were stuck in the environmental assessment process. Competitors could then poach institutions and lock them into long-term contracts using their existing but inferior networks. Even when they lost money on the contract, the existing networks would not have capital expenditures to pay off and would be able to starve out any new entrant to the market from getting the needed customers or rates to be able to recoup their capital costs and pay off any debts.

Those were among the tactics Verizon used against the Citizens project for the public school systems of Giles, Montgomery, and Pulaski Counties. Montgomery and Pulaski Counties resisted any deals Verizon tried to offer to extend their current contracts at favorable rates. However, Giles County proved to be an unexpected obstacle. The circumstance as described by various parties was that Verizon was able to lock the Giles County Public School System into a seven-year contract for more expensive service at one-tenth the speed (100 Mbps versus 1 Gbps). The county's board of supervisors had voted to prioritize broadband deployment in the county by putting forward roughly $200,000 as their matching portion of the Citizens project with the understanding that this early buy-in would help to secure below-market rates after the network was operational. However, there was a breakdown in goal communication between the board of supervisors and the school system's director of technology. The school system's director of technology diverged from the path and priorities set by the county board of supervisors by signing the contract. The individual was quoted as saying "Well, I'll be retired when we have to worry about that again" (Reece, p.c., 2014).

As a result, Giles officials questioned what benefit remained for the county to invest a significant amount of money into the project. Reece (p.c., 2014) reflected, "At one point Giles County was threatening to pull out of the project altogether and not put up the matching funds they had committed. We intentionally held off doing anything in Giles County until the very end, until we reconfirmed their commitment to the wireless authority." The situation was ultimately resolved with Giles honoring their financial commitment to the project, and Citizens connected and provided services to other community anchor institutions in Giles County, including the local government administration building and the local hospital. The fiber connection was still built to at least the high school to have future service options once the school system was out of contract.

Additional interference from other providers. In addition to causing project issues regarding planned community anchor institutions agreements, grant recipients experienced other sources of project delays due to other utility providers. Scott Woods shared,

> I don't know if you know, but during the initial period of the projects, we had a number of different—let's call them for what they are—AT&T and Verizon were totally against [BTOP]. They waged a legislative campaign to reduce the ownership and reach of these networks. Again, it just depends on how these projects are entrenched in those service areas… We saw a direct correlation between those projects that hypothetically could compete directly against incumbent service areas had a lot more difficulty and faced a lot more opposition and scrutiny with their local elected officials and local business leaders and even members of the community. Versus some other places where there were not and then there was not that direct competition. (Woods, p.c., 2014)

AT&T, Verizon, and other incumbent internet service providers lobbied state legislatures and regulatory bodies to make the process more difficult for the public or nonprofit providers to implement their projects successfully. During the conversation with Citizens staff, I asked them to identify any service providers that particularly helped or hindered their project completion. Their response was an across the board declaration of "Verizon was a hindrance. All together now! [Laughter] Verizon was a hindrance" (Citizens staff, p.c., 2014).

On a local level, obstructive efforts by Verizon and other utility providers would be more concrete. Network build-out was often reliant on other, existing utility providers to "make ready" their existing infrastructure for the addition of new lines. This included marking buried lines to prevent line cuts, but more often, these delays had to do with aerial construction. There are strict safety guidelines on how far electricity lines have to be from other lines strung on poles, and construction crews were not allowed to move existing lines without permission from line owners. Regulations surrounding this work stated that companies needed to have 45 days to give initial approval and an additional 180 days to complete the necessary work (Janney, p.c., 2014).

The Citizens project encountered a number of make ready delays beyond the standard period of make-ready processes during construction. The project also experienced make-ready delays through interactions with American Electric Power (AEP). Some of these delays lasted for more than a year and were not resolved until the final six weeks of the project (Citizens, Q32013 PPR). One pole in need of make-ready work that included pole replacement in the small community of Riner, Virginia was able to hold up a 20-mile segment of the project from being completed for over a year.

Reece noted that the delays were all for aerial portions of the project and the places where they "didn't have any aerial issues [were] the city of Radford, Blacksburg, and the city of Salem. Dealing with Tech Electric and Salem Electric and dealing with the Radford Electric—all that went smoothly. It was when we were dealing with Verizon and AEP, and other pole owners besides the municipalities" (Reece, p.c., 2014). For delays on make-ready work by both Verizon and AEP, however, delays were not attributed to local workers or decision-making. Instead, Reece noted,

> A lot of that seemed to be because they consolidated the make-ready back to Charleston, West Virginia, so I think everything in the state goes there now. They cover multiple states. And we even tried to work with the local people from AEP and Verizon. From what Charles [Huff] and Russell [Janney] had told me, local people from both those companies were ready and willing to do the work, but they didn't have permission to proceed. (Reece, p.c., 2014)

Janney confirmed this account. This could indicate that a possible reason for the delays with AEP and Verizon while there was cooperation on the part of Salem, Radford, and Virginia Tech Electric could be less due to the sectoral affiliation of the company (investor-owned versus municipal/public) and more to do with the locus of organizational control and breadth of the organization's scope.

To resolve the excessive delays in this process, Citizens had to threaten Verizon with legal and regulatory action up to and including complaints against them with the FCC in order for them to finally complete the work after the corporation took 180 days just to give initial approval and then even longer to complete the actual work (Reece, p.c., 2014). In the meantime, Verizon was able to use this additional delay to target preemptively the project's identified anchor institutions and lock them into contracts, as discussed in the previous section (Sapp, p.c., 2014). For AEP, Citizens was eventually able to gain their cooperation for some portions of the project and permission for Citizens to conduct the make-ready work themselves for additional segments in Giles County. The last of the make-ready work with Verizon and AEP was completed on June 15, 2013 with construction and testing of the remaining sections completed by July 17, 2013. The project grant period ended on July 31, 2013.

If Citizens had been a less professionally connected, respected, or experienced organization, these delays would have likely been unresolved by the grant award's end date. The result likely would have been a less successful project that would have canceled the segments in question, needed to bring in outside experts that would have further increased the cost and time to completion for the project, or otherwise experienced schedule delays due to being less efficient at handling these types of projects.

What to Change? Opportunities for Improvement

Insights related to desired improvements covered both improvements in the design of the NRV-ROAN project itself and changes to the overall program structure. Many of these opportunities can be viewed as direct reflections on ways to improve on items covered in the "What Could Have Gone Better?" section. Within the NRV-ROAN project, opportunities included better communication of network benefits with prospective partners and a better understanding of the federal grant process. Many of these insights come from conversations with the federal program officers and reflect on improvements to the program as a whole including the environmental assessment process, allocation of excess grant dollars, and providing technical assistance to new utility providers.

Citizens had to design and turn around a viable grant proposal within six weeks of the denial of the first Wireless Authority BTOP grant proposal. This timetable left little time to educate and communicate effectively with officials in Montgomery County and elsewhere on what the project would and would not be and the anticipated benefits of the project for the prospective partner(s). Concurrent with that difficulty was a lack of time to plan the network design properly. Without having confirmed buy-in from prospective partners, Citizens needed to design a route that could be sustainable without the support of uncommitted partners. It was beneficial for Citizens to have a portion of the network route planned out based on the Wireless Authority's failed grant proposal as a starting point and the involvement of the planning district commission for a preliminary environmental assessment of the route to identify potential issues (Byrd, p.c., 2014). Even with the head start provided by that mapping, Citizens was still under a tight turnaround to create a viable project proposal in the time allowed, and more time could have led to a better product.

One of the suggestions from the NTIA federal program officers tied concerns regarding grant proposal time restrictions to the difficulties many projects experienced with the environmental assessment process. Brown (p.c., 2015) and Woods (p.c., 2014) both indicated a desire to have a different environmental assessment process in any future iteration of BTOP. He explained

> We probably would have done [environmental assessments] differently. I think we would have built more time into the overall time frame to accommodate the review and approval process of the environmental assessment. That's number one. Number two, I don't know if there's a number two. Most of them that had issues were negatively impacted by the length of the environmental assessment. Quite frankly, that's something that we did not, as a program, take into account. We were not advised properly of how long the process would take. (Woods, p.c., 2014)

As an alternative, he suggested that the EA process should be integrated into later stages of the initial grant application process and not be counted against the overall grant period. With this approach, organizations would have gone in with their eyes opened to the natural and cultural preservation challenges they may encounter during implementation and BTOP would have had the option not to award funds to projects that proved to be environmentally unfeasible.

Citizens staff also reflected on the unexpected administrative costs associated with a federal grant,

> We should have planned for the administrative costs of administering the grant. We did not take that account into our budgeting and never recouped any of that expense. We absorbed that, and it was really our first federal grant. It was a new experience for us so we didn't build that in there, and that was a pretty significant expense at the end of the day. [It was] very time consuming dealing with all the reporting and routine phone calls. (Reece, p.c., 2014)

On a related note, the NTIA's Barbara Brown expressed her desires that budgetary allocations had been more flexible both within and across projects. Brown observed,

> With respect to Citizens specifically, they actually could have done more if we've been able to give them more money and the way the grants were structured [was different]. They were allocated to each grantee and if the grantee couldn't use the money, it had to go back into the Treasury… It would have been nice to see that as some funds were either unused because you saved money or if you needed slightly more to reach the same purpose for a fully justifiable reason like environmental went over budget, [we would] have been able to recirculate those funds within the grant program, following a high bar of justification. Then Citizens, who could have probably done more, would have been able to say, "Hey, we still have the capacity within the grant period to hook up more stakeholders." So, that would have been helpful, I guess, it's just—that's not how the grant was written. So, that was too bad. (Brown, p.c., 2015)

There were a few large-scale project proposals in the program that were awarded but never implemented due to a variety of socio-political issues, such as state governors or legislatures opposed to publicly fund broadband projects or any projects related to the Recovery Act. These would have been readily available funds already earmarked for the program, but the authorizing legislation required that funds ultimately be returned to the U.S. Treasury rather than reallocated within BTOP for its projects.

Barbara Brown's proposed approach would be a form of capacity building for projects in the sense of increasing their financial capacity to act. Regarding capacity, Scott Woods went further with his suggestion. He would have liked to have seen additional organizational technical assistance provided for grant recipients who were not existing telecommunications providers "not just from a construction standpoint, but how do you manage contractors, how do you manage community expectations and outreach, and then how do you deal with your external stakeholders, particularly in the business and political community?" (Woods, p.c., 2014). He noted that in addition to providing assistance for the actual network deployment portions, Woods would have liked to see additional technical assistance provided to help grant recipients that were new, or at least new to telecommunications service provision at this level, learn how to be effective service providers that can be sustainable (Woods, p.c., 2014). He noted that existing telecommunications service providers with successful BTOP grant projects were the most likely to be sustainable after grant funds ended compared to new organizations or other grant recipients without existing utility service experience. "Once we cut the BTOP chord, the money is gone, they're fine" (Woods, p.c., 2014).

> Looking back on it, I would love to give [the new-to-utilities grant recipients] more technical assistance on the front end to start thinking about how to operate as a telecom. What you need to think about two years before the proverbial umbilical cord is cut and the funds are gone. You need to start thinking about your market, your customers, how

you're going to service them, how you're going to expand. What businesses you want to capture? What partnership opportunities do you want to start laying ground support for?

This kind of comprehensive technical assistance more closely resembles the technical assistance that the Rural Utilities Service and the Rural Electrification Administration before it offered to cooperatives. The RUS/REA understood that these organizations needed additional assistance and support precisely because they do not have the existing expertise and connections in-house to manage the complexity of these types of endeavors.

Early Project Results

As mentioned in Sabatier (1991), the full outcomes of a policy or program may not become apparent for 10 years or more after implementation is completed. However, a preliminary interpretation of early results of the Citizens Telephone Cooperative's New River Valley Regional Open-Access Network (NRV-ROAN) project is possible that goes beyond the number of miles constructed for the project. At its core, the project set out to construct 186 miles of a fiber-optic network. Scott Woods (p.c., 2014) noted that the second BTOP purpose was to connect community anchor institutions with new or improved service. As of the 2013 annual report, NRV-ROAN had connected 57 community anchor institutions with improved service. Service improvements ranged from a 290% increase to a 9900% increase. Seventeen of these institutions had increased their 1.5 Mbps connections to symmetrical 1 Gbps (1,000 Mbps) connections. Other institutions increased their 10 Mbps, 45 Mbps, or 100 Mbps connections to symmetrical 1 Gbps connections with the new fiber connections (Citizens, 2013 APR).

Several interview participants described the benefits their institutions had gained from the use of the network, including President Jack Lewis from New River Community College and its Vice President for Finance and Technology, John Van Hemert. They noted that before the

Citizens project, they were paying $1,500 a month for two T-1 lines that were only 1.5 Mbps each for a 3 Mbps connection. With the new network, they are paying $1,000 a month for a gigabit connection. While spending 33 percent less in service charges, they received speeds 33,233% faster than their previous connection. When asked why New River Community College submitted a letter of support for the project, President Lewis noted, “Obviously we needed it badly. We championed a project that would connect all the community local governments and education communities together, and so they delivered and so my hat’s off to them. It should have been in place years ago” (Lewis, p.c., 2014). Because of the network, the community college is able to have high-quality connections with the local K-12 schools to improve its educational offerings to that population. Reflecting on the new network, Van Hemert (p.c., 2014) further remarked, “It’s one of those things that, it’s hard to even put the value on because it’s just truly that valuable. But once it’s there… it’s like it’s in the background. You don’t think about it, and it’s easy to take for granted. But we were frustrated for a lot of years trying to work around [bandwidth limitations].”

Tim Barnes with Pulaski County had similar glowing comments about the improved services at lower rates using the new network and its effects on education in Pulaski County:

> In the past, [the public schools] had a 38-megabyte pipe and then we were paying twice as much as we are now. Now we have 1,000 mb running between the IT department and all of the schools, except for one. We have a 10,000-megabyte interloop within the town of Pulaski—this area—and we can go up to 1,000 megabytes out to the internet.
>
> And…we cut our cost by half of what we were paying before. (Barnes, p.c., 2014)

Barnes (p.c., 2014) also commented on the network’s effects on economic growth and development in the Town and Pulaski County, “In the past, a T-1 line, which is like 1.5

megabytes [was the maximum available]. For most companies, that is not going to cut it… It's hard to monetize it this time, but intellectually, everybody understands you need [faster speeds available] to attract business." The NRV-ROAN project has helped to promote regional economic development by providing connectivity to the region's existing industrial and business parks as well as providing the infrastructure for new commerce and innovation parks in Montgomery County and Floyd County.

For Citizens Telephone Cooperative, getting the network in place was also just step one of several plans. First, the interconnection with the Virginia Tech Foundation/Mid-Atlantic Broadband Cooperative resulted in a dark fiber swap agreement that gave Citizens Cablevision, the cooperative's wholly-owned subsidiary, access to the cable television system it purchased in the small town of New Castle, Virginia (Crowder, p.c., 2014). This has enabled it to provide cable television and cable internet service in the town. Second, the network has enabled it to expand and diversify its revenue base by securing major institutional users that include New River Community College and Virginia Tech and generating revenue through data transport services as part of Lit Networks. Third, the more robust network has given Citizens the network capacity and diversity to support significant last-mile network improvements in downtown Floyd, Virginia for their core service area members. All combined, these improvements have helped Citizens become a strong regional internet service provider with the network capacity to meet the region's educational and economic development needs at the community, institutional, and individual levels.

Chapter Summary

This chapter provided a qualitative postmortem analysis of Citizens Telephone Cooperative's New River Valley Regional Open-Access Network (NRV-ROAN) BTOP project.

A postmortem analysis seeks answers to the questions of “What went well?” “What could have gone better?” and “What should be changed in the future?” The project was selected because it finished on time, under budget, and completed more miles than initial projected. The chapter began with an overview of the technical details of the project and a history and overview of the implementing organization, Citizens Telephone Cooperative. Strengths associated with NRV-ROAN’s implementation included Citizens’ technical expertise and experience, organizational leadership, and its interorganizational relationships. Areas for improvement for the principal-agent relationship included the grant’s reimbursement-only funding status, the environmental assessment process, and how grant reporting measured success. Additional areas for improvement were communications with project partners and other potential end users, local government permitting processes, and interactions with other utility providers that extended to make-ready processes.

From the analysis of strengths and areas for improvement, the postmortem analysis shifted the focus to explicitly identifying opportunities for improvement. The focuses on the environmental assessment process and on improved communication of values with potential partners continue the conversation that began in the areas for improvement section. The conversation extends to include federal program officers’ reflections on ways to improve future iterations of the Broadband Technology Opportunities Program or similar programs. These improvements focused on increased discretion, flexibility in allocating available funds after the initial awards had been made, and how to increase the availability and attractiveness of technical assistance for new projects led by new organizations or as new activities for an existing organization.

The chapter concluded with an overview of early project results observed and reported regarding the Citizens Telephone Cooperative project. Outcomes included drastically increased broadband speeds and capacity for institutions across the region and improved economic development. The project also improved the organizational and network capacity of Citizens to expand into additional markets and to improve service offerings in its incumbent local exchange carrier (ILEC) area of Floyd County, Virginia.

The next chapter will conclude this study with a discussion that integrates the findings from the quantitative analysis covered in Chapter 4 and the project postmortem analysis conducted here in Chapter 5.

Chapter 6: Integrated Discussion and Conclusion

This chapter interprets and integrates the quantitative results first presented in Chapter 4 and the qualitative findings of the project postmortem analysis in Chapter 5 to conclude the study. The initial focus is on the study's measurement of project implementation success and on the overall suitability and utility of the POPIL framework for understanding factors that influence project implementation success. The discussion then turns to the framework's implications for practitioners and those enmeshed in the policy implementation, public administration, and project management disciplines. The chapter concludes by reiterating the study's limitations and by pointing to future directions for research that may resolve many of these limitations and give a more complete understanding of which factors influence project implementation success.

Chapter 2 presented an understanding of project implementation success as a narrower interpretation of project success and situated the concept in the broader but disparate scholarship on policy implementation and project management. I then introduced a conceptual framework, POPIL, to identify and organize factors that could influence project implementation success. The framework, incorporating Project-specific, Organization-focused, Physical Environment, Interorganizational Relationships, and Legal Environment factors, describes the categories of factors hypothesized to play a role in project implementation success. The categories draw heavily from the public administration, public policy, and management literatures to give a firm theoretical foundation for the framework. Padalkar and Gopinath (2016) noted in their review of the project management literature that numerous studies have criticized the lack of firm theoretic foundations in that body of literature. Integrating the outside disciplines of policy implementation, public administration, and public/non-profit management gave added theoretical grounding for the identification and understanding of factors as influencing project management and overall project implementation success.

Chapter 3 presented the operationalization of the POPIL framework and project implementation success to explore projects implemented as part of the Broadband Technology Opportunities Program. The chapter includes an articulation of the research questions and research hypotheses and aligns Chapter 2's conceptual hypotheses with each area of research focus. I also detailed the methods for exploring these hypothesized factor-indicator relationships, including an ordinary least squares regression analysis and a qualitative project postmortem.

Chapter 4 quantitatively evaluated the significance of the hypothesized factor-indicator relationships. The study first explored the influence of factor presence and factor persistence during the grant period on the identified key performance indicator measures. Ordinary least squares (OLS) regression analyses tested the hypothesized influence of factor interactions on the key performance indicator index scores. The initial regression models based on the research hypotheses had low predictive abilities. However, additional iterations of the models based on results from the study's initial statistical testing found statistically significant regression models for each indicator index score variable.

The initially hypothesized model created to predict whether projects completed on schedule was strongest while the model to predict whether projects would complete within their planned budget was statistically significant but had negligible predictive power. The model used to predict whether projects completed on schedule was strongest while the models for predicting outputs and overall project implementation success were significant but with lower predictive ability. The analysis found that the meta-factor of organizational capacity issue reports was the strongest factor in the three significant regression models.

Chapter 5's project postmortem analysis explored in depth the Citizens Telephone Cooperative's New River Valley Regional Open-Access Network (NRV-ROAN) project postmortem. The postmortem answers the questions of "What went well?" "What could have gone better?" and "What to change?" Through additional document analysis and interviews with individuals involved with the implementation of NRV-ROAN, the total project implementation success of NRV-ROAN was attributed to Citizens' strong organizational capacity. The project and organization encountered a variety of issues during implementation that were distinct to the project or systemic in the design of BTOP. However, the organization was resilient enough to use its capacity in terms of technical expertise, organizational leadership, and its cultivated interorganizational relationships to overcome obstacles that emerged, such as environmental regulatory barriers and interference by competitors. The chapter concluded with reflections on changes to either the project or the larger BTOP that would have improved opportunities for project implementation success or further strengthened those projects that were successful.

Project Implementation Success: Goal Prioritization and Tracking

A number of interesting insights regarding the effects of goal prioritization and goal tracking approaches emerged from the examination of practices in BTOP projects and the program. First, measuring and tracking project implementation success were inconsistent between grant recipients and the grant program. Second, there was insufficient administrative capacity in the federal grant program to provide properly detailed and nuanced administrative oversight in terms of caseloads for program officers (Office of the Inspector General, 2011). Finally, project managers at the grant recipient level appeared to make tradeoffs between the three key performance indicators in situations where the three forms of success (budget, schedule, and outputs) were not simultaneously achievable to create overall project implementation success. The reasoning behind these decisions, including how recipients perceived success for themselves and how recipients interpreted the NTIA's priorities for success, varied across projects.

As illuminated in the project postmortem analysis, there were fundamental disconnects between how grant recipients initially perceived project success and how the NTIA's guidelines measured project success and progress towards completion. Of the three indicator variables, the size of the built network and number of connected institutions would have the greatest influences on improved internet access and reduced digital divide in communities. Grant recipients used the outputs indicator as an ultimate success measure to track the activities that would directly lead to a completed network as their default measurements to evaluate progress towards the goal.

However, the Recovery Act was intended to be a large-scale stimulus program with the stated purpose to "Mak[e] supplemental appropriations for job preservation and creation, infrastructure investment, energy efficiency and science, assistance to the unemployed, and State and local fiscal stabilization, for the fiscal year ending September 30, 2009, and for other purposes" (Recovery Act, 2009, p. 1). As such, its purview and goals to measure were wider than those of the NTIA/BTOP were. The NTIA/BTOP's purview and goals were also broader still than the individual grant recipient's goals. The General Accountability Office, Office of the Inspector General, and quarterly reports to Congress evaluated BTOP, in part, based on how quickly and effectively it could distribute stimulus funds in support of furthering its goals for improved internet connectivity. The mandate given to the NTIA for BTOP appeared to cause it to treat expenditures in its grant recipients as their top performance indicator as well. The disconnection between grant recipients' and the NTIA's measures of progress reflects a difference in goal prioritization between the two groups. As the NTIA had control over whether 80% of a project's budget would be available to a grant recipient, they were in the position of power to have their perspective of money as *the* measure of progress become the measure for all projects.

Grant reporting and oversight. Leaving aside normative arguments of which indicator of success should be the highest priority, the NTIA's design of BTOP grant projects' performance progress reports (PPR) was not optimal for tracking expenditures as a measure of project progress. The report was structured to measure progress along the three key performance indicators of schedule through percent of activities completed in designated categories ("milestones"), outputs through number of network miles and other outside plant components, and then budget through amount of dollars expended per preset project budget categories (different from categories specified for "milestones"). The decision to evaluate both schedule and budget using dollars expended was made post-report creation, and the original PPR design was not modified. A 2011 BTOP implementation evaluation report by the Office of the Inspector General (OIG) noted, "The report format does not contain the level of detail necessary to identify ongoing or current issues that could negatively impact the grant award" (pp. 6-7). OIG at that point expressed concerns regarding funding match delays, environmental assessment delays, and delays surrounding partnerships and signed agreements that were not identified soon enough to prevent major problems with the long-term implementation trajectory of projects.

The somewhat unusual measurement of grant dollars expended to track activity progress to the exclusion of other tracking measures resulted in increased oversight for a number of on-track projects, as was described in the NRV-ROAN postmortem analysis. Scott Woods noted that a number of projects fell under this increased oversight as early as six months to a year into project implementation based on the perception of project progress measured by dollars expended (Woods, p.c., 2014). Oversight included weekly or biweekly conference calls with BTOP staff, submission of Performance Improvement Plans to demonstrate how projects would "get back on track," or escalating to include Corrective Action Plans that required significant modifications on the part of grant recipients or else they would risk project suspension.

Oversight became even stronger at the end of Year 2 based on the "substantial completion" requirement, which stated that projects must have completed (spent) 67% of their project by the end of Year 2 to demonstrate they would be able to complete the project by the end of Year 3. By tracking progress and success based on dollars expended to determine "substantial completion" at the end of Year 2, the measurement does not capture norms of construction projects in which contractors are paid once work is completed. Fifty-one (51) of the 67 projects, including NRV-ROAN, failed to reach the Year 2 substantial completion threshold of 67% as a result, and the NTIA subjected them to additional increased administrative oversight with Performance Improvement Plans and increased contact with federal program officers. Conversely, the practice did not flag as troubled other projects that spent funds too quickly relative to project activity completion and ultimately experienced cost overruns and/or a failure to meet output projections.

While the NTIA was expanding oversight and the load required for its program officers, OIG reports over the course of the program indicated inconsistent and insufficient project oversight by the NTIA and the public and private entities with which it contracted to handle grants administration. A partial cause of this issue may have been the initial lack of funding allocated to the NTIA to support post-award oversight. The Recovery Act only authorized oversight-focused funding through September 2010, which was the NTIA's deadline to have all grant money awarded. This left the NTIA with significant budgetary uncertainty and burden to fund oversight of grant projects during their three-year implementation. A continuing budget resolution that extended funding for three month further temporarily ameliorated the issue with subsequent funding secured for oversight continuing over the remainder of the grant award period. However, funding remained at a level that proved insufficient for detailed, comprehensive oversight, which may have been part of the logistical decision to track progress by dollars expended rather than a more nuanced approach to project progress.

A number of issues highlighted the NTIA's lack of organizational capacity to cope with the oversight burden created by treating so many projects as "at-risk" due to tracking dollars expended early in project implementation. The heightened administrative oversight required for projects that did not meet the standard would have caused additional strain on the NTIA's capabilities even if it had only affected one in three projects. Instead, three out of four projects would require this additional administrative oversight. However, the Office of the Inspector General's 2011 review of BTOP noted that there were significant gaps in the NTIA's desk review process and site visits were often delayed due to budgetary restrictions (2011, p. 13). The infrequency of site visits for projects meant that many potentially problematic project details could fall through the cracks and go unresolved until problems become severe or a site visit was finally conducted (Brown, p.c., 2015). Staffing reductions at the NTIA further exacerbated the issue and resulted in each federal program officer overseeing a large number of grant award projects (OIG, 2011, p. 2). Woods described the burden on each federal program officer as being responsible for five to 12 projects, or even up to a maximum of 15, at any one point. Booz Allen Hamilton contractors and a grants officer from the National Oceanic and Atmospheric

Administration supported each NTIA officer. The program officer would spend over 25 percent of his or her week conducting conference calls and administrative oversight for the projects (Woods, p.c., 2014).

With few site visits per project and many projects per officer, officers had to rely on information provided by the grant recipient to determine whether the project was proceeding as anticipated. As Scott Woods noted, NTIA officials did devise alternative tracking measures that they used privately for those projects that had a heightened level of oversight, and these measures were purported to track project implementation success more accurately (p.c., 2014). However, with reduced capacity, the PPR reports, changes to Special Award Conditions, grant extension requests, and any official Corrective Action Plans and Letters of Suspension/Termination comprised the only data available for the public to track project progress.

Recipients' priorities. The NTIA designed BTOP project evaluation reports according to the "iron triangle" of project implementation success: budget, schedule, and outputs. However, as noted in Chapter 4, the selected dependent variables of number of quarters to grant completion, final expenditures relative to planned expenditures, and final outputs relative to planned outputs did not correlate with one another even weakly. The lack of correlation between dependent variables indicated that the problem with quantitatively modeling factor-indicator relationships was not with the way that the data were being captured or analyzed. Projects achieved success in at least one of the three measures in 91% of cases, but only 18% achieved success in all three areas.

Based on my analysis, prioritization of particular goals over others does not seem to align by sector or type of grant recipient in terms of cheap, fast, or good. The ideal choice is to have all three, and when the stars align, projects can achieve that goal. However, it is when the stars do *not* align that organizations must make choices regarding their priorities. Do they sacrifice quality in the name of money and time? Do they choose to invest additional resources so that they can complete a quality project in a timely manner? Alternatively, do they request extensions on their project's completion timetable to achieve their original construction goals with projected resources? Of course, as the number, severity, or duration of project problems increased, recipients needed to reevaluate their priorities.

Additionally, grant recipients' interpretation of the NTIA's priorities for their project completion process may have influenced some of their goal prioritization. Therefore, even if their personal or internal organizational preferences would be to commit additional time and resources to complete the project as planned, they may not have felt that it was a legitimate option available to them or one that they should be able to take within the projects' parameters. These parameters may have also included other administrative restrictions on time to completion or a lack of additional funding availability. The question then becomes "What is sacrificed from the project so that some part can succeed?" The County of Rockbridge's final progress report clearly answered this unspoken question, "Negative variance is due to the fact that we have submitted a couple route change requests that have reduced the total number of network miles then [sic] is shown in the baseline plan. The route change requests were … because with the added routes, we would not have been able to remain on budget" (Rockbridge 3Q2013 report). The Rockbridge project made the explicit decision to cut its network length by almost 50% in order to finish on time and avoid significant budgetary overruns. As the program was to have a set deadline of 3 years/36 months from start to finish, other grant recipients also may have made tradeoffs of success in one area at the cost of others. The structure of the grant program and the priorities conveyed from the NTIA to recipients appears to have predisposed grant recipients towards prioritizing staying within budget and on schedule.

The lack of successful predictive modeling of factor-budget relationships may have in part been a result of the project funding being from a one-time grant program in which the primary goal was to have the flow of dollars from government into the community happen as quickly as possible. The grant program prioritized grant expenditures over any other marker of implementation success, which meant that, where possible, there was no principal-induced incentive for projects to be more economical or methodical in their expenditures. In fact, as Citizens staff reported, there was an explicit disincentive to be careful about expenditures as slow expenditures resulted in increased oversight (Reece, p.c., 2014). Additionally, in order to have a negative budget score that would indicate cost overruns, organizations would need to have the financial capacity to put in more of their own dollars to cover the extra expenditures. In this study, the organizations that had this internal capacity were less likely to experience the types of issues that would lead to cost overruns in other projects. Instead, the findings show that "budget" issues manifested in the inability to produce the intended number of network miles and are illustrated better through the Outputs Success than the Budget Success.

Having explored the problems that resulted from measuring and prioritizing different indicators of project implementation success, I turn to an evaluation of the POPIL framework to determine its suitability for identifying the critical success factors that would influence these indicators in the next section.

Evaluation of the POPIL Framework

Overwhelmingly, the study found that organization-centric factors and interorganizational relationships were highly significant in the ability to predict whether projects would be completed on time. The framework gave less meaningful results for other measures of project implementation success. In both the quantitative analysis and the project postmortem analysis, organizational capacity emerged as the most significant factor influencing project implementation success, both negatively and positively. Organizational capacity can have cascading effects, either positive or negative, on organizations' abilities to implement successfully their projects by navigating obstacles that emerged during implementation. This section of the discussion explores the structure, applicability, and strength of the POPIL framework based on the quantitative analysis results and project postmortem analysis.

Use of framework to capture factors. With the exception of crosscutting factors that fell into more than one framework category, the POPIL framework was able to categorize all issues reported by grant recipients. Additional nuance in the operationalization of the framework to better identify the factors positively influencing project implementation success would have strengthened the predictive ability of the models, but would not have changed the categorization of factors. Compared to the TOE framework of technical, organizational, and environmental factors created by Bosch-Rekveldt, et al. (2011), the POPIL framework is much more granular to differentiate between factors in the physical environment, in interorganizational relationships, and in the legal environment. This granularity had trade-offs as there were more factors in the model that transcended a single category than in the Bosch-Rekveldt, et al. (2011) approach.

Cross-cutting factors. Very few factors fell solely within one category without any influence from other categories. Grant eligibility requirements determined project scale and the target population. Material delays were a result of relationships with vendors and contractors, who were in turn, affected on a global scale by the Japanese earthquake and tsunami that destroyed fiber optic cable manufacturing centers. The presence of a desert tortoise or burrowing owl in the physical environment led to construction restriction recommendations by federal environmental agencies that the NTIA imposed under threat of withheld funds. Grant recipients that did not properly monitor and report the adherence of their subcontractors to labor practices under the Davis-Bacon Act would face sanctions and delays the NTIA imposed. Deficient fiduciary responsibility and improper accounting practices became barriers to project completion when the NTIA discovered them, resulting in funding restrictions.

Property Access was a crosscutting meta-factor operationalized from a mix of interorganizational relationship, physical environment, and legal environment issue reports that were often identified by recipients as causes of delay. Some projects already owned all the property where they would build or upgrade their infrastructure, which eliminated property access issues for them and indicated clearly that access to property was very much an issue of relationships with other actors rather than an internal issue or one solely related to the topographical, meteorological, or cultural elements of the land. Variables included under this umbrella category include private property easement delays, utility make-ready delays, environmental permitting delays, department of transportation permitting, and local government permitting zoning delays. Recipients expected these permits or requirements for this type of project and their existence was not a positive or negative influence on projects. Instead, their influence on projects emerged when grant recipients reported issues surpassing the anticipated level of difficulty and resources in terms of time, effort, or money to accomplish.

The Property Access variable had significance in whether projects finished on time, which matched grant recipients' reports of delays by local governments, other utility providers, railroads, and private landowners, but did not have lasting significance in its influence on the overall number of miles constructed or overall project success. In fact, the Property Access component factor of "site access," which included easements and issues such as locating equipment on land was a significant and positive effect on the outputs indicator. This may mean that while property access issues cause delays in the progress of a project, they do not necessarily result in a permanent setback in project success.

Core organizational capacity. In evaluating the appropriateness of the POPIL framework categories, organization-focused factors had the most significant and largest effects on project implementation success. The meta-factor of Core Organizational Capacity included leadership, governance structure, accounting systems, fiduciary responsibility, and staffing as these factors were highly correlated with one another and with the dependent variables but did not occur individually in a large enough number to be included in the analysis without having the potential to skew results. Taken together, 40 percent of projects experienced at least one core organizational capacity issue in at least one quarter of the project, and I found the meta-factor's effect size to be nearly as large as the combined effect of all other significant factors in the regression models for predicting either schedule or overall project success.

However, some projects that experienced problems with their organization but escaped the NTIA's notice and subsequent restriction or suspension could still achieve "project implementation success" as measured in this study even if the project did not achieve long-term *project success*. For example, the Virginia-based Bristol Virginia Utilities public authority was successful in producing its planned outputs and finished within its intended budget, though it requested an additional four months to complete the project. A massive scandal for BVU emerged in 2014 regarding embezzlement, bribery, and kickbacks that included its BTOP project and resulted in several prison terms for organizational leadership. No issues were reported by either BVU or the NTIA regarding accounting system practices, leadership, or broader issues of fiduciary responsibility during the grant period even though a forensic investigation later found the issues to be longstanding, systemic, and occurring during project implementation. The issues remained undetected until a BVU board member came forward with concerns about other accounting practices in late 2013/early 2014 (Morabito, 2014). Had these issues, which also included relationships with vendors and contractors, emerged during project implementation, the NTIA would have suspended or terminated the project, resulting in project implementation failure. This scandal, along with other lesser scandals, speaks to the importance of comprehensive oversight necessary for the nongovernmental spending of public dollars and drawbacks that can come from trusting grant recipients to maintain a sense of fiduciary responsibility to the public rather than to their own organization or to act in pursuit of their own self-interest (Hundley, Brock, & Jensen, 2016).

Future research and the effects of controlling for factors. By limiting the study to only a specific kind of telecommunications construction project funded through a single time-limited grant program, the study controlled many of the factors that may have emerged as significant in a more diverse population of projects. In particular, there may be value on the broader scale for examining differences between last-mile projects that connected individual end-users and the middle-mile infrastructure projects connecting anchor institutions in this study. Likewise, physical environment factors would have a greater influence on construction projects by their very design than on services-based projects. Expanding the scope of the study sample in future research would allow better testing to see if these factors have influence by project type.

Principal-agent relationships also existed in all the studied projects and many had common restrictions applied. Some facets of the relationship emerged as significant in the models, such as delays related to award action requests, but principal-agent relationship issue reports were nearly ubiquitous across projects with 93% of projects reporting route modification requests and 83% of projects reporting issues related to the NTIA's environmental assessment process. In a more diverse sample, models may reveal that these kinds of funder-imposed restriction issue reports had a significant influence on project implementation progress and success.

Overall evaluation. Overall, the framework was a useful way of capturing and categorizing all factors that emerged during implementation. The categories provided guidance on what types of issues grant recipients may or should have reported and issues that would have guided appropriate NTIA oversight. The creation of the core organizational capacity meta-factor is the strongest contribution of the framework with an influence felt beyond the organizational factor category. Based on the meta-factor's significance and effect size on the models, core organizational capacity overwhelms any other factor in the models for schedule, outputs, or overall implementation success. These findings have strong implications for both practice and research, which I discuss in the next section.

Implications for Practice

Identifying organizational priorities and evaluating capacity. This dissertation's findings have relevance far beyond the study's population, construction projects, or grant-funded projects. The focus on organizational capacity as the driving force for success indicates that details of a project may vary, but if there is insufficient organizational capacity, any project is significantly less likely to achieve its goals. As identified in Fredericksen and London (2000), elements of organizational capacity include leadership and vision, management and planning, fiscal planning and practice, and operational support (p. 233). For projects designed in a way that stretches an organization's capacity to the limit under the best of circumstances, any setback or delay can derail progress. Conversely, organizations and their projects can compensate for setbacks caused by almost any obstacle to their trajectory as long as they have excess internal organizational capacity relative to the goal's demands.

The "as long as" part of the previous statement is important. Noble intentions or even good project designs do not create organizational capacity by themselves and often create unrealistic expectations instead that set a project up for failure. If an expectation is unreasonable and unachievable from the beginning, the end will be a failure by default. If, however, the goal is reasonable and achievable within the finite resources available, then the project to get there is more likely to be a success.

An organization should undertake an assessment of general organizational capacity and engage in strategic planning prior to designing any projects, no matter how attractive "free" grant money may seem. "What are the results we want to achieve?" and "What are the limits of our finite resources?" are two questions that then go hand-in-hand for organizations, and organizations must answer them prior to any proposal. More nuanced questions may follow depending on the answers, such as "What results can we achieve based on our capacity?" An observation from reviewing the projects in this program is that organizations with strong capacity were more likely to be realistic about their own limitations, and as a result, these organizations proposed projects that were within these parameters and subsequently achieved relative project implementation success. Their leaders were experienced, honest, and pragmatic about what the organization could produce that was still of a high quality within the set grant period and with available funds rather than proposing grand plans without the means to implement them.

If the coveted results are not achievable using current capacity and taking into account other concurrent priorities, then the organization will need to reevaluate and scale back current activities or find ways to grow and strengthen its capacity. For Citizens, the cooperative elected to postpone beginning construction on its planned network upgrades in its core footprint because its leadership knew that the organization did not have the capacity to undertake both projects at one time. Other organizations determined that they had specific deficiencies to their current capacity that needed to be resolved so that they could accomplish their goals. They mitigated the gap with the use of partners, consultants, and contractors. However, for all three types, organizations needed to have enough internal expertise to be able to carefully evaluate the literal or figurative bill of goods they were being sold. A number of projects experienced problems during the BTOP grant period due to faulty advice from consultants and contractors, incorrect information, or vendors' outright lies during implementation. In some cases, grant recipients failed at due diligence on the veracity of claims made during sales pitches and/or were not skilled enough in negotiating the contractual agreement to protect themselves and their projects. These are different types of expertise than understanding on a technical level how to string a cable from one pole to another.

In sum, if organizations want to implement successful projects, they need to evaluate carefully what it is that they want to achieve and what they are capable of achieving based on finite resources and other organizational priorities. Likewise, grantmakers and prospective partners need to be able to conduct similar evaluations of these organizations to determine if the organization is capable of implementing their proposed project. Terman and Feiock (2015) noted, "Understanding how capacity leads to implementation failure (or success) in block grants can shed light on grant management or support techniques that the federal government can use to minimize this failure and can apply to competitive grant programs as well" (p. 1064). As noted in Table 3, "Table 3 CCI Grant Program Decision Matrices by Round," the Round 2 proposal evaluation criteria did increase the weight given to "project viability" and "project sustainability," which both included components of organizational capacity. These decisions will have cascading effects on project implementation success that will affect other factors, such as target population, materials selected, and relationships with external stakeholders, including government agencies and contractors. If organizations design their projects not to stretch taut their organizational capacity as the default setting, then they will have elasticity remaining to be resilient in the face of unexpected challenges and in times of uncertainty.

Implications for Research

The creation of the POPIL framework drew from literature in the fields of policy implementation, public administration, public and nonprofit management, and project management. In return, the framework and the testing of the framework in this study offer contributions to the fields and encourage the fields to draw more heavily from one another. Integrating the knowledge learned from studying practice and individual project management into the larger and more developed bodies of theory present in the public administration and policy implementation literatures would strengthen all three disciplines.

Beginning with policy implementation, much of the current research that examines the implementation of policies is no longer termed "policy implementation research," which leaves gaps in the overall body of knowledge that accumulates compared to the knowledge that has been generated on the topic (Nilsen, Ståhl, Roback, & Cairney, 2013). Policy implementation scholarship appeared to stall from the debates and lack of consensus on policy implementation models. Three models of policy implementation were top-down policy implementation in which the focus is on goals as articulated in legislation, bottom-up policy implementation in which the focus is more on the actors involved in a policy's actual implementation, and the integrated contingency approach that takes a mixed approach. Matland (1995) noted, "It is also clear that policies are almost never self-executing. A microimplementation process occurs, even for purely technical questions with all the characteristics of administrative implementation" (p. 171). This dissertation structures an understanding of implementation that contains macrolevels and microlevels, as Berman (1978) proposed and adds an understanding of the intermediary grant making program serving as a mesolevel implementation stepping stone between a broad legislative policy and the narrowly focused project. This differs from the mesolevel implementation *analysis* proposed by Ryan (1995) that focused on institutional approaches to understanding policy implementation as an alternative to top-down or bottom-up concepts of policy implementation.

Here, the National Telecommunications and Information Administration is the mesolevel implementation stepping-stone as it ran the implementation of the Broadband Technology Opportunities Program designated for creation in the Recovery Act. The NTIA was the channeling force that helped to convert policy intent into practical action, and the creation of BTOP is its own form of policy implementation. My work here goes a step beyond evaluating BTOP's implementation to consider whether and how the projects BTOP funded and supported came to be implemented successfully. Detailed analysis of successful microlevel project implementation has trickle-up effects in informing evaluations of the successful implementation of BTOP, which also informs evaluations of the successful implementation of the Recovery Act overall. As discussed earlier, difficulties regarding goal prioritization alignment highlighted some of the issues that emerged around which performance indicators should be targeted and what happens when that alignment does not materialize in a relationship with extreme power distribution dynamics, such as principal-agent relationships in grant-based programs.

In a state-of-the-literature analysis of project management, Morabito (2016) noted that several other scholars in the field had called for strengthening the theoretical foundations for studies and the field. By incorporating literature from policy implementation, public administration, and public/nonprofit management, the field of project management would be able to diversify and strengthen these foundations using the decades of highly relevant normative and empirical research available in the other disciplines. This work demonstrates the contributions other fields have to offer project management and how project management can help other fields better conceptualize factor-indicator relationships.

Terman and Feiock (2015) noted that there was "surprisingly little research specifically examin[ing] the ways local capacity influences program and policy outcomes in federal systems" in the federalism literature (p. 1064). A limitation to the creation of the POPIL conceptual framework and subsequent analysis was the lack of a deep review of research from management studies and evolutionary economics on organizations' dynamic capabilities to respond to change (Helfat et al., 2009; Piening, 2013) and the distinctive competence that makes an organization better suited to address a problem than another organization would be (Selznick, 1957; Bryson, Ackermann, & Eden, 2007). However, the overlap between the literatures on organizational capacity, dynamic capabilities, and distinctive competence appears to be thin in modern studies on implementation, indicating an opportunity for future research to make stronger linkages and applications across disciplines.

A concept of capacity emerged in each of the listed disciplines though the focus and terminology have not been uniform across fields. However, there is not always a shared definition and articulation of the factors that feed into overall organizational capacity nor of the connection between capacity and outcomes. In this work, the focus was on a more general articulation and evaluation of organizational capacity rather than on more targeted concepts of administrative capacity (Terman & Feiock, 2005) and managerial capacity (Stanton, 2008; O'Toole & Meier, 2010) that are also common in the public administration and policy literature. A keyword search revealed a shared interest in the concept of "capacity" across eight journals: *Journal of Public Administration Research and Theory* (*JPART*), *Public Administration Review (PAR), Public Management Review (PMR), Administration & Society (A&S), Nonprofit and Voluntary Sector Quarterly (NVSQ), Policy Studies Journal (PSJ), International Journal of Project Management (IJPM), and Project Management Journal (PMJ).* While 5200 articles across the eight journals mentioned capacity in some form, the publications varied in their approach to specific forms of capacity. Studies that focused only on a particular facet of capacity, such as leadership or financial management practices, or used terms like dynamic capabilities and distinctive competencies but omitted the word "capacity" are not included in these counts. For example, 172 articles in *PMR* discuss dynamic capabilities but only seven of these also mention capacity in any form. A lack of common terminology contributes to the fragmentation of research in the field and slows the spread of knowledge as mentioning capacity even in a general sense would indicate that the researchers acknowledged and situated a topic within the larger scope of capacity. This dissertation research helps to begin bridging some of the gaps in the literature on capacity and related concepts that have developed because of this fragmentation.

The regression models tested and found to be significant in this study provide additional support for the importance of organizational capacity and should encourage additional exploration and testing to validate organizational capacity's relative significance and effect across types of projects. By situating project management as micro-level policy implementation, this study enriches research connecting local capacity to federal-level policy outcomes as a way to begin addressing their concerns and contributes to the intergovernmental relations and fiscal federalism literature. The findings further reflect the notion of relative capacity in which organizational capacity does not exist in a vacuum. Instead, it is relative to the organization's goals, which builds on research dating back to the 1980s (Bowman & Kearney, 1988) as well as more recent literature (Hall, 2008; Terman & Feiock, 2015).

Having evaluated the suitability of the framework for identifying meaningful factors related to project implementation success and discussed the implications of the research, the final dissertation sections focus on study limitations, future research prospects, and final concluding remarks.

Research Limitations

A limitation inherent in my quantitative content analysis was the availability and quality of the materials I coded to create the database. Various individuals at the NTIA, including its dedicated "BTOP Team," were contacted as part of a year-long series of attempts to obtain data regarding grant recipients beyond what was available un-redacted in the public database of applications and progress reports. Data released in accordance with the BTOP evaluation study was found to be focused on program success and outcomes for the overall Broadband Technology Opportunities Program in terms of "broadband availability and adoption and…achieving social and economic benefits" rather than an evaluation of the successful implementation of projects funded under the program (NTIA, July 26, 2010). Subsequent requests for the CCI grant recipients' merit review scores based on BTOP's application review process to gain an understanding of organizational financial health and the anticipated sustainability of the proposed project were also unsuccessful. The desired merit review sub-scores were not available due to a combination of administrative decisions and technological issues.

As most of the information available in the database was self-reported by grant recipients, the veracity and thoroughness of the information available for coding were not uniform across projects or even across reports for the same project. Some grant recipients were much more thorough, self-aware, and/or truthful in their reporting of project implementation circumstances than other recipients that only reported the bare minimum of information. After all, an analysis is only as good as the data with which it works, and there were instances in which the data are incomplete or even inaccurate. Because of the self-reported nature of grant recipients' progress reports for BTOP, organizational issues often remained undetected in the publicly-available performance progress reports for projects until they reached the point of disciplinary action through Performance Improvement Plans, Corrective Action Plans, and suspension letters. As such, organizational factors may have been under-identified in the independent variable coding compared to their frequency and severity in practice. The BVU project with its organizational leaders imprisoned for extreme financial impropriety is just one example of a project that appeared well implemented during the grant period but proved to have severe organizational capacity deficiencies in hindsight.

Other data were not available uniformly across projects due to redactions permissible under FOIA exemptions. Heavy but inconsistent redaction of for-profit projects' initial applications and various performance progress reports reduced my ability to capture information accurately on such factors as the leadership team's tenure and organizational debt ratio and the organization's ratio of grant funds to total revenues. Attempts to work around this information scarcity by obtaining grant application merit review scores and other internal NTIA documents were unsuccessful even using FOIA requests, and these organizational capacity variables or their equivalents ultimately were not included in the analysis. This omission does not appear to have negatively influenced the significance of organizational capacity as a factor of project implementation success.

As a final reminder, this study's findings reflect factors that influence successful project implementation and not factors that influence whether an implemented project was successful. What this means is that evaluating whether projects achieved intended outcomes is beyond the scope of this research. While the NTIA contracted ASR Analytics to conduct a preliminary outcomes-based evaluation of BTOP and a subset of its comprehensive community infrastructure projects, we do not yet know the long-term impacts and benefits of these projects and other projects in the program.

Future Research Avenues

Having established the importance of organizational capacity more so than any other factor for the successful implementation of grant-funded construction projects in this study, future research could follow a number of avenues that would expand our knowledge of factor-indicator relationships for project implementation success. Options include diversifying the sample population, additional in-depth project postmortem analyses, evaluating long-term project outcomes, and further pursuing access to un-redacted grant applications and NTIA evaluation reports.

The tightly-controlled sample population of only Round 2 Comprehensive Community Infrastructure projects funded through BTOP gives several options for a controlled expansion of projects for inclusion. The first would increase the sample to include all 123 Round 1 and Round 2 CCI projects. Such an expansion would introduce additional variation in initial project selection criteria, project scope, and some variation in timing while still controlling for the overall principal-agent relationship and type of project. The inclusion of BTOP's Public Computing Centers and Sustainable Broadband Adoption projects would introduce more variation by project type to expand beyond the construction of physical infrastructure while still controlling for the principal-agent relationship.

Looking beyond the NTIA and BTOP to include projects from the Recovery Act-funded Broadband Improvement Program (BIP) administered by the Rural Utilities Service in the U.S. Department of Agriculture would continue to control for type of project but introduce variations in project selection criteria, the principal-agent relationship, and issues of financial capacity. Expanding to consider other projects funded under the Recovery Act program would continue to control for the sense of urgency associated with funding these projects and the general socio-economic environment surrounding the projects. Such an expansion would allow for an overall evaluation of policy implementation for the Recovery Act that would test goal congruence among the three levels of policy implementation and determine if and where policy goals came into conflict with project goals.

Diversifying the sample population could also involve including projects that were not one-time stimulus grant projects and allow for a better understanding of the role of the federal grant program's administrative capacity in selecting, overseeing, and assisting projects to be successful in their implementation. The effects of strong established relationships between the principal and agent, the development of deep expertise by program officers, and the ability of both program and project staff to learn and evolve over time to improve the implementation process will likely have significant influences on key performance indicators but were untestable in a one-time, time-restricted grant program like BTOP.

The project postmortem analysis created a richness of information and depth of understanding that a purely quantitative study could not reproduce. While too much time may have passed since implementation to pursue this mode of inquiry for BTOP and other Recovery Act-funded projects again, such a retrospective analysis should be included in future investigations of other projects and programs within a year to 18 months of project completion and integrated into the closeout process for grant programs. Additionally, the research focus can begin to capture an understanding of the long-term outcomes of projects with the passage of time since project completion. The BVU example is certainly the most egregious example of the possible disconnect between project implementation success and long-term project success. Other examples have emerged since the completion of the grant period including FastRoads New Hampshire’s slow last-mile network deployment (Griffin, March 26, 2016) and MassBroadband 123’s network operator filing for bankruptcy in March 2017 (Bray, March 22, 2017). Such news warrants further investigation to determine what role, if any, factors apparent in the initial grant application or that emerged during project implementation play in long-term project success.

Lastly, the regression models for schedule, outputs, and overall success were found to be significant and meaningful, but they did not fully explain or predict the variations in the indicator variables. I believe this to be a problem stemming from the data available for public review. This study could be leveraged to demonstrate to the NTIA why permitting researcher access to merit review scores and un-redacted grant applications, with appropriate assurance of confidentiality for individual projects, would strengthen our understanding of factors influencing the different areas of project implementation success. Research findings based on this information could be very beneficial for the NTIA, RUS, and other funding agencies in designing future evaluation criteria both for initial project proposal selection and for tracking project progress during implementation. Such research would also contribute to theory building around each of the factors included in the POPIL framework and allow deeper testing of factor-indicator significance for evaluating the POPIL framework.

Concluding Remarks

The Recovery Act created the Broadband Technology Opportunities Program (BTOP), in part, to expand access to broadband infrastructure for communities and community anchor institutions in unserved and underserved areas around the country (Recovery Act, 2009, pp. 398-399) as part of broader policy goals included in the Act's statement of purpose (Recovery Act, 2009, p. 2):

1. To preserve and create jobs and promote economic recovery.
2. To assist those most impacted by the recession.
3. To provide investments needed to increase economic efficiency by spurring technological advances in science and health.
4. To invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits.

Understanding the effectiveness of BTOP in implementing these broad and program-specific policy goals requires an exploration of project implementation success at the microlevel. This study contributes to that understanding through testing of factor-indicator relationships to determine which factors are most likely to influence key performance indicator measures of schedule, budget, outputs, and overall success.

The model generated was strongest for determining which factor-indicator relationships were strongest in influencing on-time completion of projects, with weaker but still statistically significant models for both outputs and overall success. The analysis found that analysis of the available data do not provide statistically significant results for determining how projects meeting their budget goals. This lack of significance may have been the result of the principal funder prioritizing quickly expending funds over careful and efficient expenditures as a measure of success over other metrics. Such prioritization makes schedule and outputs more meaningful for evaluating success of network creation, but quickly expending funds aligned with the first two purposes of the overall Recovery Act as one way to lift the US out of the Great Recession by injecting funds into the economy.

The quantitative regression analysis of factor-indicator relationships found that the presence and persistence of the organizational capacity issue reports meta-factor had significant and strong negative effects on the indicator scores for schedule, outputs, and overall project implementation success. Interorganizational relationships also had significant effects on each of the indicators, but with a much lower effect and a mix of positive and negative effects compared to the organizational capacity meta-factor. Property access factors intersected with both physical environment and interorganizational relationships and were significant in the models.

The project postmortem analysis of Citizens Telephone Cooperative's New River Valley Regional Open Access Network (NRV-ROAN) examined a project that finished on-time, under-budget, and constructed more than its project number of network miles. The postmortem identified organizational capacity and interorganizational relationships as sources of strength that could positively influence project implementation. These findings further support the quantitative models and offer additional explanations behind the relationships. The analysis also provides insights into opportunities for future improvements.

The importance of organizational capacity and interorganizational relationships for successful project implementation echoes research in a variety of disciplines, including policy implementation, public administration, nonprofit management, and project management. It also has implications for both funding agencies and implementing organizations to focus more on the capacity of the organization and cultivating relationships with external stakeholders and partners. With stronger organizational capacity and strong relationships, organizations will be better able to weather any difficulties they may encounter during project implementation.

These findings both transcend a focus on broadband infrastructure projects and inform efforts to continue reducing the digital divide in and across communities so that individuals are able to participate fully in our society. Closing the divide would have cascading effects across healthcare, education, economic development and job growth, and political engagement, among others, and the influence of Internet connectivity is as transformative as the deployment of electricity and telephone infrastructure was in the early to mid-20th century. However, like with electricity and telephone, we are unlikely to see access for all without significant governmental and not-for-profit investments, as there is not a significant profit-based motivation to encourage for-profit providers to enter the most rural areas. With the magnitude of resources required to expand access, implementers must manage these resources carefully. The necessary strategic and efficient resource management requires sufficient organizational capacity and cooperation across groups. Organizations like Citizens Telephone Cooperative and other similar utility cooperatives can lead the way in efforts to reduce the divide as they did in the past, but only if they carefully select projects that are within their capacity to implement successfully.

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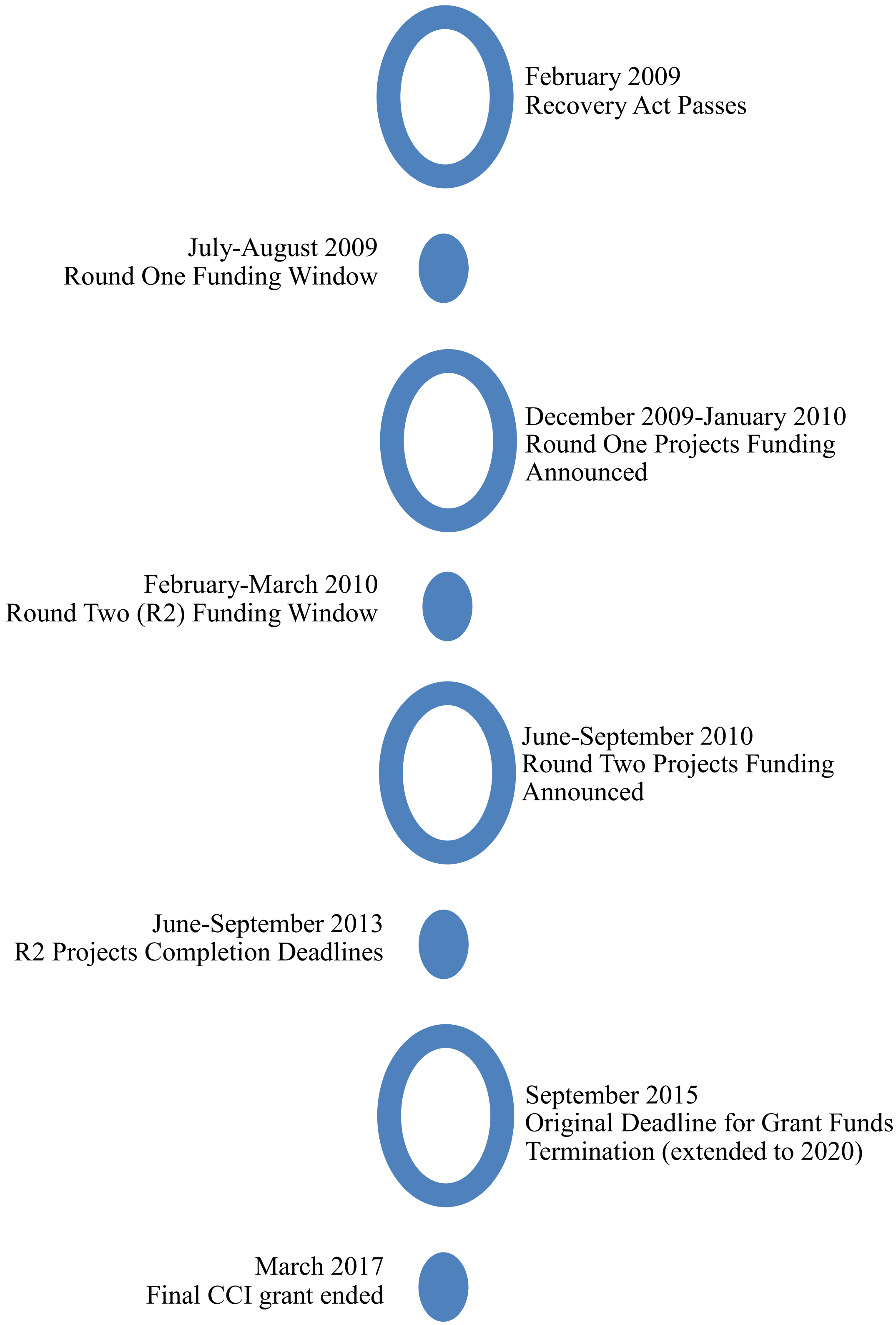
Appendix

Appendix A Glossary of Terms

ARRA	American Reinvestment and Recovery Act
Broadband	pre-2010: Minimum speed of 768 Kbps download and 200 Kbps upload as of 2010: Minimum speed of 4 Mbps download and 1 Mbps upload
BTOP	Broadband Technology Opportunities Program
CAI	Community Anchor Institution: "Schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and agencies that provide outreach, access, equipment and support services to facilitate greater use of broadband service by vulnerable populations, including low-income, the unemployed and the aged" (NTIA, 2010).
CCI	Comprehensive Community Infrastructure
FCC	Federal Communications Commission
NTIA	National Telecommunications and Information Administration
Remote	Area more than 50 miles from the limits of a non-rural area
Unserved	<10% of population has ready access to terrestrial broadband service
Underserved	<50% of the population has access to terrestrial broadband service; No provider advertises fixed or mobile broadband speeds of >3 Mbps, or <40% broadband subscription rate.

Appendix B Major Timeline Events for BTOP CCI Projects



Appendix C Code Guide

Note: **Bold** headers are the categories used for the POPIL framework. *Italicized* items are operationalized variables in the database created from quarterly performance progress reports and used for hypothesis testing.

Project-Specific	
Technology Type	Fiber, WiMAX, Wi-Fi, Microwave
	Change in technology type during implementation
Scope	Local, regional, state, multi-state
	Square miles in service area
	CAIs in service area
Materials	Delay in materials delivered, Japanese tsunami/earthquake causing supply issues, running conduit because fiber not available
	Equipment malfunction (signal interference, did not meet needs)
Organization-focused	
Experience	Utility provider, broadband provider, telephone provider, other utility provider
	Lead organization age
	Lead organization years of experience as utility provider
	Organization unclear on grant process
Governance	Sector (Government, 501(c)(3), cooperative, for-profit)
	Governance Change of organizational structure/IRS classification, Transfer of grant ownership/new organization created to manage grant
Lead Organization Type	State or state agency, nonprofit, for profit, county government, higher education, K-12 System, authority, telephone provider, broadband provider, cable provider, healthcare, electricity provider, Indian tribe, consultant
Financial	*Match* Delays in match approval, match percentage/size of award
	Accounting Issues with accounting practices
	Budget of project
Human Resources	*Staffing delays* (cannot find qualified individuals, death, additional support required to fix organizational inadequacies as identified in NTIA review)
	Leadership change (organizational restructuring, new organizational leaders hired, abrupt departure of former leaders)
Fiduciary Responsibility	Mismanagement of funds
	Conflicts of interest unresolved
	Inappropriate utilization of funds
	Inappropriate contract awards

Physical Environment	
Terrain	Delays due to rock, water crossing, mountains, trees (line of sight issues)
Climate	Delays due to heavy rain, snow, frozen ground, mud, tornado, hurricane, blizzard, extreme winter weather, wildfires, derecho, mudslides, winds, extreme heat
Physical Environment x Legal/Regulatory	
State Agencies	Historical places (Delays with *State Historical Preservation Office* (SHPO) approval)
Federal Environmental Agencies	Delays in FONSI approval or communications with US Fish and Wildlife Service, National Park Service, US Forest service, Bureau of Land Management, or Bureau of Reclamation
Environmental permitting	Permits required prior to forest access or construction
Interorganizational Relationships	
Partnerships	Number of project partners
	Issues with partners during implementation
	External project coordination issues
Contracts	*Delays signing community anchor institutions and other end users*
	Delays signing Irrevocable Rights of Use (IRU) agreements for network access
	Issues with *Request for Proposals* process/contractors' fulfillment of obligations
Interorganizational x Physical Environment	
Property Access	*Make Ready*: Delays in other providers' make ready process (moving lines & marking paths so that new infrastructure can be connected), pole attachment agreement disputes, pole access/replacement
	Private Property/Site Access: delays in site placement lease agreements, property easements from private landowners, private land rights of way
	Railroad permits
Interorganizational x Legal/Regulatory	
Principal-Agent Relationship	Disciplinary Action (Performance Improvement Plan, *Corrective Action Plan, Suspension*, Termination)
	Award Action Request (*route modification, other AAR*: budget reallocation, sub-recipient added/removed)
	Special Award Conditions (multiple project *overlap* resolution, *ASAP classification change)*
	Unclear guidance from NTIA on expectations or grant guidelines
	Automated Standard Application for Payments (ASAP) classification (advanced draw down allowed, agency review required, reimbursement-only, withdrawal limits)
Interorganizational x Legal/Regulatory x Physical Environment	
Environmental Assessment (required NTIA grant funds)	Delays pending *Finding of No Significant Impact (FONSI) award*, environmental impact mitigation requirements, *additional environmental Special Award Conditions (SACs) imposed*, supplemental environmental assessments required for route modification approval

	Project modification due to *endangered/threatened species* (location or seasonal construction restrictions, access or presence of wildlife expert/biologist on site), reference to specific species (bald eagle, raptors, desert tortoise, burrowing owl, smooth-cone flower, bats, New Mexico Meadow jumping mouse, butterflies, migratory birds, foxes, etc.)
	Project partial/total suspension due to *environmental noncompliance*
	Tribal: Delays in contact and approval of *Native American Indian tribes* for FONSI
	State Historical Preservation Office (SHPO) and state environmental agencies' approval or mitigation requirements
	Route approval by federal environmental agencies
Local Government	*Local government permitting*
Legal	
State Transportation	Delays in *Department of Transportation (DOT) permitting*
Local Government	*local government franchise agreements*
Tribal	Delays in site access permissions, delays in cultural assessments, delays in establishing tribal relations, archeologist required on site
State Legislation	State government shutdown, legislation to block/approve project, state legislation to ban municipal broadband
Other State Agencies	Delays in gaining Competitive Local Exchange Carrier (CLEC) status, state environmental agencies, public utilities commission
Other Federal Agencies	Delays in interactions with Bureau of Indian Affairs, FCC spectrum licensing, FAA flight paths, Army Corps of Engineers approval

Appendix D Fixed Factors Descriptive Statistics Tables

Table 25 Project Scope Descriptive Statistics

		Statistic	Standard Error
Square Miles	Mean	69095.6970	57358.60129
	5% Trimmed Mean	9914.6886	
	Median	3042.0000	
	Standard Deviation	465983.47970	
	Minimum	3.00	
	Maximum	3794101.00	
	Range	3794098.00	
	Interquartile Range	10865.00	
	Skewness	8.102	.295
	Kurtosis	65.755	.582
CAIs in Service Area	Mean	3781.3788	3301.86532
	5% Trimmed Mean	399.6902	
	Median	202.5000	
	Standard Deviation	26824.48066	
	Minimum	12.00	
	Maximum	218315.00	
	Range	218303.00	
	Interquartile Range	379.50	
	Skewness	8.114	.295
	Kurtosis	65.887	.582
Planned Length Miles	Mean	1368.100	346.2707
	5% Trimmed Mean	961.834	
	Median	665.000	
	Standard Deviation	2813.1161	
	Minimum	6.0	
	Maximum	21811.0	
	Range	21805.0	
	Interquartile Range	1224.6	
	Skewness	6.166	.295
	Kurtosis	44.061	.582

Table 26 Organizational Age and Years of Utility Service Provision

		Statistic	Standard Error
Lead Organization Age	Mean	56.73	7.290
	5% Trimmed Mean	51.56	
	Median	30.00	
	Standard Deviation	59.672	
	Minimum	0	
	Maximum	222	
	Range	222	
	Interquartile Range	91	
	Skewness	1.136	.293
	Kurtosis	.304	.578
Lead Organization Years of Utility Provision	Mean	24.31	3.695
	5% Trimmed Mean	21.01	
	Median	13.00	
	Standard Deviation	30.242	
	Minimum	0	
	Maximum	120	
	Range	120	
	Interquartile Range	27	
	Skewness	1.610	.293
	Kurtosis	1.788	.578

Appendix E Welch's t-Test and Mann-Whitney *U*-Test for Factor-Indicator Relationships

Table 27 Welch's t-Test and Mann-Whitney U-test Factor Presence-Overall Success Relationship

Factor Presence-Overall Success Relationship							
Issue	**Welch's t**	**Welch's p**	**Mann U**	**Mann z**	**Mann p**	**Welch Sig**	**Mann Sig**
Accounting System+	2.603	0.021*	164	-2.965	0.003**	Reject	Reject
Climate	-0.18	0.858	547	0.694	0.488	Fail to Reject	Fail to Reject
Fiduciary Responsibility+	2.577	0.031*	112	-2.74	0.006**	Reject	Reject
DOT Permitting	-1.32	0.194	604	0.618	0.537	Fail to Reject	Fail to Reject
EA/FONSI+	0.656	0.516	318	-0.196	0.844	Fail to Reject	Fail to Reject
Environmental Permitting	2.416	0.025*	261	-2.546	0.011*	Reject	Reject
Ext. Project Coordination	3.344	0.002**	248	-3.298	0.001**	Reject	Reject
Fed. Environment Agency	1.887	0.066	424	-1.607	0.108	Fail to Reject	Fail to Reject
Governance Structure+	2.72	0.025*	101	-2.942	0.003**	Reject	Reject
Leadership Change+	3.61	0.008**	36	-3.867	0	Reject	Reject
Local Gov. Franchising+	-1.764	0.103	297	1.179	0.238	Fail to Reject	Fail to Reject
Local Government Permit	-0.095	0.925	633	1.106	0.269	Fail to Reject	Fail to Reject
Make Ready	0.583	0.562	511	-0.627	0.531	Fail to Reject	Fail to Reject
Matching Funds	2.439	0.019*	368	-2.199	0.028*	Reject	Reject
Materials	0.254	0.801	440	-0.581	0.561	Fail to Reject	Fail to Reject
Other AAR	2.137	0.038*	425	-1.639	0.101	Reject	Fail to Reject
Other Federal Agencies	1.214	0.237	397	-1	0.317	Fail to Reject	Fail to Reject
Other State Agencies+	1.28	0.217	261	-1.427	0.154	Fail to Reject	Fail to Reject
Overlap SAC	2.182	0.035*	364	-2.087	0.037*	Reject	Reject
Partners+	1.607	0.134	229	-1.337	0.181	Fail to Reject	Fail to Reject
Rail Permit	-0.733	0.466	518	0.158	0.874	Fail to Reject	Fail to Reject
RFP/Contractor	1.192	0.239	470	-1.13	0.259	Fail to Reject	Fail to Reject
Route Mod Request+	-0.052	0.96	159	0.095	0.936	Fail to Reject	Fail to Reject
SHPO	2.03	0.047*	451	-1.38	0.168	Reject	Fail to Reject
Signed CAI Agreements	0.368	0.717	384	-0.09	0.928	Fail to Reject	Fail to Reject
Signed IRU Agreements	1.907	0.07	280	-2.089	0.037*	Fail to Reject	Reject
Site Access	0.713	0.479	516	-0.528	0.597	Fail to Reject	Fail to Reject
Staffing+	1.508	0.153	261	-1.696	0.09	Fail to Reject	Fail to Reject
State Legislation+	-1.19	0.256	212	0.524	0.541	Fail to Reject	Fail to Reject
Technology Change	-0.59	0.577	211	0.539	0.555	Fail to Reject	Fail to Reject
Terrain	0.816	0.42	407	-1.307	0.191	Fail to Reject	Fail to Reject
Tribal Authority	1.278	0.214	358	-1.363	0.173	Fail to Reject	Fail to Reject
Property Access META	0.596	0.559	295	-0.22	0.826	Fail to Reject	Fail to Reject
Organization Capacity META	2.881	0.007	302	-3.042	0.002	Reject	Reject

+Extremely unequal sample sizes with n<15 for one group
* p-value less than .05
Both Welch's t-test and Mann-Whitney U-test are significant at .05

Table 28 Welch's t-Test and Mann-Whitney U-test Factor Presence-Schedule Relationship

Factor Presence-Schedule Success Relationship							
Issue	**Welch's t**	**Welch's p**	**Mann U**	**Mann z**	**Mann p**	**Welch Sig**	**Mann Sig**
Accounting System+	1.99	0.068	456.5	-1.75	0.08	Fail to Reject	Fail to Reject
Climate	0.982	0.33	532	-0.52	0.606	Fail to Reject	Fail to Reject
Fiduciary Responsibility+	2.51	0.035*	399.5	-2.66	0.008**	Reject	Reject
DOT Permitting	0.183	0.855	676	-1.6	0.111	Fail to Reject	Fail to Reject
EA/FONSI+	0.934	0.363	282	-0.82	0.412	Fail to Reject	Fail to Reject
Environmental Permitting	1.75	0.095	525	-1.24	0.214	Fail to Reject	Fail to Reject
Ext. Project Coordination	-3.59	0.002**	260	-3.28	0.001**	Reject	Reject
Fed. Environment Agency	1.95	0.057	724.5	-2.3	0.022*	Fail to Reject	Reject
Governance Structure+	2.62	0.029*	415	-2.96	0.003**	Reject	Reject
Leadership Change+	3.78	0.006**	432	-3.96	0.001**	Reject	Reject
Local Gov. Franchising+	-0.836	0.408	278.5	-0.86	0.39	Fail to Reject	Fail to Reject
Local Government Permit	0.49	0.626	603.5	-0.76	0.445	Fail to Reject	Fail to Reject
Make Ready	1.43	0.159	723	-2.12	0.034*	Fail to Reject	Reject
Matching Funds	2.867	0.007	786	-3.29	0.001**	Reject	Reject
Materials	0.92	0.36	395	-1.24	0.214	Fail to Reject	Fail to Reject
Other AAR	3.2	0.003	343	-2.79	0.005**	Reject	Reject
Other Federal Agencies	1.88	0.073	585.5	-1.65	0.098	Fail to Reject	Fail to Reject
Other State Agencies+	0.45	0.659	399	-0.8	0.426	Fail to Reject	Fail to Reject
Overlap SAC	1.74	0.09	642.5	-1.59	0.111	Fail to Reject	Fail to Reject
Partners+	1.532	0.152	432	-0.72	0.471	Fail to Reject	Fail to Reject
Rail Permit	-1.005	0.319	515.5	-0.13	0.896	Fail to Reject	Fail to Reject
RFP/Contractor	0.945	0.348	671.5	-1.46	0.143	Fail to Reject	Fail to Reject
Route Mod Request+	0.296	0.774	181	-0.65	0.517	Fail to Reject	Fail to Reject
SHPO	3.19	0.002	826.5	-3.48	0.001**	Reject	Reject
Signed CAI Agreements	0.9	0.379	477	-1.37	0.171	Fail to Reject	Fail to Reject
Signed IRU Agreements	1.9	0.073	510	-1.28	0.2	Fail to Reject	Fail to Reject
Site Access	2.267	0.023*	352.5	-2.7	0.007**	Reject	Reject
Staffing+	2.55	0.022	546.5	-2.83	0.005**	Reject	Reject
State Legislation+	-3.411	0.001**	111	-1.65	0.098	Reject	Fail to Reject
Technology Change	-0.688	0.508	164.5	-0.425	0.692	Fail to Reject	Fail to Reject
Terrain	1.993	0.054	681	-2.42	0.016*	Fail to Reject	Reject
Tribal Authority	1.566	0.131	538.5	-1.2	0.23	Fail to Reject	Fail to Reject
Property Access META	3.588	.001**	164.5	-2.539	.011*	Reject	Reject
Organization Capacity META	3.197	0.003**	283	-3.435	0.001**	Reject	Reject
+Extremely unequal sample sizes with n<15 for one group * p-value less than .05 ** p-value less than .01 Both Welch's t-test and Mann-Whitney U-test are significant at .05							

Table 29 Welch's t-Test and Mann-Whitney U-test Factor Presence-Output Relationship

Factor Presence-Outputs Success Relationship							
Issue	**Welch's t**	**Welch's p**	**Mann U**	**Mann z**	**Mann p**	**Welch Sig**	**Mann Sig**
Accounting System+	3.663	0.002**	155	-3.108	0.002**	Reject	Reject
Climate	-0.892	0.377	546	0.681	0.496	Fail to Reject	Fail to Reject
Fiduciary Responsibility+	2.443	0.036*	149	-2.06	0.039*	Reject	Reject
DOT Permitting	-2.154	0.035*	673.5	1.494	0.135	Reject	Fail to Reject
EA/FONSI+	0.281	0.78	299	-0.507	0.612	Fail to Reject	Fail to Reject
Environmental Permitting	2.465	0.019*	294	-2.08	0.038*	Reject	Reject
Ext. Project Coordination	1.715	0.096	379.5	-1.542	0.123	Fail to Reject	Fail to Reject
Fed. Environment Agency	1.585	0.118	441.5	-1.386	0.166	Fail to Reject	Fail to Reject
Governance Structure+	2.695	0.023*	144	-2.151	0.031*	Reject	Reject
Leadership Change+	2.624	0.028*	110	-2.437	0.015*	Reject	Reject
Local Gov. Franchising+	-1.43	0.185	292	1.083	0.279	Fail to Reject	Fail to Reject
Local Government Permit	-0.588	0.559	644	1.252	0.21	Fail to Reject	Fail to Reject
Make Ready	0.043	0.966	590.5	0.37	0.711	Fail to Reject	Fail to Reject
Matching Funds	1.325	0.19	458	-1.02	0.297	Fail to Reject	Fail to Reject
Materials	-0.57	0.572	557	1.007	0.314	Fail to Reject	Fail to Reject
Other AAR	1.12	0.267	479	-0.958	0.338	Fail to Reject	Fail to Reject
Other Federal Agencies	-0.02	0.984	493	0.315	0.753	Fail to Reject	Fail to Reject
Other State Agencies+	1.619	0.12	278	-1.158	0.247	Fail to Reject	Fail to Reject
Overlap SAC	2.06	0.044*	427	-1.264	0.206	Reject	Fail to Reject
Partners+	1.312	0.209	258	-0.846	0.397	Fail to Reject	Fail to Reject
Rail Permit	-0.805	0.425	570	0.852	0.394	Fail to Reject	Fail to Reject
RFP/Contractor	0.789	0.434	498	-0.772	0.44	Fail to Reject	Fail to Reject
Route Mod Request+	-0.402	0.694	164	0.215	0.844	Fail to Reject	Fail to Reject
SHPO	0.538	0.592	571	0.125	0.9	Fail to Reject	Fail to Reject
Signed CAI Agreements	-0.366	0.718	440	0.76	0.447	Fail to Reject	Fail to Reject
Signed IRU Agreements	0.805	0.429	384	-0.584	0.559	Fail to Reject	Fail to Reject
Site Access	-0.71	0.48	626	0.855	0.392	Fail to Reject	Fail to Reject
Staffing+	0.422	0.679	356	-0.231	0.817	Fail to Reject	Fail to Reject
State Legislation+	0.824	0.439	155	0.539	0.555	Fail to Reject	Fail to Reject
Technology Change	-0.689	0.518	211.5	0.626	0.541	Fail to Reject	Fail to Reject
Terrain	-1.119	0.271	569	0.839	0.402	Fail to Reject	Fail to Reject
Tribal Authority	0.471	0.642	418	-0.522	0.602	Fail to Reject	Fail to Reject
Property Access META	-0.856	0.408	373	1.1	0.271	Fail to Reject	Fail to Reject
Organization Capacity META	1.663	0.103	431	-1.393	0.163	Fail to Reject	Fail to Reject

+Extremely unequal sample sizes with n<15 for one group
* p-value less than .05
Both Welch's t-test and Mann-Whitney U-test are significant at .05

Table 30 Welch's t-Test and Mann-Whitney U-Test Factor Presence-Budget Relationship

Factor Presence-Budget Success Relationship							
Issue	**Welch's t**	**Welch's p**	**Mann U**	**Mann z**	**Mann p**	**Welch Sig**	**Mann Sig**
Accounting System+	-1.83	0.88	262.5	-1.41	0.159	Fail to Reject	Fail to Reject
Climate	-0.545	0.589	481	-0.19	0.851	Fail to Reject	Fail to Reject
Fiduciary Responsibility+	-0.773	0.459	240.5	-0.38	0.705	Fail to Reject	Fail to Reject
DOT Permitting	-0.49	0.624	504.5	-0.64	0.522	Fail to Reject	Fail to Reject
EA/FONSI+	-0.671	0.514	399.5	-1.14	0.254	Fail to Reject	Fail to Reject
Environmental Permitting	0.649	0.519	507.5	-0.55	0.58	Fail to Reject	Fail to Reject
Ext. Project Coordination	0.16	0.877	462.5	-0.44	0.663	Fail to Reject	Fail to Reject
Fed Environment Agency	-1.21	0.233	507.5	-0.55	0.58	Fail to Reject	Fail to Reject
Governance Structure+	-0.75	0.471	221	-0.74	0.46	Fail to Reject	Fail to Reject
Leadership Change+	0.653	0.532	287.5	-1	0.317	Fail to Reject	Fail to Reject
Local Gov. Franchising+	-0.876	0.401	207	-0.56	0.573	Fail to Reject	Fail to Reject
Local Government Permit	0.01	0.988	497	-0.63	0.531	Fail to Reject	Fail to Reject
Make Ready	-1.31	0.196	511.5	-0.62	0.533	Fail to Reject	Fail to Reject
Matching Funds	-0.63	0.532	459.5	-1.03	0.301	Fail to Reject	Fail to Reject
Materials	0.342	0.735	484.5	-0.02	0.984	Fail to Reject	Fail to Reject
Other AAR	-2.1	0.04*	717	-2.05	0.04*	Reject	Reject
Other Federal Agencies	1.013	0.317	580.5	-1.52	0.128	Fail to Reject	Fail to Reject
Other State Agencies+	0.37	0.716	333.5	-0.28	0.78	Fail to Reject	Fail to Reject
Overlap SAC	-0.57	0.57	525.5	-0.01	0.995	Fail to Reject	Fail to Reject
Partners+	0.032	0.975	304.5	-0.06	0.953	Fail to Reject	Fail to Reject
Rail Permit	1.58	0.12	600.5	-1.25	0.21	Fail to Reject	Fail to Reject
RFP/Contractor	0.538	0.593	572.5	-0.16	0.875	Fail to Reject	Fail to Reject
Route Mod Request+	-0.058	0.956	155	0	1	Fail to Reject	Fail to Reject
SHPO	-0.69	0.494	562.5	-0.02	0.985	Fail to Reject	Fail to Reject
Signed CAI Agreements	0.64	0.525	425.5	-0.54	0.592	Fail to Reject	Fail to Reject
Signed IRU Agreements	0.93	0.359	472	-0.68	0.496	Fail to Reject	Fail to Reject
Site Access	-0.568	0.572	625	-0.85	0.397	Fail to Reject	Fail to Reject
Staffing+	-0.756	0.46	329	-0.65	0.515	Fail to Reject	Fail to Reject
State Legislation+	-1.619	0.154	111	-1.59	0.112	Fail to Reject	Fail to Reject
Technology Change	-0.59	0.577	170.5	-0.276	0.789	Fail to Reject	Fail to Reject
Terrain	2.16	0.035*	674	-2.23	0.026*	Reject	Reject
Tribal Authority	0.207	0.837	514.5	-0.82	0.414	Fail to Reject	Fail to Reject
Property Access META	-0.867	1.389	359	.867	.386	Fail to Reject	Fail to Reject
Organization Capacity META	-0.235	0.815	532	-0.103	0.918	Fail to Reject	Fail to Reject

+Extremely unequal sample sizes with n<15 for one group
* p-value less than .05
** p-value less than .01
Both Welch's t-test and Mann-Whitney U-test are significant at .05

Appendix F Correlation Tables

Correlations among Key Performance Indicators Index Scores

Index Area	Correlation Test Used	Success Index	Schedule Index	Output Index	Budget Index
Success Index	Pearson Correlation	1	.739**	.778**	.219
	Sig. (2-tailed)		.000	.000	.075
	Spearman's rho Coefficient	1	.498**	.666**	.361**
	Sig. (2-tailed)		.000	.000	.003
Schedule Index	Pearson Correlation	.739**	1	.215	.030
	Sig. (2-tailed)	.000		.081	.811
	Spearman's rho	.513**	1	.000	.021
	Sig. (2-tailed)	.000	.	1.0	.864
Output Index	Pearson Correlation	.778**	.209	1	-.027
	Sig. (2-tailed)	.000	.089		.831
	Spearman's rho	.666**	-.011	1	.071
	Sig. (2-tailed)	.000	.929	.	.570
Budget Index	Pearson Correlation	.219	.030	-.034	1
	Sig. (2-tailed)	.075	.811	.786	
	Spearman's rho	.361**	.021	.071	1
	Sig. (2-tailed)	.003	.864	.570	.
	N		67	67	67

** Correlation is significant at the 0.01 level (2-tailed).

Project-Specific Factors Correlations

Pearson's Correlations		Success Index	Schedule Index	Output Index	Budget Index
Service Area Square Miles	Pearson Correlation	-.033	.066	-.107	-.019
	Sig. (2-tailed)	.791	.597	.395	.878
CAIs in Service Area	Pearson Correlation	-.018	.075	-.090	-.019
	Sig. (2-tailed)	.882	.544	.471	.877
Planned Network Length	Pearson Correlation	-.209	-.113	-.225	.028
	Sig. (2-tailed)	.089	.361	.068	.819
Materials Stand. Issue Reports	Pearson Correlation	-.060	.008	-.073	-.075
	Sig. (2-tailed)	.631	.947	.556	.548
Technology Change Stand. Issue Reports	Pearson Correlation	.010	.027	.035	-.135
	Sig. (2-tailed)	.936	.826	.779	.277
	N	67	67	67	67

Spearman's Rho Correlations		Success Index	Schedule Index	Output Index	Budget Index	Ordinal Success
Project Scale	Correlation Coefficient	-.198	-.111	-.162	.122	.034
	Sig. (2-tailed)	.108	.371	.191	.326	.784
Service Area Square Miles	Correlation Coefficient	-.221	-.169	-.109	-.065	-.104
	Sig. (2-tailed)	.075	.175	.385	.602	.406
CAIs in Service Area	Correlation Coefficient	-.093	-.227	.091	.151	-.155
	Sig. (2-tailed)	.452	.065	.463	.222	.211
Planned Network Length	Correlation Coefficient	-.266*	-.268*	-.163	.081	-.144
	Sig. (2-tailed)	.030	.028	.188	.512	.244
Materials Stand. Issue Reports	Correlation Coefficient	-.029	.016	.016	-.015	.002
	Sig. (2-tailed)	.819	.898	.900	.905	.988
Technology Change Stand. Issue Reports	Correlation Coefficient	.062	-.056	.068	-.036	-.054
	Sig. (2-tailed)	.619	.651	.582	.770	.663
	N	67	67	67	67	67
* Significant at .05 level						

Organization-Focused Factors Correlations

Pearson's Correlations		Success Index	Schedule Index	Output Index	Budget Index
Lead Organizational Age	Pearson Correlation	.354**	.187	.381**	-.039
	Sig. (2-tailed)	.003	.130	.001	.754
Lead Organization Years of Experience	Pearson Correlation	.058	.032	.040	.057
	Sig. (2-tailed)	.641	.796	.747	.648
Total Planned Project Cost	Pearson Correlation	-.204	-.239	-.070	-.070
	Sig. (2-tailed)	.098	.051	.572	.572
Matching Funds Stand. Issue Reports	Pearson Correlation	-.333**	-.316**	-.271*	.155
	Sig. (2-tailed)	.006	.009	.026	.209
Accounting System Stand. Issue Reports	Pearson Correlation	-.595**	-.551**	-.458**	.160
	Sig. (2-tailed)	.000	.000	.000	.195
Fiduciary Responsibility Stand. Issue Reports	Pearson Correlation	-.515**	-.509**	-.353**	.093
	Sig. (2-tailed)	.000	.000	.003	.453
Governance Structure Stand. Issue Reports	Pearson Correlation	-.447**	-.408**	-.336**	.076
	Sig. (2-tailed)	.000	.001	.005	.540
Leadership Change Stand. Issue Reports	Pearson Correlation	-.319**	-.378**	-.183	.117
	Sig. (2-tailed)	.008	.002	.139	.344
Staffing Stand. Issue Reports	Pearson Correlation	-.173	-.320**	-.028	.164
	Sig. (2-tailed)	.162	.008	.822	.184
Core Org. Capacity Meta-Factor Stand. Issue Reports	Pearson Correlation	-.527**	-.562**	-.347**	.164
	Sig. (2-tailed)	.000	.000	.004	.184
	N	67	67	67	67
* Significant at .05 level	** Significant at .01 level				

Spearman's Rho Correlations		Success Index	Schedule Index	Output Index	Budget Index	Ordinal Success
Lead Organizational Age	Correlation Coefficient	.328**	.170	.333**	.002	.280*
	Sig. (2-tailed)	.007	.169	.006	.990	.022
Lead Organization Years of Experience	Correlation Coefficient	.187	.201	.153	-.079	.226
	Sig. (2-tailed)	.130	.102	.216	.525	.065
Total Planned Project Cost	Correlation Coefficient	-.178	-.299*	-.033	.072	-.063
	Sig. (2-tailed)	.150	.014	.790	.564	.611
Accounting System Stand. Issue Reports	Correlation Coefficient	-.375**	-.212	-.402**	.165	-.397**
	Sig. (2-tailed)	.002	.085	.001	.182	.001
Matching Funds Stand. Issue Reports	Correlation Coefficient	-.284*	-.382**	-.209	.143	-.282*
	Sig. (2-tailed)	.020	.001	.090	.249	.021
Fiduciary Resp. Stand. Issue Reports	Correlation Coefficient	-.335**	-.319**	-.256*	.035	.-.350**
	Sig. (2-tailed)	.006	.009	.037	.778	.004
Governance Structure Stand. Issue Reports	Correlation Coefficient	-.349**	-.342**	-.265*	.101	-.320**
	Sig. (2-tailed)	.004	.005	.030	.415	.008
Leadership Change Stand. Issue Reports	Correlation Coefficient	-.469**	-.483**	-.293*	-.119	-.392**
	Sig. (2-tailed)	.000	.000	.016	.339	.001
Staff Stand. Issue Reports	Correlation Coefficient	-.195	-.339**	-.010	.074	-.244*
	Sig. (2-tailed)	.114	.005	.937	.552	.046
Core Org. Capacity Stand. Issue Reports	Correlation Coefficient	-.413**	-.439**	-.203	.035	-.449**
	Sig. (2-tailed)	.001	.000	.099	.778	.000
	N	67	67	67	67	67
* Significant at .05 level	** Significant at .01 level					

Physical Environment Correlations

Pearson's Correlations		Success Index	Schedule Index	Output Index	Budget Index
Climate Stand. Issue Reports	Pearson Correlation	-.046	-.223	.173	-.125
	Sig. (2-tailed)	.710	.069	.163	.312
Terrain Stand. Issue Reports	Pearson Correlation	-.021	-.057	.076	-.169
	Sig. (2-tailed)	.867	.645	.540	.171
Nature Stand. Issue Reports	Pearson Correlation	-.038	-.188	.172	-.184
	Sig. (2-tailed)	.759	.128	.163	.136
	N	67	67	67	67

Spearman's Rho Correlations		Success Index	Schedule Index	Output Index	Budget Index	Ordinal Success
Climate Stand. Issue Reports	Correlation Coefficient	.105	-.046	.166	-.099	.186
	Sig. (2-tailed)	.398	.713	.179	.423	.133
Terrain Stand. Issue Reports	Correlation Coefficient	-.144	-.244*	.077	-.243*	-.085
	Sig. (2-tailed)	.245	.047	.538	.048	.494
Nature Stand. Issue Reports	Correlation Coefficient	.022	-.116	.119	-.183	.097
	Sig. (2-tailed)	.862	.352	.339	.139	.436
	N	67	67	67	67	67
* Significant at .05 level						

Interorganizational Relationships Correlations

Pearson's Correlations		Success Index	Schedule Index	Output Index	Budget Index
Number of Project Partners	Pearson Coefficient	.034	-.029	.061	.049
	Sig. (2-tailed)	.788	.816	.625	.696
Property or Site Access Stand. Issue Reports	Pearson Correlation	-.035	-.267*	.175	.040
	Sig. (2-tailed)	.781	.029	.157	.748
Make Ready Stand. Issue Reports	Pearson Correlation	.043	-.077	.084	.154
	Sig. (2-tailed)	.731	.534	.502	.214
Railroad Permit Stand. Issue Reports	Pearson Correlation	.074	.018	.153	-.171
	Sig. (2-tailed)	.552	.886	.217	.167
RFP/Contractor Stand. Issue Reports	Pearson Correlation	-.149	-.103	-.124	-.029
	Sig. (2-tailed)	.228	.407	.317	.816
Ext. Project Coordination Stand. Issue Reports	Pearson Correlation	-.319**	-.333**	-.179	-.016
	Sig. (2-tailed)	.008	.006	.148	.899
Signed CAI Agreements Stand. Issue Reports	Pearson Correlation	.084	.048	.057	.080
	Sig. (2-tailed)	.501	.697	.648	.522
Signed IRU Agreements Stand. Issue Reports	Pearson Correlation	-.082	.038	-.120	-.115
	Sig. (2-tailed)	.512	.761	.335	.354
Partnerships Stand. Issue Reports	Pearson Correlation	-.125	-.147	-.081	.072
	Sig. (2-tailed)	.312	.234	.513	.565
Overlap SAC Raw Count Issue Reports	Pearson Correlation	-.332**	-.316**	-.241*	.065
	Sig. (2-tailed)	.006	.009	.050	.602
Overlap SAC Stand. Issue Reports	Pearson Correlation	-.205	-.159	-.190	.067
	Sig. (2-tailed)	.096	.199	.123	.592
Route Modifications Raw Count Issue Reports	Pearson Correlation	-.355**	-.422**	-.169	.032
	Sig. (2-tailed)	.003	.000	.173	.798
Route Modifications Stand. Issue Reports	Pearson Correlation	-.143	-.186	-.060	.035
	Sig. (2-tailed)	.249	.131	.628	.781
Other Award Action Request Stand. Issue Reports	Pearson Correlation	-.353**	-.491**	-.120	.083
	Sig. (2-tailed)	.003	.000	.333	.506
	N	67	67	67	67

* Significant at .05 level ** Significant at .01 level

Spearman's Rho Correlations		Success Index	Schedule Index	Output Index	Budget Index	Ordinal Success
Number of Project Partners	Correlation Coefficient	-.107	-.225	.013	-.058	-.162
	Sig. (2-tailed)	.389	.068	.918	.642	.190
Property or Site Access Stand. Issue Reports	Correlation Coefficient	-.061	-.340**	.159	.122	.012
	Sig. (2-tailed)	.626	.005	.198	.323	.923
Make Ready Stand. Issue Reports	Correlation Coefficient	.143	-.066	.125	.063	.051
	Sig. (2-tailed)	.250	.597	.313	.614	.679
Railroad Permit Stand. Issue Reports	Correlation Coefficient	.022	-.034	.125	-.159	.054
	Sig. (2-tailed)	.857	.782	.314	.198	.663
RFP/Contractor Stand. Issue Reports	Correlation Coefficient	-.144	-.186	-.087	-.013	-.272*
	Sig. (2-tailed)	.245	.132	.485	.920	.026
Ext. Project Coord. Stand. Issue Reports	Correlation Coefficient	-.385**	-.361**	-.194	-.064	-.205
	Sig. (2-tailed)	.001	.003	.116	.607	.096
Signed CAI Agree. Stand. Issue Reports	Correlation Coefficient	.013	-.143	.094	-.032	-.023
	Sig. (2-tailed)	.915	.248	.451	.797	.856
Signed IRU Agree. Stand. Issue Reports	Correlation Coefficient	-.237	-.100	-.085	-.070	-.118
	Sig. (2-tailed)	.053	.423	.494	.576	.341
Partnerships Stand. Issue Reports	Correlation Coefficient	-.152	-.180	-.100	.028	-.104
	Sig. (2-tailed)	.219	.145	.419	.822	.400
Overlap SAC Raw Count Reports	Correlation Coefficient	-.289*	-.242*	-.004	-.159	-.124
	Sig. (2-tailed)	.018	.048	.977	.198	.318
Overlap SAC Stand. Issue Reports	Correlation Coefficient	-.228	-.131	-.153	.013	-.085
	Sig. (2-tailed)	.063	.292	.215	.917	.494
Route Modifications Raw Count Reports	Correlation Coefficient	-.127	-.303*	-.065	.042	-.181
	Sig. (2-tailed)	.307	.013	.599	.737	.143
Route Modifications Stand. Issue Reports	Correlation Coefficient	-.022	-.119	-.058	.058	-.097
	Sig. (2-tailed)	.863	.337	.640	.641	.436
Other Award Action Request Stand. Issue Reports	Correlation Coefficient	-.240	-.375**	-.076	.195	-.091
	Sig. (2-tailed)	.051	.002	.541	.115	.463
	N	67	67	67	67	67
* Significant at .05 level ** Significant at .01 level						

Legal Environment Factors Correlations

Pearson's Correlations		Success Index	Schedule Index	Output Index	Budget Index
Local Gov. Franchise Raw Issue Reports	Pearson Correlation				
	Sig. (2-tailed)				
Local Gov. Franchise Stand. Issue Reports	Pearson Correlation	.084	.026	.114	-.028
	Sig. (2-tailed)	.497	.837	.358	.823
Other Federal Agencies Raw Issue Reports	Pearson Correlation	-.292*	-.311*	-.113	-.150
	Sig. (2-tailed)	.016	.010	.362	.226
Other Federal Agencies Stand. Issue Reports	Pearson Correlation	-.192	-.192	-.074	-.130
	Sig. (2-tailed)	.120	.119	.549	.294
Other State Agencies Raw Issue Reports	Pearson Correlation	-.179	-.184	-.044	-.091
	Sig. (2-tailed)	.147	.136	.721	.463
Other State Agencies Stand. Issue Reports	Pearson Correlation	-.116	-.118	-.057	-.037
	Sig. (2-tailed)	.352	.343	.646	.768
Tribal Relations Raw Issue Reports	Pearson Correlation	-.325**	-.543**	.047	-.149
	Sig. (2-tailed)	.007	.000	.707	.228
Tribal Relations Stand. Issue Reports	Pearson Correlation	-.279*	-.473**	.047	-.132
	Sig. (2-tailed)	.022	.000	.706	.288
State Legislation Raw Issue Reports	Pearson Correlation	.067	.140	-.059	.140
	Sig. (2-tailed)	.592	.259	.636	.259
State Legislation Stand. Issue Reports	Pearson Correlation	.066	.140	-.059	.101
	Sig. (2-tailed)	.596	.260	.633	.415
	N	67	67	67	67
* Significant at .05 level	** Significant at .01 level				

Spearman's Rho Correlations		Success Index	Schedule Index	Output Index	Budget Index	Ordinal Success
Local Gov. Franchise Raw Issue Reports	Correlation Coefficient					
	Sig. (2-tailed)					
Local Gov. Franchise Stand. Issue Reports	Correlation Coefficient	.133	-.108	.132	.051	.063
	Sig. (2-tailed)	.283	.386	.288	.681	.613
Other Federal Agencies Raw Issue Reports	Correlation Coefficient					
	Sig. (2-tailed)					
Other Federal Agencies Stand. Issue Reports	Correlation Coefficient	-.154	-.221	.018	-.199	-.139
	Sig. (2-tailed)	.214	.072	.884	.107	.261
Other State Agencies Raw Issue Reports	Correlation Coefficient					
	Sig. (2-tailed)					
Other State Agencies Stand. Issue Reports	Correlation Coefficient	-.165	-.105	-.118	.045	-.110
	Sig. (2-tailed)	.182	.398	.340	.718	.374
Tribal Relations Raw Issue Reports	Correlation Coefficient					
	Sig. (2-tailed)					
Tribal Relations Stand. Issue Reports	Correlation Coefficient	-.205	-.216	-.055	-.107	-.163
	Sig. (2-tailed)	.096	.079	.661	.390	.188
State Legislation Raw Issue Reports	Correlation Coefficient					
	Sig. (2-tailed)					
State Legislation Stand. Issue Reports	Correlation Coefficient	.079	.209	-.077	.195	.062
	Sig. (2-tailed)	.527	.090	.536	.114	.616
	N	67	67	67	67	67

Crosscutting Factors Correlations

Pearson's Correlations		Success Index	Schedule Index	Output Index	Budget Index
Months to Initial FONSI	Pearson Correlation	-.252*	-.279*	-.180	.150
	Sig. (2-tailed)	.040	.022	.145	.226
DOT Permit Raw Reports	Pearson Correlation	.159	.094	.145	.035
	Sig. (2-tailed)	.198	.448	.242	.776
DOT Permit Stand. Issue Reports	Pearson Correlation	.127	.091	.105	.016
	Sig. (2-tailed)	.307	.465	.399	.895
Local Gov. Permits Raw Reports	Pearson Correlation	.152	.043	.173	.054
	Sig. (2-tailed)	.221	.129	.161	.663
Local Gov. Permits Stand. Issue Reports	Pearson Correlation	.189	.090	.187	.057
	Sig. (2-tailed)	.126	.471	.130	.648
EA/FONSI Raw Reports	Pearson Correlation	-.260*	-.304*	-.142	.065
	Sig. (2-tailed)	.033	.012	.251	.599
EA/FONSI Stand. Issue Reports	Pearson Correlation	-.042	-.051	-.059	.123
	Sig. (2-tailed)	.733	.682	.634	.323
Fed. Environ. Agencies Raw Reports	Pearson Correlation	-.445**	-.425**	-.267*	-.073
	Sig. (2-tailed)	.000	.000	.029	.559
Federal Environ. Agencies Stand. Issue Reports	Pearson Correlation	-.334**	-.302*	-.214	-.061
	Sig. (2-tailed)	.006	.013	.082	.626
Environ. Permitting Raw Reports	Pearson Correlation	-.180	-.151	-.103	-.102
	Sig. (2-tailed)	.146	.223	.408	.413
Environ. Permitting Stand. Issue Reports	Pearson Correlation	-.108	-.058	-.082	-.088
	Sig. (2-tailed)	.385	.644	.507	.478
SHPO Raw Reports	Pearson Correlation	-.385**	-.485**	-.181	-107
	Sig. (2-tailed)	.001	.000	.142	.390
SHPO Stand. Issue Reports	Pearson Correlation	-.241*	-.335**	-.112	.147
	Sig. (2-tailed)	.050	.006	.367	.236
Property Access Meta-Factor Raw Report	Pearson Correlation	-.034	-.245*	.179	.053
	Sig. (2-tailed)	.786	.024	.146	.668
Property Access Meta-Factor Stand. Issue Reports	Pearson Correlation	.064	-.133	.196	.062
	Sig. (2-tailed)	.607	.284	.112	.616
	N	67	67	67	67
* Significant at .05 level	** Significant at .01 level				

Spearman's Rho Correlations		Success Index	Schedule Index	Output Index	Budget Index	Ordinal Success
Months to Initial FONSI	Correlation Coefficient	-.132	-.281	-.118	.008	-.193
	Sig. (2-tailed)	.288	.021	.344	.950	.118
DOT Permit Raw Reports	Correlation Coefficient	.195	.073	.126	-.034	.129
	Sig. (2-tailed)	.114	.559	.308	.786	.298
DOT Permit Stand. Issue Reports	Correlation Coefficient	.162	.092	.093	-.044	.128
	Sig. (2-tailed)	.190	.459	.456	.724	.302
Local Gov. Permits Raw Reports	Correlation Coefficient	.161	-.088	.180	.098	.046
	Sig. (2-tailed)	.194	.480	.146	.430	.714
Local Gov. Permits Stand. Issue Reports	Correlation Coefficient	.185	-.054	.187	.107	.066
	Sig. (2-tailed)	.133	.666	.131	.391	.593
EA/FONSI Raw Reports	Correlation Coefficient	-.108	-.213	-.126	.068	-.085
	Sig. (2-tailed)	.383	.083	.309	.586	.493
EA/FONSI Stand. Issue Reports	Correlation Coefficient	.043	.019	-.108	.155	.042
	Sig. (2-tailed)	.731	.879	.383	.210	.738
Fed. Environ. Agencies Raw Reports	Correlation Coefficient	-.260	-.316**	-.205	-.010	-.181
	Sig. (2-tailed)	.034	.009	.095	.936	.143
Fed. Environ. Agencies Stand. Issue Reports	Correlation Coefficient	-.228	-.260*	-.205	-.022	-.160
	Sig. (2-tailed)	.063	.033	.096	.858	.196
Environ. Permitting Raw Reports	Correlation Coefficient	-.303*	-.142	-.226	-.115	-.032
	Sig. (2-tailed)	.013	.253	.066	.354	.795
Environ. Permitting Stand. Issue Reports	Correlation Coefficient	-.284*	-.110	-.219	-.110	-.017
	Sig. (2-tailed)	.020	.376	.075	.377	.889
SHPO Raw Reports	Correlation Coefficient	-.194	-.483**	-.025	.020	-.292*
	Sig. (2-tailed)	.116	.000	.842	.875	.017
SHPO Stand. Issue Reports	Correlation Coefficient	-.127	-.390**	-.035	.060	-.260*
	Sig. (2-tailed)	.305	.001	.776	.630	.034
Property Access Meta-Factor Raw Report	Correlation Coefficient	-.079	-.442**	.175	.080	-.076
	Sig. (2-tailed)	.523	.000	.156	.522	.542
Property Access Meta-Factor Stand. Issue Reports	Correlation Coefficient	-.004	-.348**	.202	.106	-.029
	Sig. (2-tailed)	.973	.004	.101	.395	.816
	N	67	67	67	67	67
* Significant at .05 level ** Significant at .01 level						

Appendix G Chi-Square Tests and Symmetric Measures Results

Project-Specific Factors Chi-Square Tests and Symmetric Measures

Materials Issue Report Presence

Materials Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.027[a]	.870		
Continuity Correction	.000	1.000		
Likelihood Ratio	.027	.870		
Fisher's Exact Test			1.000	.560
Linear-by-Linear Association	.027	.871		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.020	.124	-.162	.871
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.76.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Materials Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.987[a]	.320		
Continuity Correction	.513	.474		
Likelihood Ratio	.971	.324		
Fisher's Exact Test			.408	.236
Linear-by-Linear Association	.972	.324		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.121	.124	-.970	.332
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.21.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Materials Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.384[a]	.536		
Continuity Correction	.115	.735		
Likelihood Ratio	.379	.538		
Fisher's Exact Test			.582	.364
Linear-by-Linear Association	.378	.539		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.076	.124	.608	.543
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.90.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Materials Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	.979		
Continuity Correction	.000	1.000		
Likelihood Ratio	.001	.979		
Fisher's Exact Test			1.000	.599
Linear-by-Linear Association	.001	.979		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.003	.122	.026	.979
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.96. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Materials Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	.278[a]	.964		
Likelihood Ratio	.287	.962		
Linear-by-Linear Association	.058	.810		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.037	.118	-.309	.757
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.88. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Technology Change

Technology Change * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.007[a]	.934		
Continuity Correction	.000	1.000		
Likelihood Ratio	.007	.933		
Fisher's Exact Test			1.000	.709
Linear-by-Linear Association	.007	.934		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.010	.119	-.085	.932
N of Valid Cases	67			
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.07. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Technology Change * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.912[a]	.340		
Continuity Correction	.254	.614		
Likelihood Ratio	1.018	.313		
Fisher's Exact Test			.656	.321
Linear-by-Linear Association	.898	.343		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.117	.100	-1.092	.275
N of Valid Cases	67			
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.06.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Technology Change * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	.978		
Continuity Correction	.000	1.000		
Likelihood Ratio	.001	.978		
Fisher's Exact Test			1.000	.649
Linear-by-Linear Association	.001	.978		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.003	.123	-.027	.978
N of Valid Cases	67			
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.97.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Technology Change * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.080[a]	.777		
Continuity Correction	.000	1.000		
Likelihood Ratio	.078	.780		
Fisher's Exact Test			1.000	.551
Linear-by-Linear Association	.079	.779		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.035	.127	-.271	.786
N of Valid Cases	67			
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.70.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Technology Change Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	.482[a]		.923	
Likelihood Ratio	.402		.940	
Linear-by-Linear Association	.226		.635	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.028	.079	-.351	.725
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .54.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Organization-Focused Factors Chi-Square Tests and Symmetric Measures

Government Agency

Government Dummy * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.002[a]	.968		
Continuity Correction	.000	1.000		
Likelihood Ratio	.002	.968		
Fisher's Exact Test			1.000	.608
Linear-by-Linear Association	.002	.968		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.005	.123	.040	.968
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.94.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Government Dummy * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.723[a]	.395		
Continuity Correction	.332	.564		
Likelihood Ratio	.739	.390		
Fisher's Exact Test			.428	.285
Linear-by-Linear Association	.713	.399		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.104	.118	-.878	.380
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.55.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Government Sector * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.460[a]	.498		
Continuity Correction	.161	.688		
Likelihood Ratio	.468	.494		
Fisher's Exact Test			.586	.348
Linear-by-Linear Association	.453	.501		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.083	.119	.696	.486
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.22.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Government Dummy * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.019[a]	.890		
Continuity Correction	.000	1.000		
Likelihood Ratio	.019	.890		
Fisher's Exact Test			1.000	.565
Linear-by-Linear Association	.019	.891		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.017	.121	.139	.890
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.24.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Government Dummy * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	1.140	.768		
Likelihood Ratio	1.107	.775		
Linear-by-Linear Association	.109	.741		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.018	.123	-.145	.884
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.97.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

For-Profit Organization

For-Profit Dummy * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.745[a]	.388		
Continuity Correction	.282	.596		
Likelihood Ratio	.779	.378		
Fisher's Exact Test			.515	.304
Linear-by-Linear Association	.733	.392		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.105	.113	-.917	.359
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.30.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

For-Profit Dummy * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.167[a]	.683		
Continuity Correction	.020	.889		
Likelihood Ratio	.166	.684		
Fisher's Exact Test			.790	.441
Linear-by-Linear Association	.164	.685		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.050	.123	.405	.685
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.24.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

For-Profit Dummy * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.865[a]	.091		
Continuity Correction	2.020	.155		
Likelihood Ratio	2.817	.093		
Fisher's Exact Test			.109	.078
Linear-by-Linear Association	2.822	.093		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.207	.123	-1.654	.098
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.88.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

For-Profit Dummy * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.538[a]	.215		
Continuity Correction	.917	.338		
Likelihood Ratio	1.508	.219		
Fisher's Exact Test			.263	.169
Linear-by-Linear Association	1.515	.218		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.152	.125	-1.203	.229
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.81.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

For-Profit Dummy * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	1.322		.724	
Likelihood Ratio	1.332		.722	
Linear-by-Linear Association	1.280		.258	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.138	.112	-1.142	.253
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.15.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Nonprofit Organization

Nonprofit Dummy * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.419[a]	.518		
Continuity Correction	.075	.785		
Likelihood Ratio	.446	.504		
Fisher's Exact Test			.716	.409
Linear-by-Linear Association	.412	.521		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.079	.110	-.709	.478
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.87.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Nonprofit Dummy * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.088[a]	.766		
Continuity Correction	.000	1.000		
Likelihood Ratio	.089	.765		
Fisher's Exact Test			1.000	.509
Linear-by-Linear Association	.087	.768		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.036	.120	-.302	.763
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.49.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Nonprofit Dummy * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.024[a]	.877		
Continuity Correction	.000	1.000		
Likelihood Ratio	.024	.877		
Fisher's Exact Test			1.000	.567
Linear-by-Linear Association	.024	.878		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.019	.121	.156	.876
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.25.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Nonprofit Dummy * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.955[a]	.328		
Continuity Correction	.435	.510		
Likelihood Ratio	1.013	.314		
Fisher's Exact Test			.526	.260
Linear-by-Linear Association	.941	.332		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.119	.111	1.063	.288
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.54.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Nonprofit Dummy * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	2.931		.402	
Likelihood Ratio	4.317		.229	
Linear-by-Linear Association	.411		.521	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	.042	.099	.443	.658
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.43.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Utility Provider

Utility Provider Dummy * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.719[a]	.054		
Continuity Correction	2.577	.108		
Likelihood Ratio	3.688	.055		
Fisher's Exact Test			.103	.055
Linear-by-Linear Association	3.663	.056		
N of Valid Cases	67			
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.236	.120	-1.859	.063
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.01.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Utility Provider Dummy * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.041[a]	.840		
Continuity Correction	.000	1.000		
Likelihood Ratio	.041	.840		
Fisher's Exact Test			1.000	.521
Linear-by-Linear Association	.040	.841		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.025	.122	-.202	.840
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.61.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Utility Provider Dummy * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.894[a]	.027*		
Continuity Correction	3.796	.051		
Likelihood Ratio	5.124	.024*		
Fisher's Exact Test			.036*	.024*
Linear-by-Linear Association	4.821	.028*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.270	.111	-2.384	.017*
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.19.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Utility Provider Dummy * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.267[a]	.605		
Continuity Correction	.059	.809		
Likelihood Ratio	.269	.604		
Fisher's Exact Test			.784	.407
Linear-by-Linear Association	.263	.608		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.063	.120	-.523	.601
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.94.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Utility Provider Dummy * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	3.903	.272		
Likelihood Ratio	3.880	.275		
Linear-by-Linear Association	1.424	.233		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.146	.116	-1.259	.208
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.51.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Broadband Provider

Broadband Dummy * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.597[a]	.058		
Continuity Correction	2.412	.120		
Likelihood Ratio	4.337	.037*		
Fisher's Exact Test			.086	.053
Linear-by-Linear Association	3.543	.060		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.232	.085	-2.381	.017*
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.76.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Broadband Dummy * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.501[a]	.220		
Continuity Correction	.899	.343		
Likelihood Ratio	1.556	.212		
Fisher's Exact Test			.275	.172
Linear-by-Linear Association	1.479	.224		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.150	.115	-1.293	.196
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.21.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Broadband Dummy * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.393[a]	.238		
Continuity Correction	.810	.368		
Likelihood Ratio	1.364	.243		
Fisher's Exact Test			.271	.184
Linear-by-Linear Association	1.372	.241		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.144	.125	-1.144	.253
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.90.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Broadband Dummy * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.373[a]	.542		
Continuity Correction	.101	.750		
Likelihood Ratio	.367	.545		
Fisher's Exact Test			.569	.370
Linear-by-Linear Association	.367	.545		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.075	.125	-.595	.552
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.96.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Broadband Dummy * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	1.936	.586		
Likelihood Ratio	2.098	.552		
Linear-by-Linear Association	.912	.340		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.133	.114	-1.164	.244
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.97.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Accounting System

Accounting System Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.519[a]	.061		
Continuity Correction	2.170	.141		
Likelihood Ratio	5.776	.016*		
Fisher's Exact Test			.104	.057
Linear-by-Linear Association	3.467	.063		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.139	.044	-3.154	.002**
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.33.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level ** Significant at .01 level				

Accounting System Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.906[a]	.341		
Continuity Correction	.392	.531		
Likelihood Ratio	.954	.329		
Fisher's Exact Test			.518	.271
Linear-by-Linear Association	.892	.345		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.087	.085	-1.022	.307
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.46.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Accounting System Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.697[a]	.404		
Continuity Correction	.256	.613		
Likelihood Ratio	.731	.393		
Fisher's Exact Test			.521	.314
Linear-by-Linear Association	.686	.407		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.076	.085	.893	.372
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.27.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Accounting System Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.741[a]	.003**		
Continuity Correction	6.832	.009**		
Likelihood Ratio	7.988	.005**		
Fisher's Exact Test			.006**	.006**
Linear-by-Linear Association	8.610	.003**		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.258	.103	-2.493	.013*
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.69.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Accounting System Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	11.638		.009**	
Likelihood Ratio	12.350		.006**	
Linear-by-Linear Association	8.086		.004**	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.353	.092	-3.206	.001**
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.16.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
** Significant at .01 level

Matching Funds

Matching Funds Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.208[a]	.013*		
Continuity Correction	4.695	.030*		
Likelihood Ratio	7.377	.007**		
Fisher's Exact Test			.020*	.011*
Linear-by-Linear Association	6.116	.013*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.229	.077	-2.966	.003**
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.84.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Matching Funds Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.814[a]	.001**		
Continuity Correction	9.157	.002**		
Likelihood Ratio	11.899	.001**		
Fisher's Exact Test			.001**	.001**
Linear-by-Linear Association	10.652	.001**		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.374	.097	-3.839	.000**
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.27.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Matching Funds Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.979[a]	.322		
Continuity Correction	.525	.469		
Likelihood Ratio	.995	.318		
Fisher's Exact Test			.428	.236
Linear-by-Linear Association	.965	.326		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.111	.110	1.015	.310
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.87.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Matching Funds Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.677[a]	.195		
Continuity Correction	1.038	.308		
Likelihood Ratio	1.657	.198		
Fisher's Exact Test			.270	.154
Linear-by-Linear Association	1.652	.199		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.140	.110	-1.273	.203
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.66.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Matching Funds Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	12.629	.006**		
Likelihood Ratio	13.941	.003**		
Linear-by-Linear Association	2.382	.123		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.265	.115	-2.292	.022*
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.42.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Fiduciary Responsibility

Fiduciary Responsibility Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.268[a]	.132		
Continuity Correction	1.079	.299		
Likelihood Ratio	3.846	.050*		
Fisher's Exact Test			.196	.149
Linear-by-Linear Association	2.234	.135		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.096	.035	-2.724	.006**
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.61.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Fiduciary Responsibility Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.486[a]	.115		
Continuity Correction	1.439	.230		
Likelihood Ratio	2.916	.088		
Fisher's Exact Test			.149	.112
Linear-by-Linear Association	2.449	.118		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx.Significance
Kendall's tau-b	-.125	.066	-1.898	.058
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.09.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Fiduciary Responsibility Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	.973		
Continuity Correction	.000	1.000		
Likelihood Ratio	.001	.973		
Fisher's Exact Test			1.000	.623
Linear-by-Linear Association	.001	.973		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.003	.079	-.034	.973
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.96.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Fiduciary Responsibility Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.510[a]	.006**		
Continuity Correction	5.490	.019*		
Likelihood Ratio	6.724	.010**		
Fisher's Exact Test			.012*	.012*
Linear-by-Linear Association	7.398	.007**		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Ordinal by Ordinal Kendall's tau-b	-.206	.094	-2.182	.029*
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.55.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Fiduciary Responsibility Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	8.894	.031*		
Likelihood Ratio	9.129	.028*		
Linear-by-Linear Association	7.539	.006**		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.246	.092	-2.663	.008**
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .81.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Governance Structure

Governance Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.268[a]	.132		
Continuity Correction	1.079	.299		
Likelihood Ratio	3.846	.050*		
Fisher's Exact Test			.196	.149
Linear-by-Linear Association	2.234	.135		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.096	.035	-2.724	.006**
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.61.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Governance Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.486[a]	.115		
Continuity Correction	1.439	.230		
Likelihood Ratio	2.916	.088		
Fisher's Exact Test			.149	.112
Linear-by-Linear Association	2.449	.118		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx.Significance
Kendall's tau-b	-.125	.066	-1.898	.058
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.09.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Governance Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.531[a]	.466		
Continuity Correction	.121	.728		
Likelihood Ratio	.563	.453		
Fisher's Exact Test			.707	.377
Linear-by-Linear Association	.523	.470		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.057	.072	.789	.430
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.96.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Governance Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.510[a]	.006**		
Continuity Correction	5.490	.019*		
Likelihood Ratio	6.724	.010**		
Fisher's Exact Test			.012*	.012*
Linear-by-Linear Association	7.398	.007		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.206	.094	-2.182	.029*
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.55.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level ** Significant at .01 level				

Governance Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	11.044[a]		.011*	
Likelihood Ratio	10.336		.016*	
Linear-by-Linear Association	5.364		.021*	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.230	.088	-2.608	.009**
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .81.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Leadership Change

Leadership Change Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.982[a]	.159		
Continuity Correction	.840	.359		
Likelihood Ratio	3.387	.066		
Fisher's Exact Test			.333	.187
Linear-by-Linear Association	1.953	.162		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.086	.033	-2.594	.009**
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.43.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Leadership Change Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.749[a]	.029*		
Continuity Correction	3.177	.075		
Likelihood Ratio	7.284	.007**		
Fisher's Exact Test			.044*	.027*
Linear-by-Linear Association	4.678	.031*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.164	.054	-3.032	.002**
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.75.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Leadership Change Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.214[a]	.271		
Continuity Correction	.491	.484		
Likelihood Ratio	1.150	.284		
Fisher's Exact Test			.423	.237
Linear-by-Linear Association	1.195	.274		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.082	.082	-1.000	.317
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.63.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Leadership Change Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.728[a]	.002**		
Continuity Correction	7.295	.007**		
Likelihood Ratio	8.682	.003**		
Fisher's Exact Test			.005**	.005**
Linear-by-Linear Association	9.583	.002**		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.223	.094	-2.383	.017*
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.27.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Leadership Change Issue Report Presence * Ordinal Success Measure		
Chi-Square Tests		
	Value	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.342[a]	.004**
Likelihood Ratio	11.634	.009**
Linear-by-Linear Association	11.700	.001**

Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.267	.097	-2.744	.006**
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .72.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
** Significant at .01 level

Staffing

Staffing Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.396[a]	.237		
Continuity Correction	.623	.430		
Likelihood Ratio	1.646	.199		
Fisher's Exact Test			.435	.222
Linear-by-Linear Association	1.375	.241		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.090	.061	-1.484	.138
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.51.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Staffing Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.154[a]	.076		
Continuity Correction	2.130	.144		
Likelihood Ratio	3.530	.060		
Fisher's Exact Test			.114	.068
Linear-by-Linear Association	3.107	.078		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.168	.082	-2.053	.040*
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.81.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level				

Staffing Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.146[a]	.702		
Continuity Correction	.004	.951		
Likelihood Ratio	.149	.700		
Fisher's Exact Test			1.000	.484
Linear-by-Linear Association	.144	.705		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.036	.091	.392	.695
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.60.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Staffing Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.080[a]	.043*		
Continuity Correction	2.845	.092		
Likelihood Ratio	3.796	.051		
Fisher's Exact Test			.092	.049*
Linear-by-Linear Association	4.019	.045*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.181	.101	-1.787	.074
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.97.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Staffing Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	5.330[a]	.149		
Likelihood Ratio	5.062	.167		
Linear-by-Linear Association	3.921	.048*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.219	.105	-2.087	.037*
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Core Organizational Capacity Meta-Factor

Core Organizational Capacity Issue Reports Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.208[a]	.013*		
Continuity Correction	4.695	.030*		
Likelihood Ratio	7.377	.007**		
Fisher's Exact Test			.020*	.011*
Linear-by-Linear Association	6.116	.013*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.229	.077	-2.966	.003**
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.84.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Core Organizational Capacity Issue Reports Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.639[a]	.006**		
Continuity Correction	6.258	.012*		
Likelihood Ratio	8.184	.004**		
Fisher's Exact Test			.008**	.005**
Linear-by-Linear Association	7.525	.006**		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.315	.102	-3.094	.002**
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.27.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Core Organizational Capacity Issue Reports Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.005[a]	.943		
Continuity Correction	.000	1.000		
Likelihood Ratio	.005	.943		
Fisher's Exact Test			1.000	.574
Linear-by-Linear Association	.005	.944		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.008	.113	-.071	.943
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.87.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Core Organizational Capacity Issue Reports Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.718[a]	.003**		
Continuity Correction	7.163	.007**		
Likelihood Ratio	8.695	.003**		
Fisher's Exact Test			.005**	.004**
Linear-by-Linear Association	8.588	.003**		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.319	.108	-2.943	.003**
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.66.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Core Organizational Capacity Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	13.593[a]	.004**		
Likelihood Ratio	14.803	.002**		
Linear-by-Linear Association	13.213	.000**		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.460	.105	-4.366	.000**
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.42.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
** Significant at .01 level

Physical Environment Factors Chi-Square Tests and Symmetric Measures

Climate

Climate Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.407[a]	.524		
Continuity Correction	.089	.765		
Likelihood Ratio	.423	.516		
Fisher's Exact Test			.737	.392
Linear-by-Linear Association	.401	.527		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.056	.083	.673	.501
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.94.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Climate Issue Report Presence* Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.060[a]	.806		
Continuity Correction	.000	1.000		
Likelihood Ratio	.060	.807		
Fisher's Exact Test			1.000	.507
Linear-by-Linear Association	.059	.808		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.027	.110	-.244	.807
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.55.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Climate Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.185[a]	.667		
Continuity Correction	.023	.878		
Likelihood Ratio	.183	.669		
Fisher's Exact Test			.783	.435
Linear-by-Linear Association	.182	.670		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.046	.109	.425	.671
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.22.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Climate Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.193[a]	.660		
Continuity Correction	.023	.880		
Likelihood Ratio	.191	.662		
Fisher's Exact Test			.774	.435
Linear-by-Linear Association	.190	.663		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.045	.105	.432	.666
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.24.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Climate Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	.762[a]	.859		
Likelihood Ratio	.762	.859		
Linear-by-Linear Association	.413	.520		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	.089	.118	.753	.451
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.97.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Terrain

Terrain Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.564[a]	.453		
Continuity Correction	.173	.678		
Likelihood Ratio	.588	.443		
Fisher's Exact Test			.523	.347
Linear-by-Linear Association	.556	.456		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.067	.084	-.796	.426
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.12.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Terrain Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.457[a]	.035*		
Continuity Correction	3.386	.066		
Likelihood Ratio	4.757	.029*		
Fisher's Exact Test			.057	.030*
Linear-by-Linear Association	4.390	.036*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.233	.100	-2.330	.020*
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.90.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Terrain Issue Report Presence* Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.799[a]	.180		
Continuity Correction	1.139	.286		
Likelihood Ratio	1.767	.184		
Fisher's Exact Test			.273	.143
Linear-by-Linear Association	1.772	.183		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.146	.112	-1.307	.191
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.55.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Terrain Issue Report Presence* Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.074[a]	.785		
Continuity Correction	.000	1.000		
Likelihood Ratio	.074	.786		
Fisher's Exact Test			.783	.500
Linear-by-Linear Association	.073	.787		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.029	.106	-.270	.787
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.52.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Terrain Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	1.166	.769		
Likelihood Ratio	1.125	.771		
Linear-by-Linear Association	.791	.374		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.094	.113	-.831	.406
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.06.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Interorganizational Relationships Chi-Square Tests and Symmetric Measures

Utility Make Ready

Make Ready Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.482[a]	.487		
Continuity Correction	.141	.707		
Likelihood Ratio	.484	.487		
Fisher's Exact Test			.539	.354
Linear-by-Linear Association	.475	.491		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.065	.094	-.695	.487
N of Valid Cases	67			
a. 0 cells (.0 %) have expected count less than 5. The minimum expected count is 5.91.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Make Ready Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.781[a]	.016*		
Continuity Correction	4.610	.032*		
Likelihood Ratio	5.895	.015*		
Fisher's Exact Test			.021*	.015*
Linear-by-Linear Association	5.695	.017*		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.279	.111	-2.507	.012*
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.33.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level				

Make Ready Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.007[a]	.932		
Continuity Correction	.000	1.000		
Likelihood Ratio	.007	.932		
Fisher's Exact Test			1.000	.569
Linear-by-Linear Association	.007	.932		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Kendall's tau-b	.010	.115	.085	.932
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.84.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Make Ready Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.121[a]	.728		
Continuity Correction	.006	.939		
Likelihood Ratio	.121	.728		
Fisher's Exact Test			.791	.469
Linear-by-Linear Association	.119	.730		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	.038	.110	.348	.728
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.36.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Make Ready Issue Report Presence * Ordinal Success Measure		
Chi-Square Tests		
	Value	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.562[a]	.668
Likelihood Ratio	1.578	.664
Linear-by-Linear Association	.314	.575

Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.057	.128	-.447	.655
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.42.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Site Access

Site Access Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.984[a]	.321		
Continuity Correction	.452	.501		
Likelihood Ratio	1.004	.316		
Fisher's Exact Test			.359	.252
Linear-by-Linear Association	.969	.325		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.093	.091	-1.015	.310
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.55.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Site Access Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.738[a]	.017*		
Continuity Correction	4.568	.033*		
Likelihood Ratio	5.930	.015*		
Fisher's Exact Test			.021*	.015*
Linear-by-Linear Association	5.652	.017*		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.277	.109	-2.546	.011*
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.64.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Site Access Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.009[a]	.926		
Continuity Correction	.000	1.000		
Likelihood Ratio	.009	.926		
Fisher's Exact Test			1.000	.567
Linear-by-Linear Association	.009	.926		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.011	.114	.094	.925
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 10.18.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Site Access Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.948[a]	.330		
Continuity Correction	.493	.483		
Likelihood Ratio	.958	.328		
Fisher's Exact Test			.419	.242
Linear-by-Linear Association	.934	.334		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	.107	.108	.989	.323
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.79.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Site Access Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	4.897	.179		
Likelihood Ratio	5.048	.168		
Linear-by-Linear Association	.181	.670		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.029	.128	-.230	.818
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.78.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Railroad Permitting

Railroad Permitting Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.006[a]	.936		
Continuity Correction	.000	1.000		
Likelihood Ratio	.006	.936		
Fisher's Exact Test			1.000	1.000
Linear-by-Linear Association	.006	.937		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.007	.088	-.081	.936
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.12. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Railroad Permitting Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.236[a]	.627		
Continuity Correction	.046	.830		
Likelihood Ratio	.238	.626		
Fisher's Exact Test			.788	.419
Linear-by-Linear Association	.232	.630		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.053	.109	-.493	.622
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.90. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Railroad Permitting Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.799[a]	.180		
Continuity Correction	1.139	.286		
Likelihood Ratio	1.767	.184		
Fisher's Exact Test			.273	.143
Linear-by-Linear Association	1.772	.183		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.146	.112	-1.307	.191
N of Valid Cases	67			
a. 0 cells (25.0%) have expected count less than 5. The minimum expected count is 7.55. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Railroad Permitting Issue Report Presence* Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.755[a]	.385		
Continuity Correction	.341	.559		
Likelihood Ratio	.777	.378		
Fisher's Exact Test			.569	.283
Linear-by-Linear Association	.744	.388		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	.091	.100	.905	.365
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.52.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Railroad Permitting Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	2.521[a]	.471		
Likelihood Ratio	2.698	.471		
Linear-by-Linear Association	.001	.971		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	.031	.121	.258	.797
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.06.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

External Project Coordination

External Project Coordination Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.407[a]	.524		
Continuity Correction	.089	.765		
Likelihood Ratio	.423	.516		
Fisher's Exact Test			.737	.392
Linear-by-Linear Association	.401	.527		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.056	.083	-.673	.501
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.94.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

External Project Coordination Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.955[a]	.162		
Continuity Correction	1.264	.261		
Likelihood Ratio	2.034	.154		
Fisher's Exact Test			.184	.130
Linear-by-Linear Association	1.926	.165		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.152	.103	-1.484	.138
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.55.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

External Project Coordination Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.185[a]	.667		
Continuity Correction	.023	.878		
Likelihood Ratio	.183	.669		
Fisher's Exact Test			.783	.435
Linear-by-Linear Association	.182	.670		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.046	.109	-.425	.671
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

External Project Coordination Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.712[a]	.030*		
Continuity Correction	3.543	.060		
Likelihood Ratio	4.552	.033*		
Fisher's Exact Test			.044*	.031*
Linear-by-Linear Association	4.642	.031*		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.225	.109	-2.055	.040*
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.24.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level				

External Project Coordination Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	5.888		.117	
Likelihood Ratio	5.654		.130	
Linear-by-Linear Association	3.577		.059	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.236	.123	-1.913	.056
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.97.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

RFP/Contractor

RFP/Contractor Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.220[a]	.269		
Continuity Correction	.617	.432		
Likelihood Ratio	1.243	.265		
Fisher's Exact Test			.347	.217
Linear-by-Linear Association	1.201	.273		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-1.03	.092	-1.126	.260
N of Valid Cases	67			
a. 0 cells (.0 %) have expected count less than 5. The minimum expected count is 5.73.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

RFP/Contractor Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.364[a]	.124		
Continuity Correction	1.639	.201		
Likelihood Ratio	2.394	.122		
Fisher's Exact Test			.197	.100
Linear-by-Linear Association	2.329	.127		
N of Valid Cases	67			
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.178	.113	-1.575	.115
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.99.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

RFP/Contractor Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.070[a]	.792		
Continuity Correction	.000	.997		
Likelihood Ratio	.070	.791		
Fisher's Exact Test			1.000	.499
Linear-by-Linear Association	.069	.793		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.030	.114	.265	.791
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

RFP/Contractor Issue Report Presence* Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.537[a]	.033*		
Continuity Correction	3.455	.063		
Likelihood Ratio	4.605	.032*		
Fisher's Exact Test			.056	.031*
Linear-by-Linear Association	4.469	.035*		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.234	.108	-2.180	.029*
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.07.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

RFP/Contractor Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	6.536	.088		
Likelihood Ratio	6.827	.078		
Linear-by-Linear Association	5.887	.015*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.302	.120	-2.508	.012*
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.42.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Signed CAI Agreement

Signed CAI Agreement Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.662[a]	.197		
Continuity Correction	.823	.364		
Likelihood Ratio	1.974	.160		
Fisher's Exact Test			.273	.185
Linear-by-Linear Association	1.637	.201		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.101	.062	-1.629	.103
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Signed CAI Agreement Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.760[a]	.185		
Continuity Correction	1.036	.309		
Likelihood Ratio	1.882	.170		
Fisher's Exact Test			.230	.154
Linear-by-Linear Association	1.734	.188		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.128	.088	-1.454	.146
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.15.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Signed CAI Agreement Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.450[a]	.502		
Continuity Correction	.129	.720		
Likelihood Ratio	.440	.507		
Fisher's Exact Test			.542	.354
Linear-by-Linear Association	.443	.506		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.064	.099	-.648	.517
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.93.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Signed CAI Agreement Issue Report Presence* Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.665[a]	.415		
Continuity Correction	.240	.624		
Likelihood Ratio	.700	.403		
Fisher's Exact Test			.527	.320
Linear-by-Linear Association	.655	.418		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	.075	.085	.877	.380
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.25.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Signed CAI Agreement Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	4.290	.232		
Likelihood Ratio	4.818	.186		
Linear-by-Linear Association	.213	.644		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.039	.095	-.411	.681
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.34.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Signed IRU Agreement

Signed IRU Agreement Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	.974		
Continuity Correction	.000	1.00		
Likelihood Ratio	.001	.974		
Fisher's Exact Test			1.000	.643
Linear-by-Linear Association	.001	.974		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.003	.081	-.033	.974
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.04.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level ** Significant at .01 level				

Signed IRU Agreement Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.009[a]	.923		
Continuity Correction	.000	1.000		
Likelihood Ratio	.009	.923		
Fisher's Exact Test			1.000	.572
Linear-by-Linear Association	.009	.923		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	.010	.101	.097	.923
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.84.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Signed IRU Agreement Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.062[a]	.803		
Continuity Correction	.000	1.000		
Likelihood Ratio	.062	.803		
Fisher's Exact Test			1.000	.513
Linear-by-Linear Association	.061	.804		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.025	.101	-.247	.805
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.58.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Signed IRU Agreement Issue Report Presence * Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.842[a]	.175		
Continuity Correction	1.094	.296		
Likelihood Ratio	1.762	.184		
Fisher's Exact Test			.217	.148
Linear-by-Linear Association	1.815	.178		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.130	.103	-1.264	.206
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.82.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Signed IRU Agreement Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	4.899		.179	
Likelihood Ratio	4.466		.215	
Linear-by-Linear Association	.434		.510	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.100	.117	-.852	.394
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.42.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Partnerships

Partnerships Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	.980		
Continuity Correction	.000	1.000		
Likelihood Ratio	.001	.980		
Fisher's Exact Test			1.000	.634
Linear-by-Linear Association	.001	.980		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.002	.070	.026	.980
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.97.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Partnerships Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.291[a]	.590		
Continuity Correction	.037	.848		
Likelihood Ratio	.300	.584		
Fisher's Exact Test			.736	.434
Linear-by-Linear Association	.286	.593		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.046	.082	-.563	.573
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.78.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Partnerships Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.185[a]	.667		
Continuity Correction	.006	.937		
Likelihood Ratio	.190	.663		
Fisher's Exact Test			1.000	.480
Linear-by-Linear Association	.182	.670		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.037	.082	.446	.655
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Partnerships Issue Report Presence* Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.893[a]	.169		
Continuity Correction	1.020	.312		
Likelihood Ratio	1.765	.184		
Fisher's Exact Test			.270	.156
Linear-by-Linear Association	1.865	.172		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.112	.092	-1.224	.221
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.12.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Partnerships Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	3.351		.341	
Likelihood Ratio	2.991		.393	
Linear-by-Linear Association	.645		.422	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.088	.105	-.841	.401
N of Valid Cases	67			
a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is .99.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Overlap Special Award Condition

Overlap SAC Issue Report Presence* Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.948[a]	.330		
Continuity Correction	.415	.520		
Likelihood Ratio	.993	.319		
Fisher's Exact Test			.512	.264
Linear-by-Linear Association	.933	.334		
Symmetric Measures				
	Value	Asymptotic Standard Error[a]	Approximate T[b]	Approx. Significance
Kendall's tau-b	-.119	.113	-1.037	.300
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.48. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Overlap SAC Issue Report Presence* Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.887[a]	.170		
Continuity Correction	1.227	.268		
Likelihood Ratio	1.942	.163		
Fisher's Exact Test			.195	.134
Linear-by-Linear Association	1.859	.176		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.168	.116	-1.437	.151
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.58. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Overlap SAC Issue Report Presence* Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.181	.670		
Continuity Correction	.025	.876		
Likelihood Ratio	.180	.671		
Fisher's Exact Test			.789	.435
Linear-by-Linear Association	.178	.673		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.052	.123	-.422	.673
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.21. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Overlap SAC Issue Report Presence* Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.260	.610		
Continuity Correction	.053	.818		
Likelihood Ratio	.2258	.611		
Fisher's Exact Test			.780	.405
Linear-by-Linear Association	.256	.613		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.062	.124	-.503	.615
N of Valid Cases	67			

a. 0 cells (25.0%) have expected count less than 5. The minimum expected count is 7.09.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Overlap SAC Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	1.274	.735		
Likelihood Ratio	1.269	.736		
Linear-by-Linear Association	.600	.439		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.106	.127	-.833	.405
N of Valid Cases	67			

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Route Modification Request

Route Modification Request Issue Report Presence* Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.016	.899		
Continuity Correction	.000	1.000		
Likelihood Ratio	.016	.901		
Fisher's Exact Test			1.000	.640
Linear-by-Linear Association	.016	.900		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.015	.127	-.122	.903
N of Valid Cases	67			

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .90.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Route Modification Request Issue Report Presence* Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.913	.088		
Continuity Correction	2.097	.148		
Likelihood Ratio	2.976	.085		
Fisher's Exact Test			.122	.073
Linear-by-Linear Association	2.870	.090		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.209	.117	-1.772	.076
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.21.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Route Modification Request Issue Report Presence* Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.492	.483		
Continuity Correction	.045	.832		
Likelihood Ratio	.535	.465		
Fisher's Exact Test			.653	.436
Linear-by-Linear Association	.485	.486		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.086	.106	.780	.436
N of Valid Cases	67			
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.72.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Route Modification Request Issue Report Presence* Output Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.360	.548		
Continuity Correction	.007	.933		
Likelihood Ratio	.339	.560		
Fisher's Exact Test			.617	.440
Linear-by-Linear Association	.355	.551		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.072	.133	.543	.587
N of Valid Cases	67			
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.42.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Route Modification Request Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	.989	.804		
Likelihood Ratio	.834	.841		
Linear-by-Linear Association	.380	.538		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	.033	.079	.418	.676
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .45.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other Award Action Request

Other AAR Issue Report Presence* Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.057	.811		
Continuity Correction	.000	1.000		
Likelihood Ratio	.057	.811		
Fisher's Exact Test			1.000	.535
Linear-by-Linear Association	.056	.812		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.029	.121	.240	.810
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.37.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other AAR Issue Report Presence* Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.913	.088		
Continuity Correction	2.097	.148		
Likelihood Ratio	2.976	.085		
Fisher's Exact Test			.122	.073
Linear-by-Linear Association	2.870	.090		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.209	.117	-1.772	.076
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.30				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other AAR Issue Report Presence* Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.181	.670		
Continuity Correction	.025	.876		
Likelihood Ratio	.180	.671		
Fisher's Exact Test			.789	.435
Linear-by-Linear Association	.178	.673		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.052	.123	-.422	.673
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.21.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other AAR Issue Report Presence* Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.662	.416		
Continuity Correction	.293	.589		
Likelihood Ratio	.660	.417		
Fisher's Exact Test			.430	.294
Linear-by-Linear Association	.652	.419		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.099	.122	-.809	.418
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.51.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other AAR Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	1.292	.731		
Likelihood Ratio	1.325	.723		
Linear-by-Linear Association	1.140	.286		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.133	.121	-1.096	.273
N of Valid Cases				
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Legal Environment Factors Chi-Square Tests and Symmetric Measures

Local Government Franchise Agreements

Local Government Franchise Agreement Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.982[a]	.159		
Continuity Correction	.840	.359		
Likelihood Ratio	3.387	.066		
Fisher's Exact Test			.333	.187
Linear-by-Linear Association	1.953	.162		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.086	.033	-2.594	.009**
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis.
** Significant at .01 level

Local Government Franchise Agreement Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.749[a]	.029*		
Continuity Correction	3.177	.075		
Likelihood Ratio	7.284	.007**		
Fisher's Exact Test			.044*	.027*
Linear-by-Linear Association	4.678	.031*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.164	.054	-3.032	.002**
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.75.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis.
* Significant at .05 level ** Significant at .01 level

Local Government Franchise Agreement Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.253[a]	.615		
Continuity Correction	.010	.919		
Likelihood Ratio	.264	.608		
Fisher's Exact Test			1.000	.475
Linear-by-Linear Association	.249	.618		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.037	.070	.533	.594
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Local Government Franchise Agreement Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.3.596[a]	.058		
Continuity Correction	2.186	.139		
Likelihood Ratio	5.754	.016*		
Fisher's Exact Test			.094	.058
Linear-by-Linear Association	3.542	.060		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.135	.047	2.912	.004**
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.27.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Local Government Franchise Agreement Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	7.366		.061	
Likelihood Ratio	10.375		.016*	
Linear-by-Linear Association	.419		.517	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	.046	.041	1.055	.291
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.42.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Other Federal Agencies

Other Federal Agencies Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.1.902[a]	.168		
Continuity Correction	1.173	.279		
Likelihood Ratio	1.838	.175		
Fisher's Exact Test			.236	.140
Linear-by-Linear Association	1.874	.171		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.139	.106	-1.307	.191
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.67.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Other Federal Agencies Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.100[a]	.294		
Continuity Correction	.590	.443		
Likelihood Ratio	1.137	.286		
Fisher's Exact Test			.402	.223
Linear-by-Linear Association	1.084	.298		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.111	.101	-1.100	.271
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.87.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Other Federal Agency Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.664[a]	.415		
Continuity Correction	.281	.596		
Likelihood Ratio	.652	.419		
Fisher's Exact Test			.570	.295
Linear-by-Linear Association	.654			
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.086	.108	-.793	.428
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Other Federal Agency Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.902[a]	.168		
Continuity Correction	1.173	.279		
Likelihood Ratio	1.838	.175		
Fisher's Exact Test			.236	.140
Linear-by-Linear Association	1.874	.171		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.139	.106	-1.307	.191
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Other Federal Agency Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	3.229		.358	
Likelihood Ratio	3.157		.368	
Linear-by-Linear Association	1.199		.274	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.116	.128	-.905	.366
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.79.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other State Agencies

Other State Agency Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.293[a]	.588		
Continuity Correction	.019	.890		
Likelihood Ratio	.278	.598		
Fisher's Exact Test			.689	.424
Linear-by-Linear Association	.288	.591		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.040	.080	.501	.616
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.46.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other State Agency Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.091[a]	.763		
Continuity Correction	.000	1.000		
Likelihood Ratio	.092	.762		
Fisher's Exact Test			1.000	.518
Linear-by-Linear Association	.089	.765		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.028	.090	-.307	.759
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other State Agency Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.031[a]	.860		
Continuity Correction	.000	1.000		
Likelihood Ratio	.032	.859		
Fisher's Exact Test			1.000	.569
Linear-by-Linear Association	.031			
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.016	.090	.179	.858
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.27. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other State Agency Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.514	.113		
Continuity Correction	1.545	.214		
Likelihood Ratio	2.351	.125		
Fisher's Exact Test			.169	.109
Linear-by-Linear Association	2.477	.116		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b				
N of Valid Cases	67			
b. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.69. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Other State Agency Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	5.819	.121		
Likelihood Ratio	5.272	.153		
Linear-by-Linear Association	1.852	.174		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.110	.124	-.887	.375
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.16. b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

State Legislation

State Legislation Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.066	.302		
Continuity Correction	.225	.635		
Likelihood Ratio	.918	.338		
Fisher's Exact Test			.291	.291
Linear-by-Linear Association	1.050	.305		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b				
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

State Legislation Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.057[a]	.080		
Continuity Correction	1.684	.194		
Likelihood Ratio	2.876	.090		
Fisher's Exact Test			.171	.100
Linear-by-Linear Association	3.011	.083		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.116	.077	1.499	.134
N of Valid Cases	67			
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.06.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

State Legislation Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.222[a]	.076		
Continuity Correction	1.794	.180		
Likelihood Ratio	5.060	.024		
Fisher's Exact Test			.167	.082
Linear-by-Linear Association	3.174			
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.118	.046	2.531	.010**
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level ** Significant at .01 level				

State Legislation Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.080[a]	.777		
Continuity Correction	.000	1.000		
Likelihood Ratio	.08	.180		
Fisher's Exact Test			1.000	.221
Linear-by-Linear Association	.079			
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.018	.066	-.271	.786
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

State Legislation Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	2.912	.405		
Likelihood Ratio	3.213	.360		
Linear-by-Linear Association	.304	.581		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	.032	.083	.384	.701
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .54.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level ** Significant at .01 level				

Tribal Authority

Tribal Authority Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.984[a]	.321		
Continuity Correction	.407	.523		
Likelihood Ratio	1.071	.301		
Fisher's Exact Test				
Linear-by-Linear Association	.969	.325	.485	.270
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.084	.075	-1.115	.265
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.40.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Tribal Authority Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.755[a]	.385		
Continuity Correction	.341	.559		
Likelihood Ratio	.777	.378		
Fisher's Exact Test			.569	.283
Linear-by-Linear Association	.744	.388		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.091	.100	-.905	.365
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.52.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Tribal Authority Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.193[a]	.660		
Continuity Correction	.023	.880		
Likelihood Ratio	.191	.662		
Fisher's Exact Test			.774	.435
Linear-by-Linear Association	.190	.663		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.045	.105	-.432	.666
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.24.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Tribal Authority Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.940[a]	.332		
Continuity Correction	.447	.504		
Likelihood Ratio	.912	.339		
Fisher's Exact Test			.376	.249
Linear-by-Linear Association	.926			
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.096	.104	-.926	.340
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.69.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Tribal Authority Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	1.959	.581		
Likelihood Ratio	1.972	.578		
Linear-by-Linear Association	1.368	.242		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.149	.113	-1.321	.186
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.70.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Crosscutting Factors Cross-Tabs with Chi-Square Tests and Symmetric Measures

Department of Transportation Permitting

DOT Permitting Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.087[a]	.297		
Continuity Correction	.521	.470		
Likelihood Ratio	1.082	.298		
Fisher's Exact Test			.349	.235
Linear-by-Linear Association	1.070	.301		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.097	.094	-1.028	.304
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.37.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

DOT Permitting Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.668[a]	.055		
Continuity Correction	2.744	.098		
Likelihood Ratio	3.678	.055		
Fisher's Exact Test			.072	.049*
Linear-by-Linear Association	3.614	.057		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.221	.114	-1.937	.053
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.30.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level				

DOT Permitting Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.198[a]	.656		
Continuity Correction	.034	.854		
Likelihood Ratio	.199	.656		
Fisher's Exact Test			.795	.429
Linear-by-Linear Association	.195	.659		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.051	.113	-.448	.654
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

DOT Permitting Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.662[a]	.416		
Continuity Correction	.293	.589		
Likelihood Ratio	.660	.417		
Fisher's Exact Test			.430	.294
Linear-by-Linear Association	.652	.419		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.089	.110	.809	.418
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

DOT Permitting Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	2.822	.420		
Likelihood Ratio	2.828	.419		
Linear-by-Linear Association	.164	.686		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.041	.130	-.316	.752
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.42.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Local Government Permitting

Local Government Permitting Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.000[a]	.992		
Continuity Correction	.000	1.000		
Likelihood Ratio	.000	.992		
Fisher's Exact Test			1.000	.626
Linear-by-Linear Association	.000	.992		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.001	.092	-.010	.992
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Local Government Permitting Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.857[a]	.176		
Continuity Correction	1.214	.271		
Likelihood Ratio	1.894	.169		
Fisher's Exact Test			.201	.135
Linear-by-Linear Association	1.829	.176		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.156	.111	-1.409	.159
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.61.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Local Government Permitting Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.010[a]	.918		
Continuity Correction	.000	1.000		
Likelihood Ratio	.010	.918		
Fisher's Exact Test			1.000	.566
Linear-by-Linear Association	.010	.919		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.012	.113	.103	.918
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.19.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Local Government Permitting Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.137[a]	.386		
Continuity Correction	.626	.429		
Likelihood Ratio	1.160	.281		
Fisher's Exact Test			.411	.215
Linear-by-Linear Association	1.120	.290		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.116	.105	1.099	.272
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Local Government Permitting Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	4.903	.179		
Likelihood Ratio	5.266	.153		
Linear-by-Linear Association	.000	.996		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	.042	.127	.330	.741
N of Valid Cases	67			
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.51.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Environmental Permitting

Environmental Permitting Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.311[a]	.577		
Continuity Correction	.039	.843		
Likelihood Ratio	.301	.584		
Fisher's Exact Test			.720	.408
Linear-by-Linear Association	.307	.580		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.046	.088	.528	.597
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Environmental Permitting Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.011[a]	.917		
Continuity Correction	.000	1.000		
Likelihood Ratio	.011	.917		
Fisher's Exact Test			1.000	.579
Linear-by-Linear Association	.011	.918		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.011	.102	-.104	.917
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Environmental Permitting Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.003[a]	.958		
Continuity Correction	.000	1.000		
Likelihood Ratio	.003	.958		
Fisher's Exact Test			1.000	.589
Linear-by-Linear Association	.003	.958		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.005	.102	-.052	.958
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.91.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Environmental Permitting Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.343[a]	.246		
Continuity Correction	.728	.393		
Likelihood Ratio	1.295	.255		
Fisher's Exact Test			.359	.195
Linear-by-Linear Association	1.323	.250		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.113	.103	-1.094	.274
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.10.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Environmental Permitting Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	2.910	.406		
Likelihood Ratio	2.869	.412		
Linear-by-Linear Association	.345	.557		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.067	.125	-.534	.593
N of Valid Cases	67			
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.61.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

State Historical Preservation Office

SHPO Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.440[a]	.064		
Continuity Correction	2.360	.124		
Likelihood Ratio	3.580	.058		
Fisher's Exact Test			.109	.061
Linear-by-Linear Association	3.389	.066		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.174	.091	-1.916	.055
N of Valid Cases	67			
a. 0 cells (25.0%) have expected count less than 5. The minimum expected count is 5.91.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

SHPO Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.520[a]	.006**		
Continuity Correction	6.175	.013*		
Likelihood Ratio	7.760	.005**		
Fisher's Exact Test			.010**	.006**
Linear-by-Linear Association	7.408	.006**		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.318	.109	-2.921	.003**
N of Valid Cases	67			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.33.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				
* Significant at .05 level ** Significant at .01 level				

SHPO Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.367[a]	.545		
Continuity Correction	.119	.730		
Likelihood Ratio	.367	.544		
Fisher's Exact Test			.609	.365
Linear-by-Linear Association	.361	.548		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.070	.115	-.607	.544
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.84.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

SHPO Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.792[a]	.373		
Continuity Correction	.383	.536		
Likelihood Ratio	.794	.373		
Fisher's Exact Test			.425	.268
Linear-by-Linear Association	.780	.377		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.098	.110	-.894	.371
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.36.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

SHPO Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	5.680	.128		
Likelihood Ratio	6.063	.109		
Linear-by-Linear Association	4.320	.038*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.253	.121	-2.093	.036*
N of Valid Cases	67			

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.96.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Federal Environmental Agencies

Federal Environmental Agencies Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.590[a]	.443		
Continuity Correction	.199	.655		
Likelihood Ratio	.602	.438		
Fisher's Exact Test			.531	.331
Linear-by-Linear Association	.581	.446		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.071	.090	-.788	.430
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.19.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Federal Environmental Agencies Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.219[a]	.040*		
Continuity Correction	3.220	.073		
Likelihood Ratio	4.361	.037*		
Fisher's Exact Test			.068	.035*
Linear-by-Linear Association	4.156	.041*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.236	.109	-2.175	.030*
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.96.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Federal Environmental Agencies Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.639[a]	.424		
Continuity Correction	.288	.591		
Likelihood Ratio	.645	.422		
Fisher's Exact Test			.447	.297
Linear-by-Linear Association	.629	.428		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.091	.112	.811	.417
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.52.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Federal Environmental Agencies Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.944[a]	.331		
Continuity Correction	.487	.485		
Likelihood Ratio	.939	.333		
Fisher's Exact Test			.415	.242
Linear-by-Linear Association	.930	.335		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.106	.110	-.964	.335
N of Valid Cases	67			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.22.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Federal Environmental Agencies Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	2.154		.541	
Likelihood Ratio	2.159		.540	
Linear-by-Linear Association	2.021		.155	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.171	.125	-.1369	.171
N of Valid Cases	67			

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.60.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Environmental Assessment/FONSI

Environmental Assessment/FONSI Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.015[a]			
Continuity Correction	.000			
Likelihood Ratio	.016			
Fisher's Exact Test			1.000	.901
Linear-by-Linear Association	.015	.902		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.009	.070	.127	.599
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Environmental Assessment/FONSI Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.593[a]	.207		
Continuity Correction	.858	.354		
Likelihood Ratio	1.531	.216		
Fisher's Exact Test			.314	.176
Linear-by-Linear Association	1.569	.210		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.112	.095	-1.179	.239
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.12.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Environmental Assessment/FONSI Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	517[a]	.472		
Continuity Correction	.144	.704		
Likelihood Ratio	.502	.479		
Fisher's Exact Test			.510	.345
Linear-by-Linear Association	.509	.475		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.063	.092	.686	.493
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.94.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Environmental Assessment/FONSI Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.081[a]	.776		
Continuity Correction	.000	1.000		
Likelihood Ratio	.083	.774		
Fisher's Exact Test			1.000	.541
Linear-by-Linear Association	.080	.777		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.024	.082	-.293	.769
N of Valid Cases	67			
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.40.				
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis				

Environmental Assessment/FONSI Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value		Asymptotic Significance (2-sided)	
Pearson Chi-Square	1.114		.774	
Likelihood Ratio	1.246		.742	
Linear-by-Linear Association	.193		.660	
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	-.048	.091	-.532	.595
N of Valid Cases	67			

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.07.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level ** Significant at .01 level

Property Access Meta-Factor

Property Access Meta-Factor Issue Report Presence * Success Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	.980		
Continuity Correction	.000	1.000		
Likelihood Ratio	.001	.980		
Fisher's Exact Test			1.000	.634
Linear-by-Linear Association	.001	.980		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b				
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Property Access Meta-Factor Issue Report Presence * Schedule Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.014[a]	.025*		
Continuity Correction	3.580	.058		
Likelihood Ratio	4.761	.029*		
Fisher's Exact Test			.038*	.032*
Linear-by-Linear Association	4.940	.026*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	-.192	.096	-2.001	.045*
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.78.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Property Access Meta-Factor Issue Report Presence * Budget Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.074[a]	.785		
Continuity Correction	.000	1.000		
Likelihood Ratio	.073	.787		
Fisher's Exact Test			1.000	.520
Linear-by-Linear Association	.073	.787		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.023	.087	.267	.790
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.61.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Property Access Meta-Factor Issue Report Presence * Outputs Binary Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.442	.035*		
Continuity Correction	3.034	.082		
Likelihood Ratio	4.059	.044*		
Fisher's Exact Test			.062	.045*
Linear-by-Linear Association	4.376	.036*		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-b	.172	.096	1.793	.073
N of Valid Cases	67			

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.12.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis
* Significant at .05 level

Property Access Meta-Factor Issue Report Presence * Ordinal Success Measure				
Chi-Square Tests				
	Value	Asymptotic Significance (2-sided)		
Pearson Chi-Square	7.602	.055		
Likelihood Ratio	7.374	.061		
Linear-by-Linear Association	.166	.684		
Symmetric Measures				
	Value	Asymptotic Standard Error[b]	Approximate T[c]	Approx. Significance
Kendall's tau-c	.072	.101	.716	.474
N of Valid Cases	67			

a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is .99.
b. Not assuming the null hypothesis. c. Using the asymptotic standard error assuming the null hypothesis

Appendix H Initial Regression Models Based on Research Hypotheses

Factor-Schedule Success Index Score Regression—Model 1

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.529[a]	.279	.207	.188589708
a. Predictors: (Constant), TotalOverlap, Nature Standardized Issue Reports, Project Scale, Government Dummy, OVERALLPropertyAccess, Months to FONSI Award				
b. Dependent Variable: Schedule Index				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.827	6	.138	3.878	.002[b]
	Residual	2.134	60	.036		
	Total	2.961	66			
a. Dependent Variable: Schedule Index						
b. Predictors: (Constant), TotalOverlap, Nature Standardized Issue Reports, Project Scale, Government Dummy, OVERALLPropertyAccess, Months to FONSI Award						

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
Model 1	B	Std. Error	Beta	t	Sig.
(Constant)	.301	.111		2.701	.009**
Government Yes/No	-.011	.050	-.025	-.228	.821
Project Scale	-.093	.037	-.279	-2.512	.015*
Months to FONSI Award	-.012	.007	-.205	-1.783	.080
Property Access Meta-factor Raw Count Issue Reports	-.005	.002	-.225	-1.987	.052
Nature Standardized Issue Reports	-.308	.233	-.149	-1.324	.191
Overlap SAC Total Issue Reports	-.026	.013	-.240	-2.095	.040*
Dependent Variable: Schedule Index * Significant at .05 level ** Significant at .01 level					

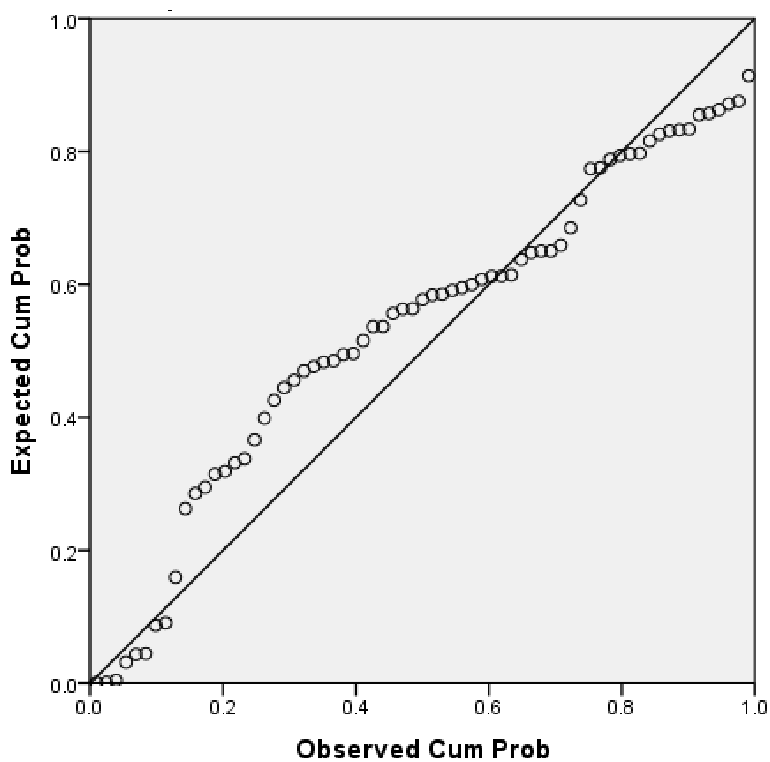


Figure 10 Normal P-P Plot of Schedule Success Index Regression Model 1 Residual

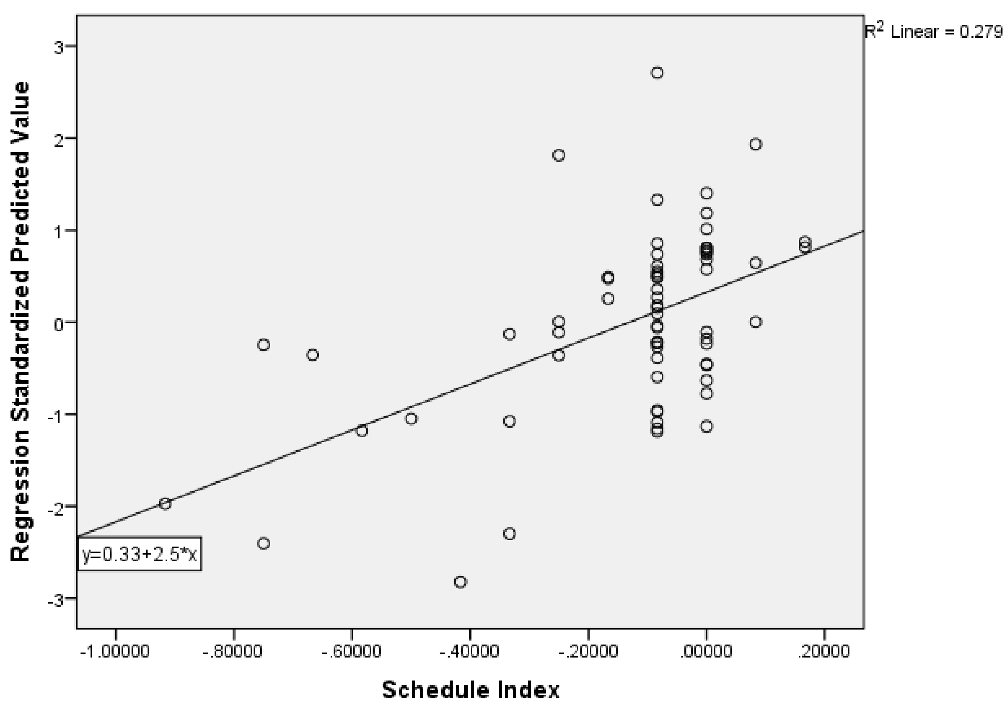


Figure 11 Scatterplot Schedule Success Index Regression Model 1

Factor-Budget Success Index Score Regression—Model 1

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.325[a]	.106	-.017	.0787163465
a. Predictors: (Constant), Nature Standardized Issue Reports, TotalOverlap, Project Scale, Property Access Meta Standardized Issue Reports, UtilityProvider, Months to FONSI Award, StandCoreOrg, Lead Organizational Age				
b. Dependent Variable: Budget Index				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.043	8	.005	.858	.556[b]
	Residual	.359	58	.006		
	Total	.402	66			
a. Dependent Variable: Budget Index						
b. Predictors: (Constant), Nature Standardized Issue Reports, TotalOverlap, Project Scale, Property Access Meta Standardized Issue Reports, UtilityProvider, Months to FONSI Award, StandCoreOrg, Lead Organizational Age						

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
(Constant)	-.033	.064		-.514	.609
Months to FONSI Award	.004	.003	.174	1.310	.195
Utility Provider	.007	.025	.045	.289	.774
Property Access Meta-factor Standardized Reports	.060	.106	.072	.562	.576
Lead Organizational Age	9.822E-5	.000	.075	.461	.646
Organizational Capacity Meta-factor Standardized Reports	.311	.230	.184	1.350	.182
Overlap Special Award Condition Raw Count Reports	.000	.005	-.006	-.049	.961
Project Scale	.004	.018	.029	.198	.844
Nature (Climate and Terrain) Standardized Reports	-.190	.099	-.249	-1.920	.060
Dependent Variable: Budget Success Index					

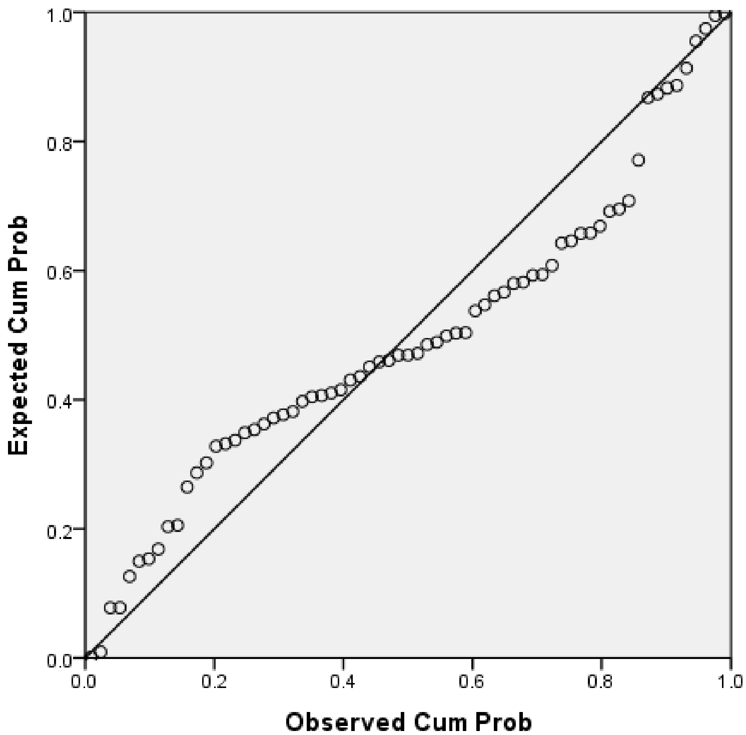


Figure 12 Normal P-P Plot of Budget Success Index Regression Model 1 Residual

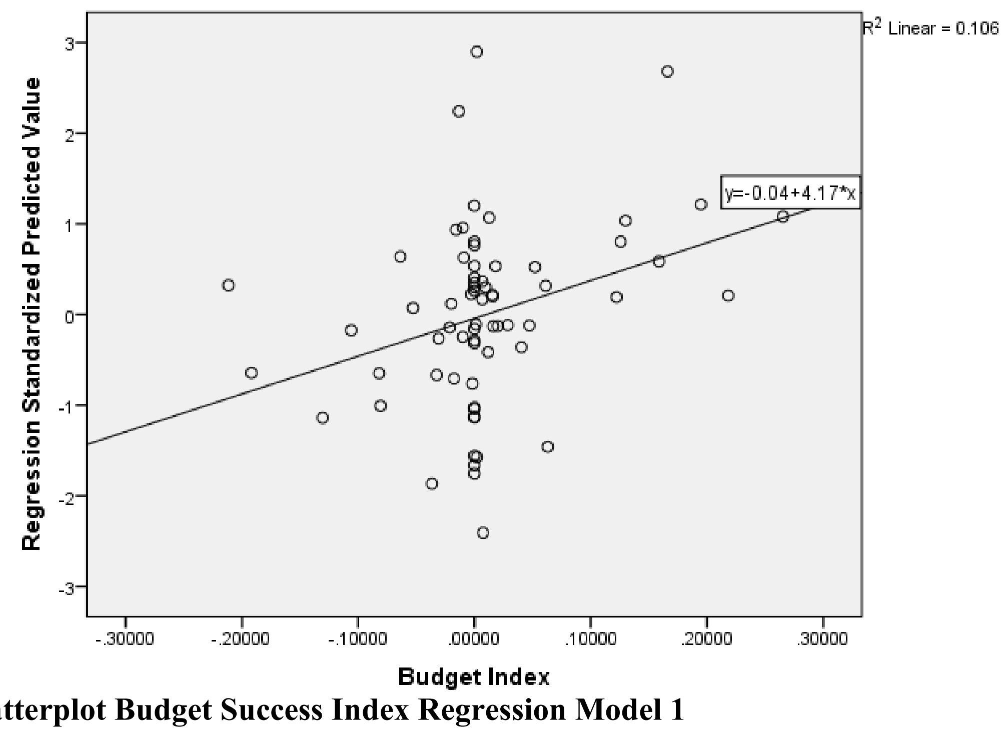


Figure 13 Scatterplot Budget Success Index Regression Model 1

Factor-Outputs Success Index Score Regression—Model 1

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.296[a]	.088	.029	.231683815
a. Predictors: (Constant), Lead Organization Years of Experience, TotalEAFONSI, Property Access Meta Standardized Issue Reports, Project Scale				
b. Dependent Variable: Output Index				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.320	4	.080	1.490	.216[b]
	Residual	3.328	62	.054		
	Total	3.648	66			
a. Dependent Variable: Output Index						
b. Predictors: (Constant), Lead Organization Years of Experience, TotalEAFONSI, Property Access Meta Standardized Issue Reports, Project Scale						

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.155	.130		1.192	.238
Property Access Meta-factor Standardized Issue Reports	.450	.309	.180	1.455	.151
FONSI/Environmental Assessment Raw Count Reports	-.013	.013	-.126	-1.018	.312
Project Scale	-.065	.049	-.176	-1.337	.186
Organization Years of Experience	.000	.001	-.058	-.446	.657
Dependent Variable: Outputs Success score					

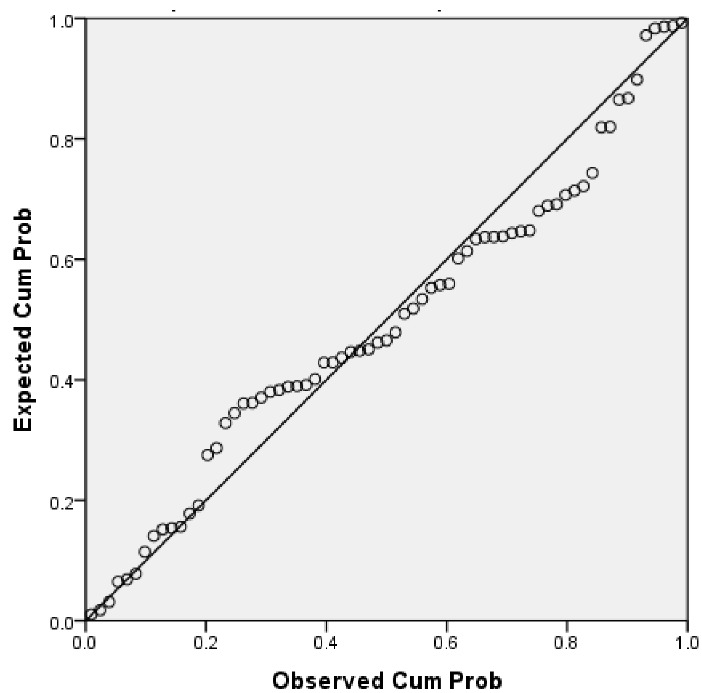


Figure 14 Normal P-P Plot of Outputs Success Index Regression Model 1 Residual

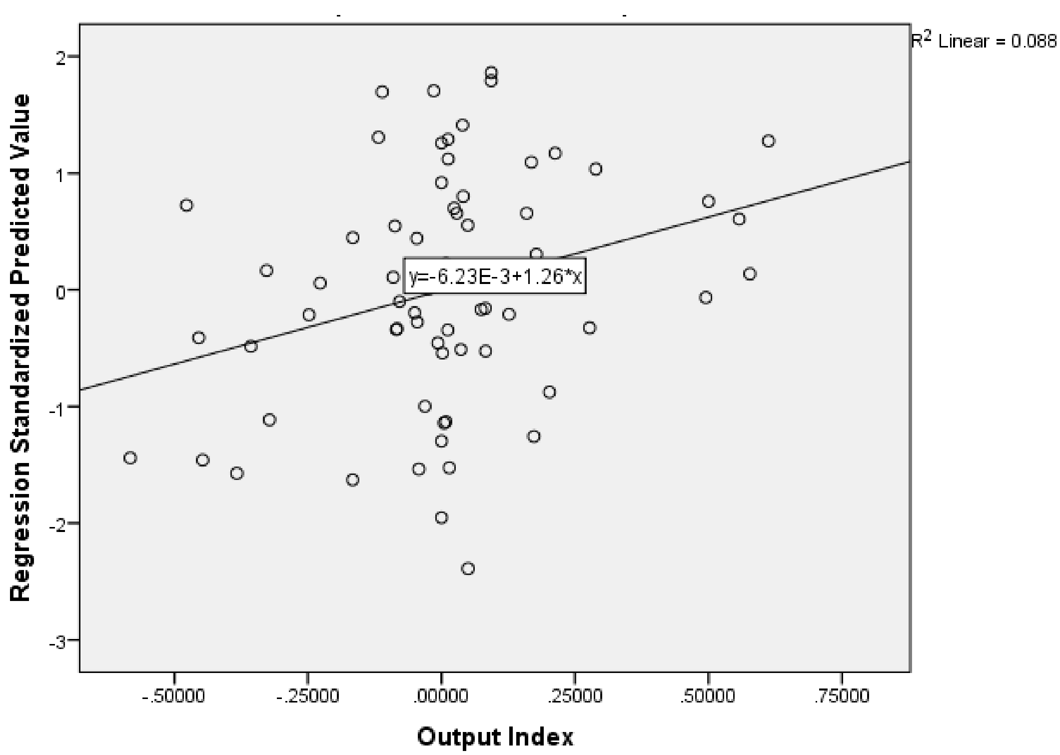


Figure 15 Scatterplot Output Success Index Regression Model 1

Factor-Overall Success Index Score Regression—Model 1

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.455[a]	.207	.142	.33028086
a. Predictors: (Constant), TotalOverlap, EA/FONSI Standardized Issue Reports, Property Access Meta Standardized Issue Reports, Other Award Action Request Standardized Issue Reports, Route Modifications Standardized Issue Reports				
b. Dependent Variable: Success Index				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.734	5	.347	3.178	.013[b]
	Residual	6.654	61	.109		
	Total	8.388	66			
a. Dependent Variable: Success Index						
b. Predictors: (Constant), TotalOverlap, EA/FONSI Standardized Issue Reports, Property Access Meta Standardized Issue Reports, Other Award Action Request Standardized Issue Reports, Route Modifications Standardized Issue Reports						

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.006	.089		.072	.943
Property Access Meta Standardized Reports	.310	.458	.082	.677	.418
Overlap Special Award Condition Raw Count Reports	-.052	.022	-.281	-2.378	.021*
Other Award Action Request Standardized Reports	-1.133	.483	-.281	-2.344	.022*
Route Modifications Standardized Reports	-.102	.232	-.058	-.441	.661
EA/FONSI Standardized Reports	.024	.284	.011	.085	.932
Dependent Variable: Success Index * Significance level <.05					

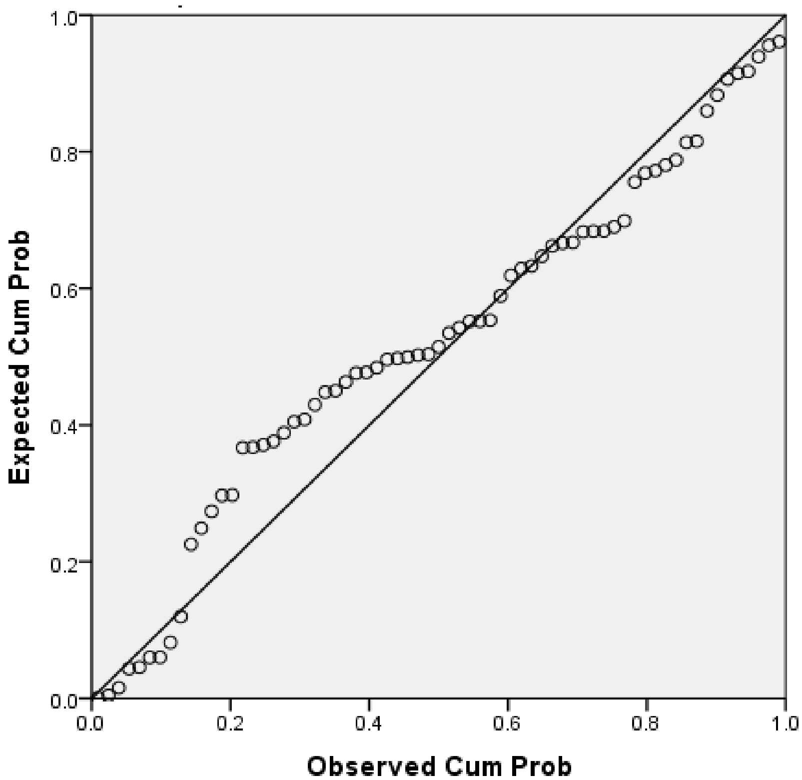


Figure 16 Normal P-P Plot of Overall Success Index Regression Model 1 Residual

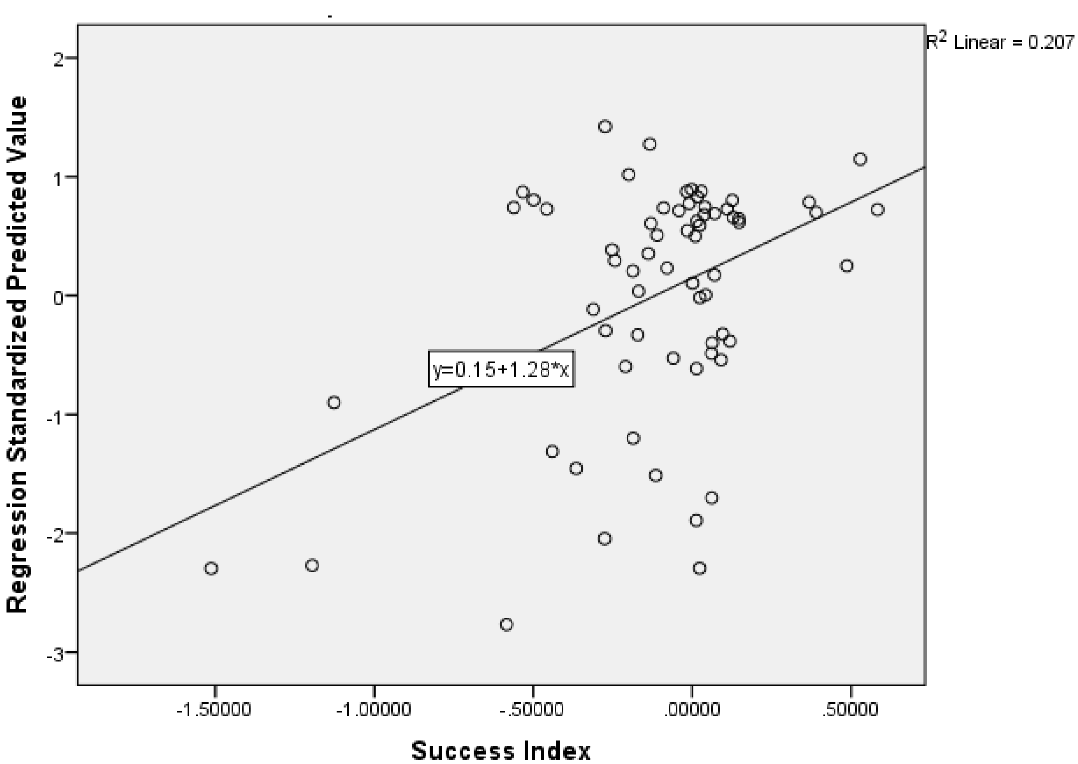
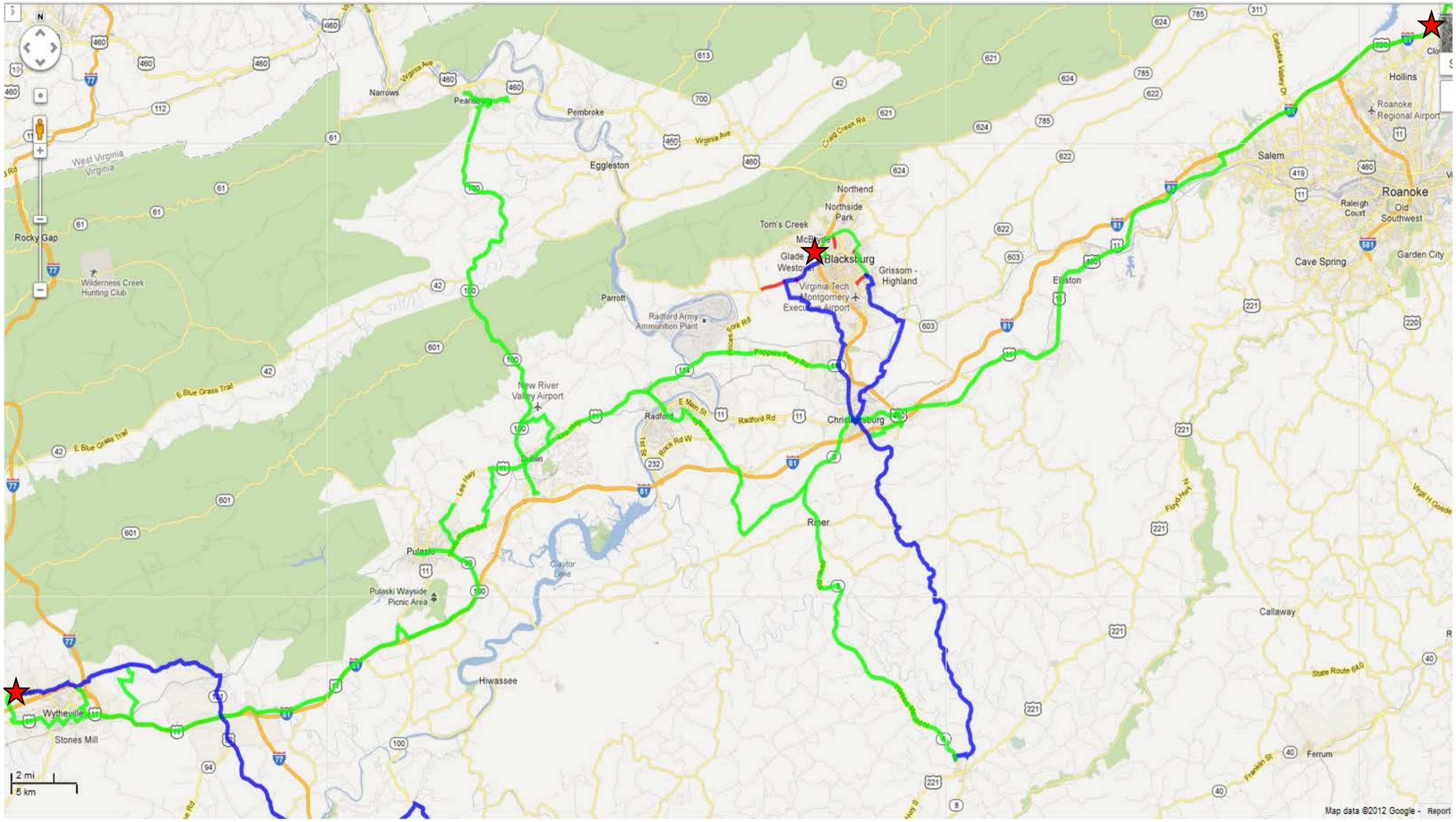


Figure 17 Scatterplot Overall Success Index Regression Model 1

Appendix I NRV-ROAN Network Map



LEGEND:

Green: New River Valley Regional Open-Access Network BTOP Project

Blue: Existing Citizens Fiber Network

Red: Fiber Drops to Blacksburg Schools

★ Interconnection points with other BTOP-funded projects

Appendix J Participant Interview Materials

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Informed Consent for Participants in Research Projects Involving Human Subjects

Title of Project: Connecting Communities: Factors Influencing Project Implementation Success in the Broadband Technology Opportunities Program

Investigators:
Brian Cook, PhD; Principal Investigator
Professor, Center for Public Administration and Policy

Meredith Hundley, MPA; Co-Investigator
Doctoral Candidate, Center for Public Administration and Policy

1. Purpose of this Research

This project will undertake an examination of the implementation of the Broadband Technology Opportunities Program's Comprehensive Community Infrastructure projects. The researchers intend to better understand what factors may have had a significant influence on the implementation success of these projects. Implementation success, for the purposes of this research, means simply that the project did what its initial application said it would, when it said it would, and for no more resources than it said it would. Milestones, time, and budget are the three dependent indices being investigated in this work. Hypotheses for this research predict that success along these three indices will be dependent on technical, organizational, and institutional factors.

The research uses mixed methods that focus first on a quantitative study of data drawn from public documents related to 123 grant projects. A supplemental case study of the New River Valley-Regional Open-Access Network (NRV-ROAN) project will be used to explore factors that may have influenced successful implementation but are not adequately captured by the quantitative data. This case study will include completion of questionnaires and interviews with 15-20 individuals involved with the project's implementation. Participants will be drawn from Citizens Telephone Cooperative, other utility providers, and local, regional, state, and federal public and nonprofit officials.

2. Procedures

The qualitative portion of this study involves both a questionnaire and semi-structured interviews with individuals in organizations involved in some way with the implementation of the NRV-ROAN project. By completing the questionnaire, individuals consent to their participation in that portion of the study. This consent form pertains specifically to the second portion of the survey: semi-structured interviews. These interviews will last approximately one hour and take place in person whenever possible and via telephone or other electronic means if in-person interviews are not feasible. The researchers and interviewees will jointly determine a mutuallyagreeable interview date, time, and location. The focus of the interviews will be shaped in large part by information participants provided in their questionnaire responses.

With your permission, this interview will be digitally recorded for later transcription. Transcripts will be provided to you before analysis to verify accuracy and offer an opportunity to clarify meaning, if necessary. A separate permission is also requested to permit the researchers to use your name in association with remarks you may make during the course of this interview. You will have the opportunity to grant or deny this request at the end of this form.

At your request, the recording will be destroyed upon your validation of the recording's transcript. Otherwise, the recording will be destroyed within 5 years of the interview date. Interview transcripts will be kept unless their destruction is specifically requested at the conclusion of the current dissertation research.

3. Risks

The emotional, physical, social, and dignity-related risks associated with participating in this research are mostly equal to the risks associated with the day-to-day activities of individual participants. Questions will be focused on perceptions of organizations' actions and individuals' particular roles in those organizations. Legal and economic risks to individual study participants are low. The only legal risks would be associated with improper breach of confidentiality agreements with other providers or actors by participants or revealing information regarding improprieties that occurred during the course of the project.

Additionally, there is the small possibility even for participants who choose not to have their names identified with the project that someone in the region or the broadband field could identify a participant by his/her comments or identified role. In certain instances, this identification could, in the abstract, have the potential to cause damage to their professional reputation or jeopardize their career in some way.

All participants will have the opportunity to evaluate their respective level of risk when they give approval for the transcripts provided to them post-interview.

On an organizational level, most of the information is available in public documents and the risks associated with data collected from those documents are the same whether or not this study takes place. At the organizational level, the only perceived risks would be possible damage to network relationships with other entities in the event of negative remarks or information revealed that could otherwise endanger future arrangements with other providers.

Benefits

By participating in this research, you may help the investigators develop a more robust understanding of the factors influencing project implementation success in the Broadband Technology Opportunities Program Comprehensive Community Infrastructure projects.

The benefits of this research for Citizens Telephone Cooperative may include gaining a more in-depth understanding of some of the factors that positively or negatively influenced the success of their project's implementation. This understanding will aid in further improving implementation success for future projects. The information obtained could also be of use to partner organizations and other involved actors as they make similar decisions regarding future project implementation.

For society, both the quantitative analysis and supplemental case study have the potential to help shape future selection of projects and the mechanisms of support put in place for future grant projects of this nature. Better project selection and support means the projects will have higher utility for society towards an end goal of eliminating the gap in physical access to digital services between urban and rural areas.

No promise or guarantee of benefits has been made to encourage you to participate.

4. Extent of Anonymity and Confidentiality

With your permission explicitly granted by checking the appropriate box at the end of this form, your name will be associated with any remarks you make. You may revoke this permission for particular comments or all comments made during your interview at any time up to and including final verification of written transcript post-interview.

If you do not explicitly give permission below or request that particular information you provide not be attributable to you, the link between your identity and your remarks will be kept confidential. The researchers will achieve this confidentiality by protecting the link between interview participants' personal information and responses with the use of Participant ID codes and a key document linking ID codes to individuals. The key document will be password protected and available only to the listed researchers and the IRB upon request for auditing purposes. In any research products, you would be identified by either your assigned Participant ID and/or use of more general descriptors. As an example, a participant could be referred to as "Participant B3, a local government director of technology." The connection between that label and the participant's name would be kept confidential in this password-protected file. The IRB is responsible for oversight of efforts to protect the human subjects involved in this research.

In either case, your identity may still appear in the course of this research but only as it is available in publicly-available information that may link you to this project or an organization involved in this project. Additionally, individuals familiar with the details of the NRV-ROAN project may be able to ascertain your identity based on the content of your responses even if your response or our descriptor of you does not contain personally-identifiable information.

5. Compensation

There is no compensation for participation in this study beyond the researchers' gratitude and any generalized societal or organizational benefits from the attainment of knowledge regarding project implementation.

6. Freedom to Withdraw

You are free to withdraw from this study at any time without penalty. You may stop participating in the interview at any point or decline to answer any question if you so desire.

Should you have any questions about this research or its conduct, or your rights as a participant in the study, please contact:

Meredith Hundley
merehund@vt.edu; 757-630-8238
Investigator/PhD Candidate

Dr. Brian Cook
brml27@vt.edu
Principal Investigator/Dissertation Chair

David M. Moore, Chair, Virginia Tech Institutional Review
Board for the Protection of Human Subjects
Telephone/e-mail: 540-231-4991/moored@vt.edu

7. Consent to Participate in the Study

☐ I ***DO*** give permission for the researchers to use my name in conjunction with my remarks in their work **except** where I indicate otherwise.

☐ I ***DO NOT*** give permission for the researchers to use my name in conjunction with any of my remarks in their work.

I have reviewed the Consent Form and description of this project. I have had an opportunity to questions answered. I hereby acknowledge the above and give my voluntary consent. A copy of this document has been provided to me to keep for reference purposes.

___

(Participant name) (sign) (date)

☐ Yes, I would like to receive a summary of the research results when they are available.

___

(Researcher name) (sign) (date)

Pre-Interview Questions

Thank you for agreeing to discuss your views on the implementation of Citizens Telephone Cooperative's New River Valley Regional Open Access Network (NRV-ROAN) BTOP project. I recognize that everyone's time is precious, so in the interest of time management, please answer the below questions prior to our interview. Your answers will help to guide our conversation, so please return them at least 12 hours prior to our interview.

Note: For this study, "implementation success" means the following three criteria:

1. Meeting or exceeding project completion milestones,
2. Being on or ahead of schedule, and
3. Being on or under budget.

How successful would you view the *overall implementation* of the Citizens NRV-ROAN BTOP project?						
1	**2**	**3**	**4**	**5**	**6**	**7**
Completely Failed			**Achieved Expectations**			**Exceeded Expectations**
How successful would you view the *project milestones achievement* of the Citizens NRV-ROAN BTOP project?						
1	**2**	**3**	**4**	**5**	**6**	**7**
Completely Failed			**Achieved Expectations**			**Exceeded Expectations**
How successful would you view the *schedule adherence* of the Citizens NRV-ROAN BTOP project?						
1	**2**	**3**	**4**	**5**	**6**	**7**
Completely Failed			**Achieved Expectations**			**Exceeded Expectations**
How successful would you view the *budget adherence* of the Citizens NRV-ROAN BTOP project?						
1	**2**	**3**	**4**	**5**	**6**	**7**
Completely Failed			**Achieved Expectations**			**Exceeded Expectations**

How financially ready was Citizens to implement the NRV-ROAN project?									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Not Ready at All									**Completely Ready**
How ready was the Citizens leadership team to implement the NRV-ROAN project?									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Not Ready at All									**Completely Ready**

Please rate the following interorganizational relationships of Citizens Telephone Cooperative specifically regarding the NRV-ROAN project on a scale of 1 to 7 with 1 being relationship completely impeded project implementation, 4 being neither impeding nor enabling, and 7 being relationship completely enabled project implementation:

Telecommunications/Internet Service Providers								
	Completely Impeded			**Neutral**			**Completely Enabled**	**Don't Know/ N/A**

Verizon	1	2	3	4	5	6	7	
Cox	1	2	3	4	5	6	7	
Comcast	1	2	3	4	5	6	7	
Shentel	1	2	3	4	5	6	7	
BVU	1	2	3	4	5	6	7	
MBC	1	2	3	4	5	6	7	
Lumos	1	2	3	4	5	6	7	
Other Telecom Providers	1	2	3	4	5	6	7	
Other Utility Providers								
	Completely Impeded			**Neutral**			**Completely Enabled**	**Don’t Know/ N/A**
AEP/APCO	1	2	3	4	5	6	7	
Salem Electric	1	2	3	4	5	6	7	
Radford Electric	1	2	3	4	5	6	7	
VT Electric	1	2	3	4	5	6	7	
NRV Regional Water Authority	1	2	3	4	5	6	7	
Roanoke Gas	1	2	3	4	5	6	7	
ATMOS Gas	1	2	3	4	5	6	7	
Roanoke Water Authority	1	2	3	4	5	6	7	
Other Utility Providers	1	2	3	4	5	6	7	
Federal and State Actors								
	Completely Impeded			**Neutral**			**Completely Enabled**	**Don’t Know/ N/A**
NTIA	1	2	3	4	5	6	7	
NOAA	1	2	3	4	5	6	7	
VDOT	1	2	3	4	5	6	7	
CIT	1	2	3	4	5	6	7	
VA DEQ	1	2	3	4	5	6	7	
VA Historical Resources	1	2	3	4	5	6	7	
Tobacco Commission	1	2	3	4	5	6	7	
Localities/Regional Actors								
	Completely Impeded			**Neutral**			**Completely Enabled**	**Don’t Know/ N/A**
County of Wythe	1	2	3	4	5	6	7	
Town of Wytheville	1	2	3	4	5	6	7	

County of Pulaski	1	2	3	4	5	6	7	
Town of Pulaski	1	2	3	4	5	6	7	
County of Giles	1	2	3	4	5	6	7	
County of Montgomery	1	2	3	4	5	6	7	
Town of Christiansburg	1	2	3	4	5	6	7	
Town of Blacksburg	1	2	3	4	5	6	7	
County of Floyd	1	2	3	4	5	6	7	
County of Roanoke	1	2	3	4	5	6	7	
City of Salem	1	2	3	4	5	6	7	
City of Radford	1	2	3	4	5	6	7	
County of Botetourt	1	2	3	4	5	6	7	
Virginia Tech	1	2	3	4	5	6	7	
NRV PDC	1	2	3	4	5	6	7	
NRV Wireless Authority	1	2	3	4	5	6	7	

Please return the completed questionnaire to Meredith Hundley at merehund@vt.edu at least 12 hours prior to interview. Thank you again for participating, and I look forward to our interview!

Citizens Telephone Cooperative Staff Interviews:

Thank you for taking the time to meet with me today and completing the questionnaire you received. With your permission, I would like to create an audio recording of today's interview for the purposes of transcribing and giving you the opportunity to read back over the conversation at a later time to ensure the transcript is factual and you feel comfortable with the information you will provide today.

Your thorough, honest participation will contribute to a better understanding of what factors may have influenced the project implementation success of the NRV-ROAN BTOP project. As a reminder, when I say "implementation success," I mean meeting or exceeding project completion milestones, being on or ahead of schedule, and being on or under budget.

Although I have some structured questions I would like to ask you, I may ask unscripted questions to aid in the flow of our discussion. Also, please feel free to add information at any time; this interview is intended to be conversational and comfortable.

(Sub-questions are included as prompts/guidance only if needed and may be customized based on questionnaire responses)

1. To begin, please describe your personal involvement with the NRV-ROAN project.
2. While involved with NRV-ROAN, did you observe or encounter any technical factors related to the project that made implementation success more or less difficult to achieve?
    a. Any issues related to initial project design or issues encountered during the construction phase of the project?
    b. What do you think was done well in the technical planning and what would you do differently if you had an opportunity to do it over again?
    c. Were there any technical aspects of the project that emerged that you wish you had thought of ahead of time to either take better advantage of or avoid?
    d. What steps did Citizens and its partners take to get back on track after delays in project implementation?
3. How about organizational factors?
    a. How much did taking on this project stretch Citizens' available resources?
        i. What (could have) aided Citizens in being well prepared for this project?
    b. How did this project fit into the broader strategic plan?
        i. Did the BTOP project preempt completion of other projects within Citizens traditional footprint?
    c. How has the BTOP project otherwise impacted Citizens as an organization?
    d. To what extent did the leadership team's composition and competencies influence implementation success?
4. Lastly, I am curious about the relationships Citizens has developed with other actors and how those relationships may have influenced implementation success.
    a. Federal and state agencies
        i. Have there been any stumbling blocks or hurdles that come to mind during the course of this project's implementation?
        ii. What aspects of the Citizens-BTOP relationship facilitated successful implementation?
        iii. What aspects of that relationship made it more difficult for Citizens to complete the project successfully?

    iv. What aspects of federal legislation/regulation most strongly impacted successful implementation of this BTOP project?
    v. What impact did state legislation and regulation have on project implementation?
  b. Localities
    i. Would you please share any examples you have of particularly advantageous interactions with various localities?
    ii. Did actions on the part of any particular locality make it more difficult to successfully implement the BTOP project?
    iii. What interactions/actions on the part of localities that you experienced during the completion of this project would you like to see again in future projects?
    iv. What interactions/actions on the part of localities that occurred during the completion of this project would you like to avoid in the future?
    v. Is there anything in particular that you wish a locality or localities in general would have done but did not do?
    vi. Were there any instances of local level legislation and regulation that enabled/impeded implementation success that stand out in your mind?
  c. Utility Providers
    i. Do any interactions with other providers stand out as particularly enabling or encumbering?
    ii. Did actions by any service provider involved in the implementation of this project particularly surprise you in good or bad ways?
    iii. Did relationships with other BTOP recipients influence the implementation success of NRV-ROAN? If so, how?
  d. Do any interactions with other actors not already mentioned stand out to you as significantly influencing the success of this project's implementation?
5. Are there factors aside from technical, organizational, environmental, and relationships with other actors that you feel influenced the implementation success of this BTOP project?
6. Do you have any additional remarks about the implementation of NRV-ROAN you would like to make but have not had the opportunity to do so?

Thank you for your time today. Your responses will help me tremendously in my research. If you think of anything else you would like to add, please feel free to call or email me. Otherwise, I will be back in touch once I have completed the transcript for your interview. If I have any follow-up questions after I leave here today or after completing the transcript, would you be willing to consent to a second interview at your convenience?

State Officials/Actors Interviews:

Thank you for taking the time to meet with me today and completing the questionnaire you received. With your permission, I would like to create an audio recording of today's interview for the purposes of transcribing and giving you the opportunity to read back over the conversation at a later time to ensure the transcript is factual and you feel comfortable with the information you will provide today.

Your thorough, honest participation will contribute to a better understanding of what factors may have influenced the project implementation success of the NRV-ROAN BTOP project. As a reminder, when I say “implementation success,” I mean meeting or exceeding project completion milestones, being on or ahead of schedule, and being on or under budget.

Although I have some structured questions I would like to ask you, I may ask unscripted questions to aid in the flow of our discussion. Also, please feel free to add information at any time; this interview is intended to be conversational and comfortable.

(Sub-questions are included as prompts/guidance only if needed and may be customized based on questionnaire responses)

1. What was your involvement with the NRV-ROAN project?
2. Compared to other BTOP projects in the state, what do you feel were the comparative strengths and weaknesses of the NRV-ROAN project’s implementation approach?
3. How would you characterize your interactions with Citizens during the course of this project’s implementation?
4. If you were able to play a leadership role in either the redo of NRV-ROAN or a similar project, what design or implementation changes would you have wanted to see?
5. Was Citizens the best-suited organization to implement this project?
    a. Did it have the right capacity in terms of both finances and leadership to do so?
6. Are you aware of any interactions by other actors with Citizens during the course of this project’s implementation that had a significant positive or negative impact on the ability of Citizens to complete its set goals on time and on budget?
    a. Will you please describe what you know of these situations?
7. How did state-level policies influence the successful implementation of the NRV-ROAN project?

Thank you for your time today. Your responses will help me tremendously in my research. If you think of anything else you would like to add, please feel free to call or email me. Otherwise, I will be back in touch once I have completed the transcript for your interview. If I have any follow-up questions after I leave here today or after completing the transcript, would you be willing to consent to a second interview at your convenience?

Localities/Regional Actors Interviews:

Thank you for taking the time to meet with me today and completing the questionnaire you received. With your permission, I would like to create an audio recording of today’s interview for the purposes of transcribing and giving you the opportunity to read back over the conversation at a later time to ensure the transcript is factual and you feel comfortable with the information you will provide today.

Your thorough, honest participation will contribute to a better understanding of what factors may have influenced the project implementation success of the NRV-ROAN BTOP project. As a reminder, when I say “implementation success,” I mean meeting or exceeding project completion milestones, being on or ahead of schedule, and being on or under budget.

Although I have some structured questions I would like to ask you, I may ask unscripted questions to aid in the flow of our discussion. Also, please feel free to add information at any time; this interview is intended to be conversational and comfortable.

(Sub-questions are included as prompts/guidance only if needed and may be customized based on questionnaire responses)

1. Can you tell me about your involvement with the NRV-ROAN project?
2. Did [your organization] have a history of interacting with Citizens?
3. To what extent did you engage with Citizens in the initial design of the project?
    a. How supportive was [your organization/area] at the outset of the project's conceptualization? Examples of support?
    b. If you had the opportunity to do things over again, what changes would you like to see in either the implementation process or the NRV-ROAN end product?
4. How equipped, both in terms of finances and leadership, do you think Citizens was to take on this BTOP project?
5. How would you characterize [your organization's] interactions with Citizens during the implementation of this grant project? Can you think of any particular moments of friction or synergy between Citizens and [your organization] that may have influenced successful implementation?
6. How smooth were the permitting and construction processes for Citizens in the deployment of infrastructure in [your area]? What policy changes would have eased the process?
7. Are community anchor institutions (libraries, education, medical, public safety) in [your area] receiving service via the new network? Why or why not? Is the service from Citizens directly or through a third party provider?

Thank you for your time today. Your responses will help me tremendously in my research. If you think of anything else you would like to add, please feel free to call or email me. Otherwise, I will be back in touch once I have completed the transcript for your interview. If I have any follow-up questions after I leave here today or after completing the transcript, would you be willing to consent to a second interview at your convenience?

Other Providers/BTOP Recipients Interviews:

Thank you for taking the time to meet with me today and completing the questionnaire you received. With your permission, I would like to create an audio recording of today's interview for the purposes of transcribing and giving you the opportunity to read back over the conversation at a later time to ensure the transcript is factual and you feel comfortable with the information you will provide today.

Your thorough, honest participation will contribute to a better understanding of what factors may have influenced the project implementation success of the NRV-ROAN BTOP project. As a reminder, when I say "implementation success," I mean meeting or exceeding project completion milestones, being on or ahead of schedule, and being on or under budget.

Although I have some structured questions I would like to ask you, I may ask unscripted questions to aid in the flow of our discussion. Also, please feel free to add information at any time; this interview is intended to be conversational and comfortable.

1. What was your/your organization's involvement with the NRV-ROAN project?
2. What in your interactions with Citizens regarding this project would you like to see repeated in future projects? Not repeated?

3. What do you think Citizens should have done differently during the implementation of this project that would have aided implementation success?
4. From your perspective, did Citizens have financial and leadership capacity did successfully implement a project of this magnitude? Why or why not?
5. Did Citizens appear to be granted or ask for special privileges because of this project?
6. How was the negotiation process for pole attachments and conduit/right of way access managed?
7. Is your organization using the network now?

Thank you for your time today. Your responses will help me tremendously in my research. If you think of anything else you would like to add, please feel free to call or email me. Otherwise, I will be back in touch once I have completed the transcript for your interview. If I have any follow-up questions after I leave here today or after completing the transcript, would you be willing to consent to a second interview at your convenience?

Federal Regulatory Officer Interviews:

Thank you for taking the time to meet with me today and completing the questionnaire you received. With your permission, I would like to create an audio recording of today's interview for the purposes of transcribing and giving you the opportunity to read back over the conversation at a later time to ensure the transcript is factual and you feel comfortable with the information you will provide today.

Your thorough, honest participation will contribute to a better understanding of what factors may have influenced the project implementation success of the NRV-ROAN BTOP project. As a reminder, when I say "implementation success," I mean meeting or exceeding project completion milestones, being on or ahead of schedule, and being on or under budget.

Although I have some structured questions I would like to ask you, I may ask unscripted questions to aid in the flow of our discussion. Also, please feel free to add information at any time; this interview is intended to be conversational and comfortable.

What was your involvement with the NRV-ROAN project?

1. How would you characterize your interactions with the organization, particularly with members of the Citizens leadership team?
2. How did the implementation of the Citizens BTOP project differ from other BTOP projects you oversaw? Were these distinctions beneficial or detrimental to the relative level of implementation success for NRV-ROAN project?
3. During periods of lower levels of implementation success (behind schedule, costs higher than budgeted, etc.), how did the organization respond? In hindsight, are there particular actions that could have been done differently to avoid those periods of lower implementation success?

Thank you for your time today. Your responses will help me tremendously in my research. If you think of anything else you would like to add, please feel free to call or email me. Otherwise, I will be back in touch once I have completed the transcript for your interview. If I have any follow-up questions after I leave here today or after completing the transcript, would you be willing to consent to a second interview at your convenience?