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Predicting Citizen Satisfaction with Government Services in Belize

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PREDICTING CITIZEN SATISFACTION WITH GOVERNMENT SERVICES IN BELIZE

THESIS

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Abstract

Assessing the effectiveness of humanitarian assistance and foreign aid has presented a challenge to personnel tasked with these operations. Answering the question "are we winning hearts and minds" has similarly eluded military personnel in Iraq and Afghanistan. This research presents a review of humanitarian assistance and foreign aid conducted by the U.S. government and literature on U.S. military doctrine regarding humanitarian assistance and infrastructure investment. The research builds upon expectancy disconfirmation theory to determine the strongest predictors of citizen satisfaction with government services. Case study data was collected in Belize before and after a U.S. military humanitarian and civil assistance construction project was executed, and this data was analyzed using an expectancy theory model. The results indicate that the model using performance, disconfirmation, and an interaction effect of both explains 56% of the variation in citizen satisfaction and proposes a predictive model of citizen satisfaction. This article proposes further research with improvement to the survey methods and instrument; it also discusses how the model may not account for an unmeasured variable. Further research is also suggested to determine the relationship of time and location on a citizen's satisfaction rating when considering the impact of a humanitarian project.

To the countless Soldiers, Sailors, Marines, and Airmen that put their lives in danger to perform reconstruction missions.

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Samuel W. Logan

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List of Acronyms

AFIT – Air Force Institute of Technology

AOR – Area of Responsibility

BDF – Belize Defense Force

CERP – Commanders Emergency Response Program

COIN – Counter Insurgency

CPA – Coalition Provisional Authority

CRS – Congressional Research Service

DFA – Director of Foreign Assistance

DoD – Department of Defense

DoS – Department of State

FDR – Foreign Disaster Response

FY – Fiscal Year

GAO – General Accounting Office

GDP – Gross Domestic Product

GIS – Geospatial Information System

HA – Humanitarian Assistance

HCA – Humanitarian and Civic Assistance

IDP – Internally Displaced Persons

IRB – Institution Review Board

JP – Joint Publication

LAPOP – Latin America Public Opinion Project

MOE – Measures of Effectiveness

MOP – Measures of Performance

OHDACA – Overseas Humanitarian, Disaster, and Civic Aid

PRT – Provincial Reconstruction Team

UN – United Nations

U.S. – United States

USACE – United States Army Corps of Engineers

USAID – United States Agency for International Development

PREDICTING CITIZEN SATISFACTION WITH GOVERNMENT SERVICES IN BELIZE

I. Introduction

The United States (U.S.) military has been heavily involved in combat operations since the invasions of Afghanistan and Iraq in 2001 and 2003, respectively. In both of these conflicts, the U.S. military has executed counterinsurgency (COIN) campaigns with a heavy emphasis on humanitarian assistance projects. Enormous sums of money have been spent in these countries, but measuring the effectiveness of these projects has been problematic. While many measures of performance have been used, such as the number of projects completed and dollars spent, measures of effectiveness of a given project are rarely implemented. The recent use of COIN strategies by the U.S. military and the increased emphasis on operations intended to build partnerships with developing nations necessitates further development of measures of effectiveness for these non-combat operations. The main effort of this research is to evaluate a survey method for measuring the effectiveness of humanitarian assistance projects.

This thesis is in the scholarly article format. Chapter I begins by presenting background information on U.S. government humanitarian assistance programs. Next, the chapter presents the research questions, methodology, and scope of the research. The chapter then presents more in-depth background on U.S government humanitarian assistance programs, U.S. military doctrine, the impact of humanitarian assistance, and models for explaining citizen satisfaction. The chapter proceeds with background on

Belize, the location of the case study, before detailing aspects of Operation NEW HORIZONS 14. The chapter then discusses the experiment design and survey procedures before concluding with a discussion of the anticipated significance of the research. Chapter II is an article to be submitted for publication with the results of this research, and Chapter III reviews the research questions, provides more discussion regarding the results, and concludes with recommendations for further research.

Brief Background

The U.S. government executes humanitarian assistance programs around the world through a myriad of programs. While these programs and intentions are diverse, a common critique of these programs is that projects are poorly evaluated for effectiveness. Criticisms of these programs identify poorly defined goals, nonexistent evaluations of past programs, and questionably quantified assessments after completion of projects. These criticisms have been amplified in the wake of the U.S. invasions of Afghanistan and Iraq after 2001, where humanitarian assistance programs have been pivotal elements of the U.S. military COIN campaigns. The U.S. military has outspent the post-World War II European reconstruction effort, the Marshal Plan, on reconstruction programs in Afghanistan since 2001 when adjusted for inflation to current year dollars (SIGAR, 2014).

Despite these massive humanitarian activities, the question of "are we winning hearts and minds" remains a difficult question to answer. The difficulty in answering this question is a factor of the difficulty of measuring the effectiveness of these projects. Measures of effectiveness (MOE) are often selected based on convenience or the ease of

quantification, such as numbers of projects or dollars spent, instead of more applicable metrics such as change in perception of legitimacy of the host nation government by their population. Recent research also outlines examples where well-meaning assistance may be detrimental to security of developing nations and stability of fragile governments.

Problem Statement and Research Questions

Determining the effectiveness of humanitarian assistance has been a difficult problem. This research will test a method for measuring citizen satisfaction with government services in Belize using citizen satisfaction models developed regarding government services in U.S. cities. The key research questions to be answered in this research are:

- Can satisfaction be predicted when the expectations of the population is known?
- Can satisfaction be predicted when the population's rating of government service performance is known?
- Can satisfaction be predicted when the difference between the population's expectations and perception of government services performance is known?
- Which factors are most influential on citizen satisfaction?
- Can guidance be given in target selection to increase return on investment on infrastructure targets with respect to citizen satisfaction?
- Is the model of predicting citizen satisfaction sensitive to sample size?

Methodology

This research employed citizen satisfaction surveys in order to answer the outlined research questions. Surveys were administered in conjunction with a U.S.

military-led humanitarian assistance mission in Belize, where samples were collected in the vicinity of these projects. These survey data were then analyzed to determine the predictors of citizen satisfaction using models adapted from citizen satisfaction models outlined in detail in Chapter I. Various regression techniques and dominance analysis were conducted on the data to determine the relationships of the predictor variables in order to build a predictive regression equation. Further detail of the survey instrument development, survey sampling plan, and experiment designed are also included in this chapter, and details of the methodologies used for analysis of the results are included in Chapter II.

Scope and Limitations

This research effort was conducted with another student in the AFIT program and was sponsored by Twelfth Air Force (Air Forces Southern). Both students used the same data collected through the same survey method, but two sets of analyses were conducted. This thesis research effort builds upon Hansen's (2015) analysis and further explored the application of his analysis towards predicting citizen satisfaction. In Hansen's research, the Van Ryzin expectancy-disconfirmation model was adapted into the model presented in Figure 1, with the interaction of expectations on disconfirmation removed (Hansen, 2015). This research intends to explore the combined effects of these variables on citizen satisfaction through additional analysis and attempts to predict citizen satisfaction given expectations, performance, and disconfirmation are known within a given population.

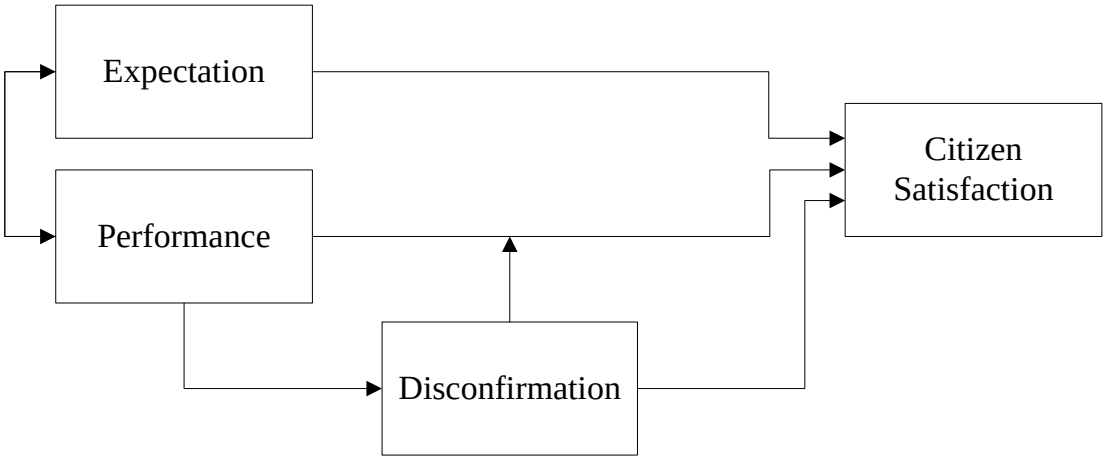

Figure 1: Hansen Research Model (Hansen, 2015)

The research efforts of the author and Hansen needed to be separate and distinct in order to meet the thesis requirement for graduation. While both students worked closely together throughout the research, each student analyzed different aspects of the citizen satisfaction research question using different methodologies. These research efforts were delineated into separate topics as illustrated in Figure 2. Hansen analyzed precursors to investment using Geospatial Information Systems (GIS) and tested relationships between predictor variables in the citizen satisfaction model, while this research effort analyzed the citizen satisfaction problem with a focus on predicting satisfaction and determining the most significant predictors in the model.

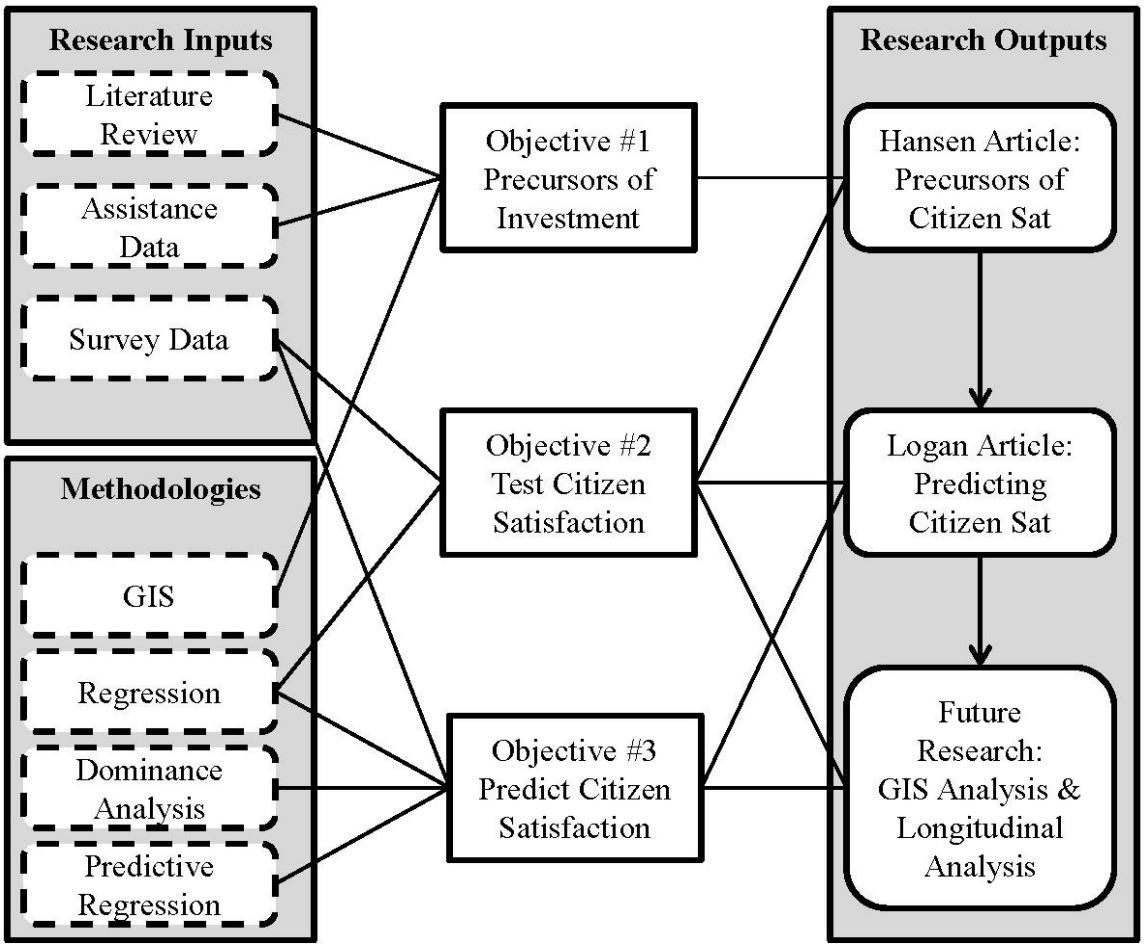

Figure 2: Delineation of Research Efforts

Humanitarian Assistance Background

The United States has been heavily involved in both humanitarian assistance and combat operations from the second half of the 20th century through present day. American involvement in foreign aid began with the passage of the European Recovery Program, more commonly known as the Marshall Plan, in 1947 after the end of World War II. Between 1948 and 1952, the United States gave $13 billion to 16 European countries for reconstruction, which equates to approximately $103.4 billion in current year dollars (SIGAR, 2014). From 1952 to 1961, the United States continued providing

assistance around the world, and in 1961 the United States Agency for International Development (USAID) was established with the passage of the Foreign Assistance Act. While USAID is the primary agency within the federal government responsible for foreign assistance, the U.S. military is also permitted to execute various humanitarian assistance programs. Additionally, many other elements of the executive branch have been involved in humanitarian assistance operations in Iraq and Afghanistan since 2003. A brief description of each of these major civilian and military humanitarian assistance programs is provided in further detail in this section.

Civilian Agency Foreign Assistance

The Department of State (DoS), through the Director of Foreign Assistance (DFA), is the lead coordinator within the federal government for foreign assistance. USAID is the lead agency within the federal government responsible for executing economic development, health, governance, and disaster relief programs, while DoS is the lead agency for executing law enforcement, counter-terrorism, democracy promotion, refugee relief, counter-proliferation, and UN-led peacekeeping operations (CRS, 2011). The DFA has categorized all foreign assistance programs funded by DoS and USAID budgets into five major program areas: Peace and Security, Investing in People, Governing Justly and Democratically, Promoting Economic Growth and Prosperity, and Humanitarian Assistance. These programs are funded through three main budget accounts: Assistance Serving Development and Humanitarian Purposes, Assistance Serving Both Development and Special Political/Strategic Purposes, and Assistance Serving Security Purposes (CRS, 2011). While these accounts help organize programs and funding, the current structure makes it difficult to determine the exact amounts of

money spent on humanitarian assistance by civilian functions of the federal government. All military humanitarian assistance considered in this research is funded through Department of Defense (DoD) accounts, which is not tracked through DFA accounts. In total, these accounts were funded at $39.4 billion in Fiscal Year (FY) 2010, which included $1.9B in Food Aid that is not considered in the previous three accounts (CRS, 2011).

Department of Defense Foreign Assistance

Overseas Humanitarian, Disaster, and Civic Aid (OHDACA) is an appropriation for DoD that funds Humanitarian Assistance (HA), Foreign Disaster Response (FDR), and transportation of donated humanitarian supplies to a foreign location. HA operations are diverse and varied, ranging from supporting internally displaced personnel or refugees, to providing security for storage and distribution of relief materials, providing technical assistance such as repairing communications infrastructure, and training personnel in procedures for demining operations. FDR missions are designated to "alleviate the suffering of foreign disaster victims, including victims of natural disasters and conflicts, internally displaced persons (IDPs), refugees, stateless persons, and vulnerable migrants," and are authorized operations only if military capabilities are unique or local civilian capability to respond has been overwhelmed (JP 3-29, 2014). DoD has spent $328.4 million between fiscal years 2005 and 2010 on these operations in every geographic combatant command's area of responsibility (AOR), with the highest amount spent in U.S. Southern Command (GAO, 2012). A graph of these total amounts from 2005 through 2010 is shown in Figure 3 (GAO, 2012).

Humanitarian and Civic Assistance (HCA) is a program specifically authorized by Title 10, USC, Section 401, which authorizes DoD to execute humanitarian projects as deployment training in a foreign country. These activities are limited to medical assistance in areas where services are not available, construction of surface transportation systems, construction of basic sanitation facilities, and construction or repair of public facilities (JP 3-29, 2014). DoD has been heavily engaged in these operations, spending $75.1 million from fiscal years 2005 through 2010 in all geographic combatant commands' AORs except US Northern Command, with the highest amount spent within U.S. Southern Command (GAO, 2012). An example of an HCA program is Operation NEW HORIZONS 2014, which occurred from April to June 2014 in Belize and is the source of survey data for this research. A graph of these total amounts from 2005 through 2010 is included in Figure 3 (GAO, 2012).

While the US military has been heavily involved in spending money and executing projects through the OHDACA and HCA programs, the General Accounting Office (GAO) has been critical of its project evaluation process. DoD instructions mandate an after-action review within 30 days of completion of each OHDACA project, and all projects valued at over $10 thousand require another evaluation one year after completion; however, the GAO found that 53% of completed projects did not have an after-action review, and 90% of projects over $10 thousand did not have a one-year evaluation (GAO, 2012). While some of the lack of project evaluations can be attributed to funding and logistical challenges tied to traveling to these locations, DoD also indicated that it is difficult to assess the impact of humanitarian assistance projects (GAO, 2012). The GAO identified resources from RAND and the Sphere Project as

starting points for the development of these metrics, and cited USAID performance measurement planning as a method for assessment (GAO, 2012).

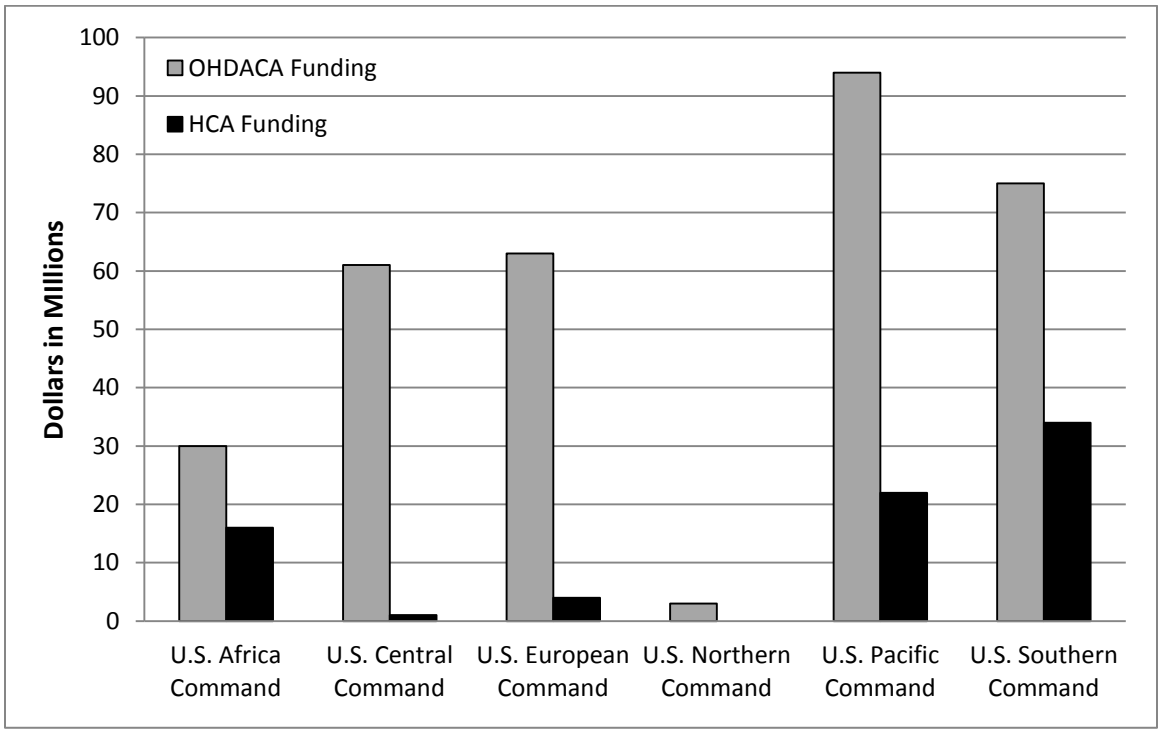

Figure 3: OHDACA and HCA Funding from 2005-2010 (Adapted from GAO, 2012)

Commander's Emergency Response Program (CERP)

The origins of CERP can be traced to the aftermath of the 2003 invasion of Iraq when US Forces recovered Ba'ath Party funds and executed emergency projects with this cash. Within two months of the establishment of the Coalition Provisional Authority (CPA) in April of 2003, Ambassador Paul Bremer authorized coalition forces to use these funds through the newly-named CERP for commanders to "respond to urgent humanitarian relief and reconstruction requirements within their areas of responsibility,

by carrying out programs that will immediately assist the Iraqi people and support the reconstruction of Iraq." Further guidance from coalition commanders were promulgated in fragmentary orders within a few days, which allowed commanders to execute projects including "the building, repair, reconstitution, and reestablishment of the social and material infrastructure in Iraq" (Martins, 2005). Initial limitations on these projects restricted project approval levels to $100 thousand for colonels and $500 thousand for major generals; furthermore, coalition forces were prohibited from using these funds on projects that benefited coalition forces, to purchase weapons or ammunition, or pay salaries of government employees. Despite these restrictions, the CERP account exhausted Ba'ath Party funding quickly and required $180 million in Operations and Maintenance (O&M) funding from the $87 billion emergency supplemental funding bill signed into law on November 6, 2003 (Martins, 2005). At this point, CERP had transitioned from an Iraqi-funded to federally-funded program. By the time that U.S. forces had left Iraq in December 2011, U.S. forces had executed over 36,000 CERP projects at a cost of $3.7 billion (SIGIR, 2013a).

Numerous reports by SIGIR have been critical about project and contract management of CERP projects in Iraq. The governing guidance for the use of CERP funds was titled "Money as a Weapon System" (MAAWS), which mandated project milestone and financial status tracking for projects. MAAWS also mandated coordination with USAID and Government of Iraq officials in response to criticism that DoD was not defining project requirements frequently enough with all stakeholders. The initial intent of CERP was to fund small, swift projects for urgent humanitarian needs; through 2010, there were over 16,000 CERP projects each under $25 thousand and 744

projects each costing in excess of $500 thousand dollars (SIGIR,2013a). Some large projects were attempted in which the timeline for the project surpassed the project manager's departure date; for example, 46 projects worth $35.5 million were executed at Baghdad International Airport over the course of 4 years by Civil Affairs personnel deployed for 6 to 9 months at a time, which resulted in only 22 projects evaluated as successful (SIGIR, 2013a). While program management was a challenge, it was also cited in reports that goals and outcomes were poorly defined for many projects. Goals were arbitrarily selected and metrics to judge progress or success were often absent (SIGIR, 2013a).

CERP was authorized in both Afghanistan and Iraq starting in FY 2004. In both theaters, the intent was to address urgent humanitarian relief requirements through small, quick projects in specific categories, with prohibitions on using the funds for the benefit of coalition forces (SIGAR, 2009). Unlike in Iraq, CERP in Afghanistan was always an appropriation of federal funding. Similar to the experience in Iraq, reports are critical about the management of projects. US forces have spent $3.7 billion through CERP in Afghanistan from 2004 through July 2014 (SIGAR, 2014).

Other U.S. Government Humanitarian Assistance Programs in Iraq

In addition to CERP, the US government spent $25.7 billion in humanitarian assistance from 2003 through the end of 2011. Of this total, $20.9 billion was spent through the Iraq Relief and Reconstruction Fund, and $4.8 billion was spent through the Economic Support Fund (SIGIR, 2013a). Iraq Relief and Reconstruction Fund projects were primarily executed by the Department of Defense and consisted of two separate programs, funded at $2.5 billion and $18.4 billion, which focused on infrastructure

projects in 12 critical sectors including electricity, oil, healthcare, transportation, education, and security. The Economic Support Fund was funded by the Departments of State, Agriculture, Justice, Commerce, the Treasury, as well as USAID, with the focus on economic development, job creation, community security, democracy promotion, and transitioning the Iraqi economy away from state-owned enterprises (SIGIR, 2013b). These totals do not include funds spent on Iraqi Security Forces or on law enforcement operations, which are counted as reconstruction efforts, but not directly associated with humanitarian assistance.

Other U.S. Government Humanitarian Assistance Programs in Afghanistan

Excluding CERP, there are three major humanitarian assistance funds in Afghanistan, with a total of $19.5 billion spent from 2002 to 2014. Of this total, $17.5 billion was spent on political, economic, and security priorities through the USAID-funded Economic Support Fund. Additionally, the Department of Defense spent $1.2 billion on large-scale public infrastructure projects through the Afghanistan Infrastructure Fund; it spent another $0.8 billion on financial sector and banking reforms through the Task Force for Business and Stability Operations. In total, these programs dwarf the $3.7 billion in CERP funding over the same time period (SIGAR, 2014). These totals do not include funds spent on counter-narcotics operations, law enforcement operations, or the Afghan Security Forces. These activities are considered reconstruction efforts, but should be considered separate from humanitarian assistance.

Doctrine Background

US military forces can be employed throughout a wide spectrum of operations at any location in the world. These operations range from peacetime operations in a friendly country, to stability operations in a troubled nation, and ultimately in combat operations in enemy territory. The continuum of military operations as accepted by US military joint doctrine is illustrated in Figure 4 (JP 3-0, 2011). While US military forces are trained, organized, and equipped primarily for combat operations, these forces could be called upon to execute operations anywhere within this continuum.

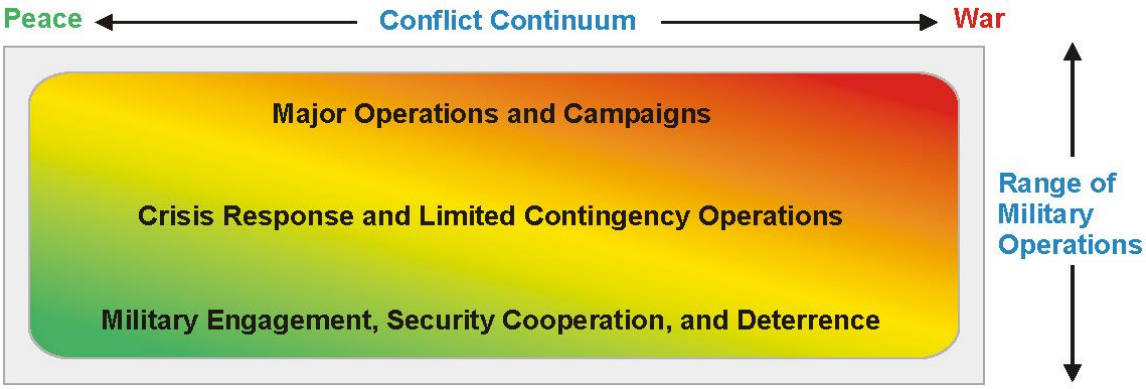

Figure 4: The Range of Military Operations (JP 3-0, 2011)

Humanitarian assistance operations can be expected to be executed throughout the range of military operations. The type and scale of humanitarian operations can be expected to differ based on the amount of conflict in the Area of Responsibility (AOR) of the operation; for example, crisis response operations may have a large humanitarian assistance component, but depending on the situation in the objective country there could be no combat operations. These operations are categorized on the range illustrated in

Figure 4, with elements of humanitarian assistance possible at each level dependent on where the operation lies on the conflict continuum (JP 3-0, 2011). This section will first discuss the overall Joint Operations Process, with further discussions of peace operations, stability operations, and COIN operations as elements of doctrine at different locations along the conflict continuum. The section will conclude with a discussion on operations assessments and their use in humanitarian assistance.

The Joint Operations Process

The joint operations process is a framework that outlines how the U.S. military executes across the range of military operations. These operations could be anything from peacetime humanitarian assistance projects to a major theater war. For many of these various operations, there will be an element of civil-military operations where military personnel interface with governmental organizations and the civilian population in order to achieve military objectives and maximize civilian support for operations (JP 3-0, 2011). These civil-military operations may occur in any phase during the operations process shown in Figure 5 (JP 3-0, 2011); in particular, civil-military operations involving humanitarian assistance projects should be expected to be heavy during Phases 0, I, IV, and V.

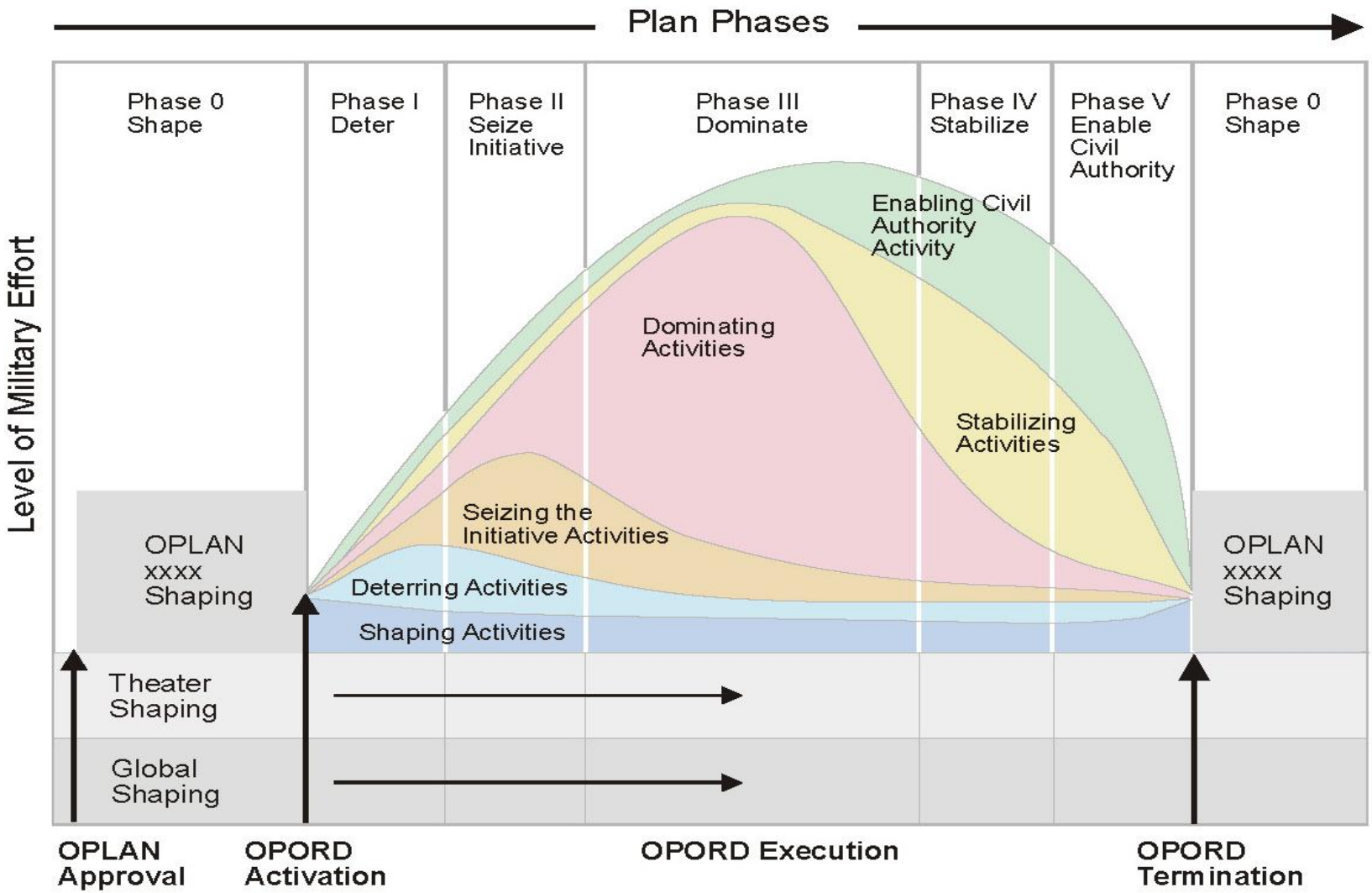

Figure 5: Operations Phases and Military Effort (JP 3-0, 2011)

Stability Operations

The U.S. military has been heavily involved in stability operations in Iraq and Afghanistan since 2001, which consist of operations outside of the U.S. to "maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief" (JP 3-07, 2011). While both Iraq and Afghanistan have been considered major COIN operations, the proper doctrine terms dictate that the "build" portion of COIN is a stability operation (JP 3-07, 2011). As such, stability operations can consist of heavy humanitarian assistance and infrastructure investment efforts. The core mission of stabilization operations is to build the legitimacy of the host nation government in the opinion of the host nation population (JP 3-07, 2011). While U.S. civilian agencies such as USAID and USACE should lead the execution of major infrastructure projects to restore essential services to the population, U.S. military doctrine specifies that military units can be tasked to execute quick impact projects as part of a multi-agency team such as Provincial Reconstruction Teams (PRTs). U.S military doctrine also cites CERP in Iraq and Afghanistan as an example of how to implement economic development initiatives (JP 3-07, 2011).

Stability operations are intended to build the legitimacy of the host nation government as seen by the host nation population, yet the assessment guidance in U.S. military doctrine emphasizes Measures of Effectiveness (MOE) that measure the change in a citizen's life rather than their perception of their government and references metrics such as reductions in violence and improvement of public utility performance as examples (JP 3-07, 2011). Detailed assessment tools have been developed for specific

assessment purposes; for example, the Interagency Conflict Assessment Framework tool is used to determine the groups involved and drivers of conflict, whereas the District Stability Framework is a tool used to determine the root cause of instability and identify means to address those causes (JP 3-07, 2011). There are four assessment tools listed in JP 3-07, but the only tool that takes into account the perception of the population is the District Stability Framework.

COIN Operations

Counterinsurgency (COIN) operations have been conducted by the U.S. military extensively in Iraq, Afghanistan, the Philippines, and the Horn of Africa since 2001. COIN operations are a combined political and military effort where the legitimacy of the government as viewed by the population is the objective (JP 3-24, 2013). JP 3-24 states that the authority to govern is dependent on four factors:

- Mandate. The perceived legitimacy of the mandate that establishes a state authority, whether through the principles of universal suffrage, a recognized or accepted caste/tribal model, or authoritarian rule.
- Manner. The way in which those exercising that mandate conduct themselves, both individually and collectively in meeting the expectations of the local population(s).
- Support and Consent. The extent to which local populations consent to, or comply with, the manner/authority of those exercising the mandate. Consent may range from active support, passive support, or indifference, through unwilling compliance.
- Expectations. The relative quality or amount of support that local populations expect from their government.

COIN is a comprehensive approach to building the legitimacy of the host nation government through information, security, and economic activities executed through a

political strategy (JP 3-24, 2013). In both Iraq and Afghanistan, the "Shape, Clear, Hold, Build, Transition" operations scheme was used for COIN. This method saw extensive use of infrastructure investment in the "Build" and "Transition" phases as part of the U.S. military strategy, which could also be considered stability operations. The security activities of COIN secure the conditions for economic, political, and social improvements by the host nation government such as restoring rule of law, providing essential services, and rebuilding economic systems (JP 3-24, 2013). The complex relationships of these factors resulted in the development of a system dynamics diagram shown in Figure 6, which was leaked to the press in 2010, where General Stanley McChrystal, then Commander of the International Security Assistance Force (ISAF), commented "When we understand that slide, we'll have won the war" (Bumiller, 2010).

Operations assessments are vital to every military operation, but COIN doctrine stresses that the understanding of the COIN operational environment requires continuous assessment in order to detect changing conditions (JP 3-24, 2013). JP 3-24 includes an extensive 18-page long chapter dedicated to assessing COIN operations, which is considerably more than the previously mentioned doctrine documents. While this seems extensive, the operations assessments process is focused on definitions and types of inputs and outputs rather than suggesting ways to collect data. Despite COIN being a population-centric strategy, there is no specific mention of surveys of the population during operations assessments.

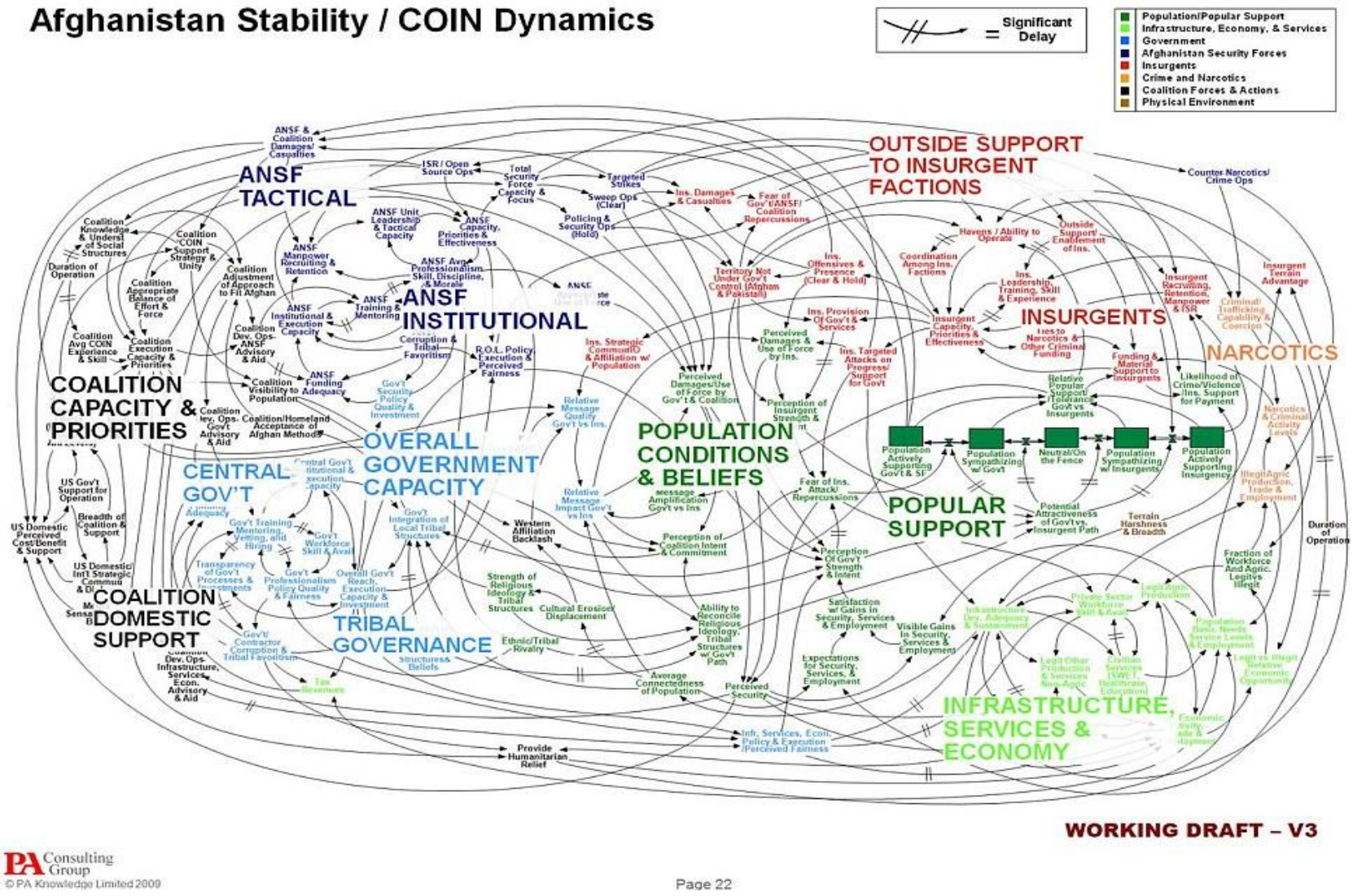

Figure 6: Afghanistan Stability / COIN System Dynamics Chart (Bumiller, 2010)

Operations Assessments

According to U.S. military doctrine, operations assessments should start during the initial planning stages of the operations process and continue throughout execution. These assessments provide data to commanders to determine progress towards defined objectives and provide vital information for decisions (JP 3-0, 2011). These assessments use Measures of Effectiveness (MOE), which assess the overall change in a system, and Measures of Performance (MOP), which indicate specific task performance (JP 3-29, 2014). While doctrine documents focus on defining these terms, they fall short on providing guidance in how to actually perform operations assessments (Schroden, 2011). As presented in the COIN Doctrine section, COIN guidance does not mention using population surveys to determine their perception of their own government.

Assessments of whether the U.S. military operations in Iraq and Afghanistan were winning or losing was difficult to accomplish and widely criticized (Schroden, 2011). Some critics have cited improper metrics, but Schroden identified five factors in his "Failure Cycle for Operations Assessment," with poor doctrine, inadequate training, poor processes and products, commander disinterest, and lack of advocacy listed as the links in a chain causing failure.

> Poor and confusing doctrine leads (in part) to inadequate (or no) training of assessment practitioners, which leads to poor assessment processes and products, which leads to commanders who are uninterested in assessment, which leads to a lack of advocacy for fixing assessment, which leads to a perpetuation of poor doctrine – and the cycle continues. (Schroden, 2011)

In the case of infrastructure investment in both Iraq and Afghanistan, it could be argued that doctrine did not provide adequate assessment guidance since COIN does not mention population surveys despite being a population-centric strategy. The lack of this data left

a key variable unmeasured in COIN assessment such that training of the assessors may have been irrelevant, but the omission of population perception survey data likely resulted in an assessment product that did not measure the progress towards the ultimate objective in a COIN operation.

Operations assessments are not limited to combat operations. By law, the U.S. military must conduct an after-action review or project evaluation on all OHDACA projects within 30 days of project completion and again a year after completion; however, from FY2005 to FY2009, 53% of surveyed projects did not have a 30-day evaluation accomplished and over 90% did not have a 1-year evaluation (GAO, 2012). The GAO also criticized the U.S. military for using inconsistent evaluation of HCA projects and for executing projects that did not meet host country needs (GAO, 2012).

Impact of Humanitarian Assistance and Foreign Aid

The impact of humanitarian assistance and foreign aid is a controversial subject. Core to the assessment of the impact of humanitarian assistance or foreign aid is defining the intended effect. During the Cold War, the U.S. used foreign aid as a tool to spread democracy, but little evidence exists to prove that this aid had a significant impact on recipient nations' progress towards democracy. Analysis indicates that progress towards democracy is often offset by a country's dependence on aid which also results in a government becoming less accountable to their citizens but rather to their aid donors (Knack, 2004). Others argue that variables such as the style of government and the breadth of distribution of wealth within a country influence progress towards democratization upon a dictator receiving foreign aid (Wright, 2009).

Several studies have been conducted studying the effect of CERP spending in Iraq and Afghanistan on violence levels. An analysis of 2,000 CERP records in the Afghanistan project database reported less than 10% of those projects identified violence reduction as an intended outcome (Fischerkeller, 2011). Many respondents to a survey conducted by SIGIR of personnel involved with CERP in Iraq reported that reduction in violence was the intended impact; however, the intended impact of a project such as "increase government capacity" was often not adequately related to the metrics used to assess the impact or to the actual project executed (Bowen & Collier, 2013).

Data from Iraq supported a model for determining the impact of CERP project spending on violence levels, which indicated that "every additional dollar per capita of CERP spending predicted 1.59 less violent incidents per 100,000 population per half year," (Berman, Shapiro, Felter, 2011). The data also supports the conclusion that reconstruction spending outside of CERP, which accounted for approximately 90% of the funds expensed over the analyzed time period, did not have a violence-reducing effect (Berman, Shapiro, Felter, 2011). Similar results in another study show that the type of project executed and a city's baseline violence level in Iraq influence whether or not spending through CERP reduces violence levels. While many of the results were not statistically significant at the $p = 0.01$ level, the data shows that spending on democracy, education, transportation, and water, as well as large projects in general, reduced the per capita violence rates in cities with a higher baseline violence level; however, spending in lower violence baseline cities on democracy, transportation, and water were the only ones that reduced violence (Clark & Jackson, 2013). The results indicate that smaller projects executed at lower levels were more effective at reducing violence in some situations, but

it is unclear if the larger projects had an impact on other aspects of COIN and stability objectives such as building the legitimacy of the Iraqi government.

Recent research into stability and international aid is inconclusive on the overall effect of assistance in Afghanistan. In one study, evidence suggests that the large amounts of aid being spent enabled corruption and decreased the perception of legitimacy of the government and, in some situations, actually increased violence as parties competed for aid resources (Fishstein & Wilder, 2012). In COIN and stability operations, the objective is to increase the legitimacy of the government, yet few studies address how aid may impact this outcome. Measuring the impact of aid is difficult, but public opinion polling may be a method that has merit. In many cases, the impact of PRTs has been reported in terms of dollars spent and numbers of projects executed; in other cases, the metrics of success have been reported in terms of number of smiling children (McNerney, 2006). Fishstein and Wilder (2012) caution that western-style polls may be unreliable; however, organizations should invest more in measuring outcomes and impacts of aid.

Citizen Satisfaction Research Background

The discipline of Public Administration focuses in the area of citizen satisfaction and has mature models developed to measure citizen satisfaction with government services, along with a multitude of other measures such as justice and trust. Within the discipline of Public Administration, there has been a recent synthesis of traditional citizen satisfaction theory with consumer expectancy-disconfirmation theory that originated in the marketing and business fields (Van Ryzin et al., 2004). This model has been adapted and tested by Van Ryzin, who has published several articles with his results. The core of

his adapted expectation, performance, and citizen satisfaction model compares a citizen's survey ratings of the level of performance of nine city services with their previous expectations of level of performance, and then compares this relationship to the citizen's overall satisfaction with government services (Van Ryzin, 2004).

Van Ryzin's model as represented in Figure 7 illustrates that citizen expectations of government services and perceptions of performance feed into the overall perception of disconfirmation. The citizen's perceived difference between their expectations and perceived performance will either be positive, meaning government services exceeded their expectations, or will be negative, meaning government services did not meet their expectations. This disconfirmation variable then drives the citizen's overall perception of satisfaction (Van Ryzin, 2004).

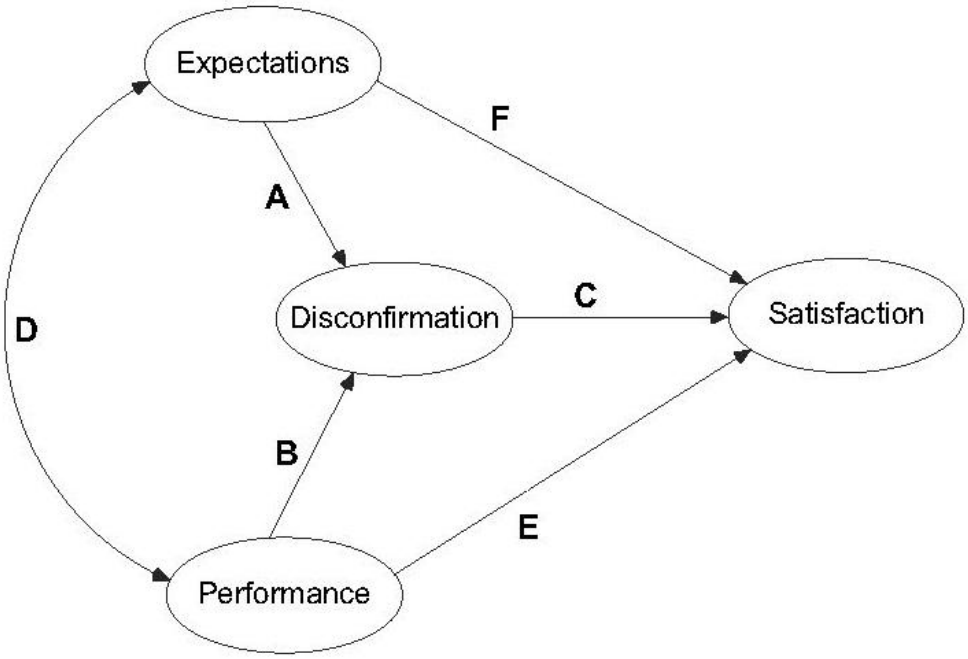

Figure 7: Expectancy Disconfirmation Model (Van Ryzin, 2004)

Van Ryzin's first model showed a strong relationship between disconfirmation and satisfaction; however, later results determined that the initial model had statistical flaws which biased the results (Van Ryzin, 2005). These flaws were identified and modified in later studies by measuring disconfirmation with a survey response instead of calculating disconfirmation by subtracting the expectations rating from the performance rating. A new model was tested by Van Ryzin using an online survey sent to 1,631 people, of which 615 people completed the survey (Van Ryzin, 2005). The results of this survey formed the basis of his 2005 paper which tested three similar models, of which the most applicable model appeared to be one with a survey question response for disconfirmation. This differed from the other two models which used a mathematical disconfirmation value, and the combination of a mathematical value and survey data, to determine citizen satisfaction. Using the survey-only measure for disconfirmation reduced the effect of disconfirmation on satisfaction, but it still accounted for a standardized effect of 0.49 on the overall satisfaction rating, with performance contributing 0.41 and expectations contributing 0.10 towards this measure as well. The summary model of these results is included in Figure 8, which illustrates that the total model explained 75% of the variation of the data (Van Ryzin, 2005).

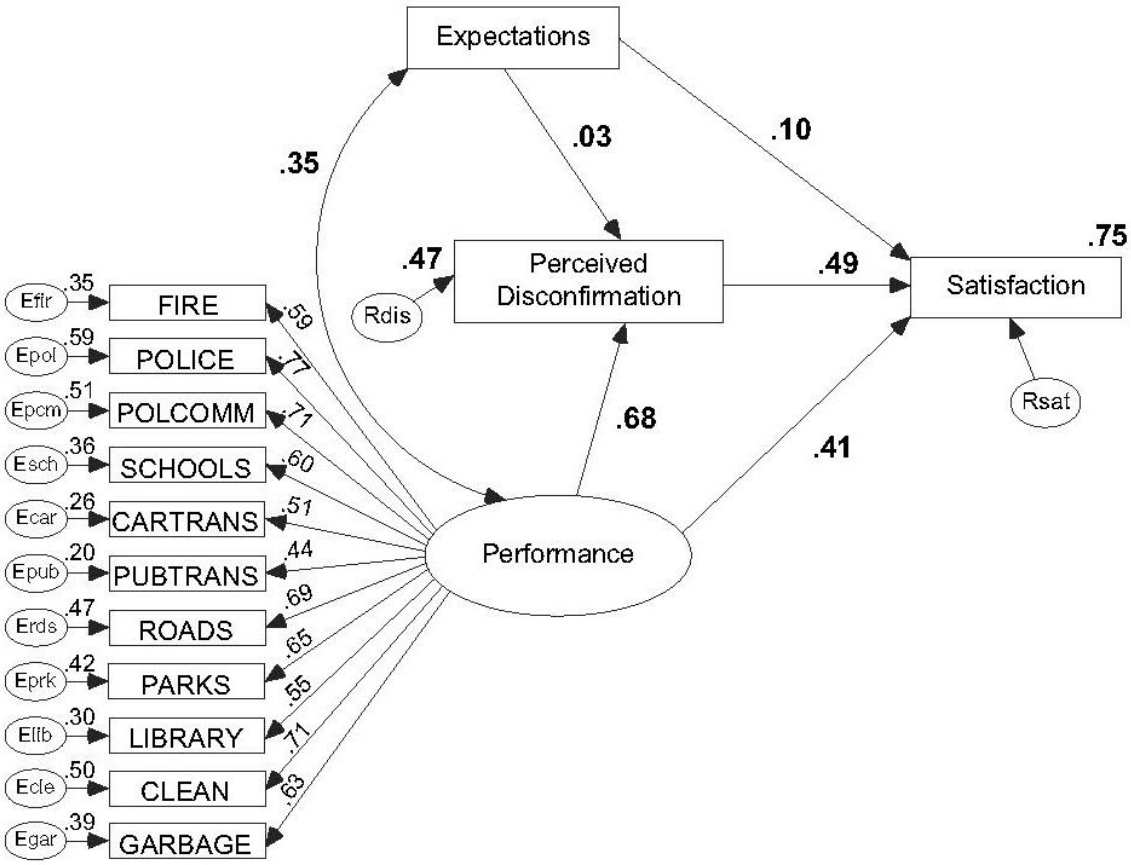

Figure 8: Expectancy Disconfirmation Model Parameter Estimates (Van Ryzin, 2005)

Using this framework, the impact of humanitarian assistance can be assessed by measuring the change in citizen satisfaction before and after a humanitarian project is executed. Van Ryzin's model was developed from research on government services in New York City, which will require modification of the measured factors when used in a less developed country, as fewer government services are typically available to such a population. Hansen (2015) adapted this framework to measure citizen satisfaction in Belize, which formed the basis for this research.

Background on Belize

Belize is a former British Colony in Central America. Both the British and Spanish claimed Belize until 1854 when it was designated British Honduras, and Belize was granted independence from the United Kingdom in 1991. The current population of Belize is approximately 340 thousand people and the country's gross domestic product (GDP) is approximately $1.6 billion per year, which yields a per capita GDP of $8.8 thousand per citizen (CIA: The World Factbook, 2014). The largest sector of Belize's economy is tourism, which accounts for 33.2% of the GDP and 30.1% of the employed workforce (World Travel & Tourism Council, 2012). The rest of Belize's economy consists of agricultural exports such as bananas, cacao, citrus, sugar, lumber, and fish, as well as industries such as textile manufacturing, oil, and food processing (CIA: The World Factbook, 2014). Figure 9 shows a map of Belize that illustrates locations of interest and the geography of the country. Overall, the country is impoverished with an economy based on services, exporting resources, and limited industrial capacity.

Figure 9: Map of Belize (belize.com, 2015)

In contrast to these average ratings of government trust, the average rating of Belize citizens' satisfaction with municipal services in 2008 was the third lowest in Latin America with a 39.6 satisfaction rating. The average rating was 49.9 elsewhere in Latin America, and the only countries lower than Belize in that study were Haiti and Jamaica, at 39.5 and 37, respectively (Montalvo, 2009). Similar results can be seen over time from 2008 through 2012 in Figure 10, which was compiled using data from LAPOP's System for Online Data Analysis. This chart illustrates that less than 20% of Belize citizens have a favorable rating of municipal services; low ratings are consistent across several years, and the percentage of people rating their municipal services "Poor" or "Very Poor" has decreased in the last 4 years (LAPOP, 2014). These data suggest that the overall level of municipal services are lacking in Belize compared to the rest of Latin America, but citizens' trust in government is similar to other countries in the region.

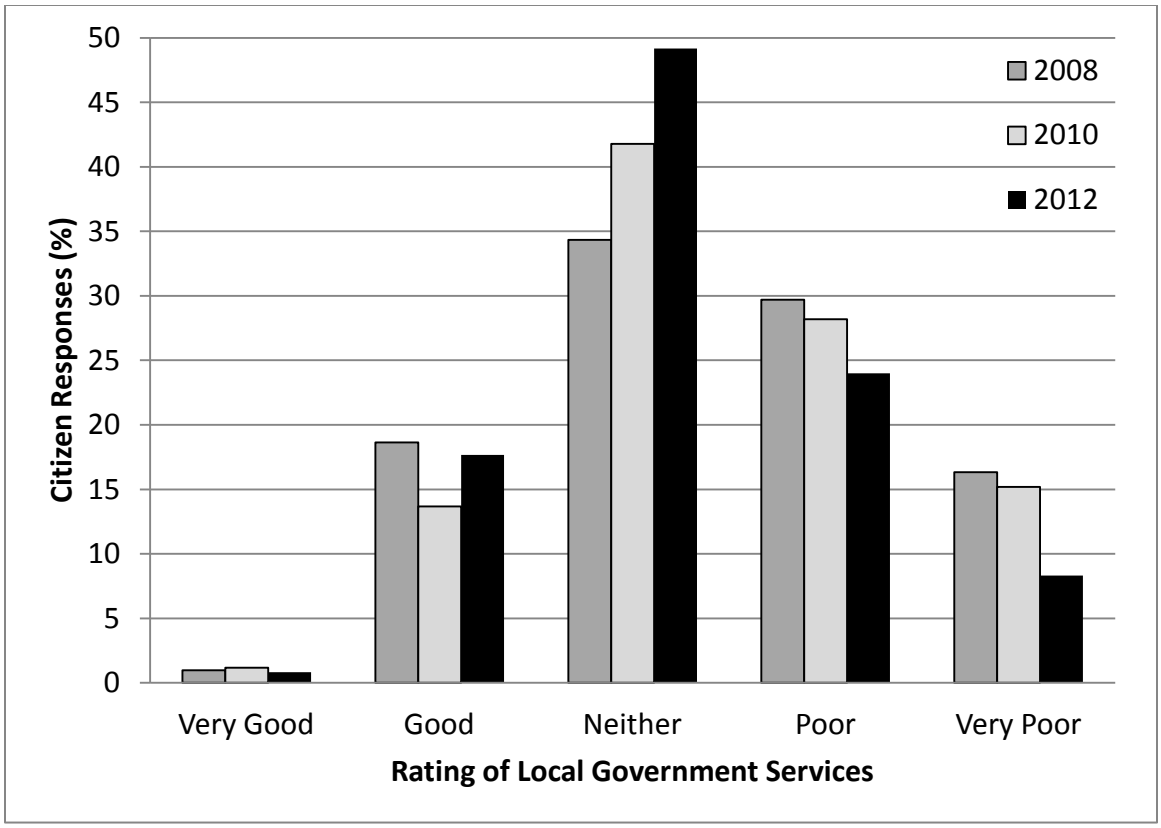

Figure 10: Citizen's Perceptions of Local Government Services in Belize, 2008-2012 (Adapted from LAPOP, 2014)

Another area of interest for this research is the population's perception of the U.S. Recent data indicates that the perception of trust in the U.S. among citizens of Belize is rated 48.9 out of 100, which is below the Latin America average of 55.6. Trust in the U.S. was analyzed using regression models which determined that trust ratings are driven by trade with the U.S., and many of the countries with the lowest trust ratings in the U.S. were located farther away than countries with higher ratings, with the exception of Mexico (Silliman, 2014). While the citizens of Belize have a relatively low level of trust in the U.S. despite being geographically close, it should also be noted that the rating of

trust in the U.S. of 48.9 is higher than the citizens of Belize's rating of 47.2 regarding trust in their own government.

In addition to these measures of government services and trust, there is data available regarding overall life satisfaction within Latin America. Like many of the other measures previously discussed, Belize rated only 53.4 out of 100, below the average rating of 59.5 for Latin America, with only four other countries rating lower than Belize, and with Brazil ranked highest at 71.6 in 2010. Further analysis suggests a link between individual wealth, national wealth, and happiness ratings (Corral, 2011). These data appear to show a different picture than the data regarding trust in government, which showed ratings close to the average for Latin America, although that data was correlated to GDP growth rate per capita. Further analysis regarding the determinants of satisfaction with government services, trust in government, and overall happiness is warranted to better understand these relationships.

Operation NEW HORIZONS 14

The 820th RED HORSE Squadron (RHS) deployed to Belize from April through June 2014 in support of Operation NEW HORIZONS 14. During this deployment, the 820th RHS executed five construction projects at three locations which had been selected prior to this research effort. These projects ranged in cost from $75 thousand to $204 thousand each. Projects included four school additions and one hospital addition, with three school projects occurring in Belize City and the other projects occurring in Belmopan and Hattieville. A summary of these projects and locations is included in Table 1. This operation provided an opportunity to gather population survey data before

and after the execution of these projects in order to determine the effect of the project on the population's satisfaction with their host nation (HN) government and their perception of the U.S.

Table 1: Operation NEW HORIZONS 14 Project Summary

Project Title	Location	Cost
Western Regional Hospital Addition	Belmopan, Belize	$204,000
Hattieville Preschool	Hattieville, Belize	$173,000
Sadie Vernon School	Belize City, Belize	$144,000
Stella Maris School	Belize City, Belize	$119,000
Edward P. York School	Belize City, Belize	$75,000

Experiment Design

While both Hansen and this research effort answer distinctly different questions, the core research effort shared common survey data collected during Operation NEW HORIZONS 14 in Belize. An experiment was designed to test the effect of a given humanitarian project on a population. The treatment for this experiment is the project being executed in a given community. Because treatments are being executed on existing groups as the community population, a quasi-experimental approach using the nonequivalent control group design was used to test the hypotheses (Patten, 2009). A diagram of this experimental design is included in Figure 11, with the four school projects and one clinic project consisting of the three treatments in this diagram, and a sixth control group at the bottom. Since three of the school projects were executed in Belize City, the treatments and observations were combined. The dashed lines indicate that these treatments are being done on existing separate populations of Belmopan,

Hattieville, Belize City, and control locations. Surveys were given before and after the treatments to determine the population's change in satisfaction with government services and perception of the U.S. due to the infrastructure investment.

Hospital	O	X	O
Preschool	O	X	O
School #2 - #4	O	X	O
Control	O		O

Figure 11: Experiment Design

Survey Development

The population's satisfaction with government services was measured with a survey using the expectancy-disconfirmation model proposed by Van Ryzin (2004). The structure of Van Ryzin's survey instrument (2005) was used as a basis to develop the survey instrument employed at multiple locations across Belize, with additional questions included to measure factors not considered in Van Ryzin's research. The survey first measured the citizen's top three priority services in a free response format to determine the citizen's priority of services without being prompted by a Likert scale question. Next, the survey collected ratings of expectations, performance, disconfirmation, and satisfaction with government services on a 1 to 5 Likert scale, with three questions for each measure except performance, which had seven measures.

The seven performance measures asked citizens to rate the performance of schools, health care, local police, garbage removal, quality of drinking water, cleanliness,

and quality of roads in their neighborhood. These measures were selected based on the public services available in Belize. The next section of the survey included a series of questions designed to assess the quality of the target selected in that area for diagnostic purposes and asked questions unrelated to infrastructure to determine if there is an external threat to validity on the results of the satisfaction rating. The next section asked citizens about their perceptions of the U.S. and U.S. military personnel in Belize during the exercise. Finally, the survey concluded with date, location, and demographic questions to determine if the number of children, education level, income level, gender, or age have an effect on the results. A summary of the survey questions is included in Table 2; the survey instrument itself is included in Appendix A.

Latent variables in the expectancy-disconfirmation measures and the perceptions of the U.S. measure have multiple survey questions to improve the reliability of the survey data. For the expectations, disconfirmation, and satisfaction measures there are three questions each, while the perceptions of the U.S. measure has four questions. The citizen priority measure has three questions and the services measure has eight questions. However, each project will only influence one of these measures; therefore, it should not be considered a reliability improvement for having multiple questions. Similarly, the target quality questions are all specific to aspects of the target such as the infrastructure, staff, and equipment of these services. These measured served as a diagnostic to determine what aspects of the service are better in their opinion, and will better explain the changes before and after the infrastructure improvement is executed at that location.

Table 2: Survey Question Structure

Section	Measure	Type of Measure	Number of Questions
Section 1: Priorities	Citizen's Priority of Services	Free Response	3
Section 2: Expectancy - Disconfirmation Series	Expectations	1-5 Likert	3
	Performance	1-5 Likert	8
	Disconfirmation	1-5 Likert	3
	Satisfaction	1-5 Likert	3
Section 3: Target Quality	Factors of Target Quality	1-5 Likert	4
Section 4: Perception of US	Citizen's Perception of US due to HA in Area	1-5 Likert	4
Section 5: Demographics	Demographics, Location, Date	Free Response	7

Survey Procedure

Survey data was collected by Belize Defense Forces (BDF) personnel from the population before and after each of the five projects was executed. The official language of Belize is English, which negated the requirement for language translation and back-translation of the survey instrument; however, due to a literacy rate of only 76.8% (CIA: The World Factbook, 2014), the survey was designed to be read to the respondent for verbal answers to questions with BDF personnel circling answers on paper surveys. The survey results were compared to determine the strength of the statistical difference between satisfaction ratings as well as multiple regression analysis to determine the effect of the project on the population's satisfaction. According to Cohen (1992) and anticipating medium-strength effect size for three multiple regression factors and an alpha of 0.05, the estimated minimum number of samples per location was 76 both before and after each project plus a control set, for a minimum total number of 912 samples for the entire project.

Anticipated Significance

This research is intended to develop further understanding of citizen satisfaction with government services that may be applied towards a target selection methodology for humanitarian assistance projects. This research may also benefit municipal governments by contributing to the body of knowledge by further exploring the influence of government service performance on citizen satisfaction.

Overview of Remaining Chapters

This thesis is in the scholarly article format. The following chapter is an article that contains all of the elements of a thesis; it could be submitted for publication when combined with the article written by Hansen. As an independent chapter, it includes an abstract, introduction, background, methodology, and discussion section. Chapter 3 concludes this thesis with a discussion of the results and conclusions; it also proposes further research opportunities within this topic.

II. Scholarly Article

Abstract

Assessing the effectiveness of humanitarian assistance and foreign aid has presented a challenge to personnel tasked with these operations. Answering the question "are we winning hearts and minds" has similarly eluded military personnel in Iraq and Afghanistan. This research presents a review of humanitarian assistance and foreign aid conducted by the U.S. government and literature on U.S. military doctrine regarding humanitarian assistance and infrastructure investment. The research builds upon expectancy disconfirmation theory research to determine the strongest predictors of citizen satisfaction with government services. Case study data was collected in Belize before and after a U.S. military humanitarian and civil assistance construction project was executed, and this data was analyzed using an expectancy theory model. The results indicate that the model using performance, disconfirmation, and an interaction effect of both explains 56% of the variation in citizen satisfaction and proposes a predictive model of citizen satisfaction. This article proposes further research with improvement to the survey methods and instrument; it also discusses how the model may not account for an unmeasured variable. Further research is also suggested to determine the relationship of time and location on a citizen's satisfaction rating when considering the impact of a humanitarian project.

Introduction

The United States entered the domain of major world aid provider starting with the Marshall Plan following World War II. Since then, the United States has been heavily involved in foreign aid and humanitarian assistance to present day. These aid programs are often executed by the Department of State, but the U.S military has taken on enormous aid programs since the invasions of Afghanistan and Iraq in 2001. While the goals and means of these programs vary considerably, all share a common deficiency in assessing the impact of these aid efforts. This article will discuss means of U.S. humanitarian assistance and foreign aid, methods of assessing the effectiveness of aid, and will propose an adaptation of existing citizen satisfaction measures to analyze the relationship of performance and disconfirmation on citizen satisfaction. Results of these analyses will be presented and discussed, and further research efforts are proposed.

Background

The U.S. military has statutory authority to conduct foreign assistance through two major appropriations: Overseas Humanitarian, Disaster, and Civic Aid (OHDACA) and Humanitarian and Civic Assistance (HCA). OHDACA is primarily used for disaster response operations, with the military spending $328.4 million between 2005 and 2010. By contrast, HCA is used for troop deployment training exercises in foreign countries where medical assistance or construction projects are executed, with $75.1 million being spent between 2005 and 2010 at various locations around the world (GAO, 2012).

Following the invasions of Afghanistan and Iraq, the U.S. military undertook the much-criticized Commander's Emergency Response Program (CERP). This program

originated in Iraq and was initially executed with seized Iraqi Ba'ath Party funds on emergency humanitarian needs; however, once the Iraqi funds were exhausted, this program was then funded with U.S. appropriated funds (Martins, 2005). By the end of the Iraq War in 2011, the U.S. military had executed over 36,000 projects at a total cost of $3.7 billion (SIGIR, 2013a). A similar CERP effort was started in Afghanistan in 2004, with the key difference being that this program was always resourced through appropriated funds, with $3.7 billion spent in Afghanistan through July 2014 (SIGAR, 2014).

While CERP represents a large amount of aid, this total is eclipsed by the amount of non-military humanitarian assistance programs executed by other U.S. agencies. The U.S. government spent $25.7 billion in Iraq from 2003 through 2011, with $20.9 billion spent on critical infrastructure and $4.8 billion spent on economic development (SIGIR, 2013a). In Afghanistan, the U.S. has spent $19.5 billion through 2014, with $17.5 billion spent on economic development, $1.2 billion on large public infrastructure, and $0.8 billion on banking sector reforms (SIGAR, 2014). These programs were executed mainly through U.S. Agency for International Development (USAID), but other agencies such as the Departments of State, Agriculture, Justice, Commerce, and Treasury have all participated as well.

Humanitarian assistance and foreign aid have been used in enormous quantities to support the U.S. military's counterinsurgency (COIN) campaigns in Iraq and Afghanistan. The ultimate objective according to U.S military doctrine is to build the legitimacy of the host nation government in the opinion of the population (JP 3-24, 2013). This is accomplished through providing security to the population in the "Clear"

and “Hold” phases of operations, which sets the stage for the “Build” and “Transition” phases to start with heavy investment in essential government services, economic systems, and infrastructure (JP 3-24, 2013). Even though the stated goal of these operations is to build legitimacy of a government as perceived by their constituents, CERP projects were often assessed based on measuring the change in levels of violence (Bowen & Collier, 2013) despite less than 10% of projects being identified as intended to reduce violence (Fisherkeller, 2011).

Stability operations are similar to the “Build” and “Transition” phases of a COIN operation with a common goal of building the legitimacy of the host nation government and are often accompanied by humanitarian assistance and infrastructure investment (JP 3-07, 2011). These projects have been executed through CERP and other humanitarian and foreign aid programs in Iraq, Afghanistan, and in various locations worldwide, but most of the data and research is from the conflicts in Iraq and Afghanistan. U.S. military doctrine recommends using assessment tools such as USAID’s District Stability Framework, which uses a variety of analysis and survey data collection to conduct root cause analysis of sources of instability and address them accordingly (JP 3-07, 2011). This tool can be used to measure population perceptions of the legitimacy of their government, but implementation of this process occurred late in the Afghan campaign.

Assessing the impact of humanitarian projects in peacetime, COIN, and stability operation environments is difficult and has been criticized, with some examples citing “number of smiling Afghan children” as a measure of effectiveness (McNerney, 2006). Research in this area has focused on determining the effect of CERP spending on violence levels. In one study, the per capita spending on projects was linked to reducing

the violence rate in Iraq over the studied period (Berman, Shapiro, Felter, 2011), while another study linked the effect of specific project types such as education and water improvements to different effect magnitudes and directions on violence rates at a city level (Clark & Jackson, 2013). While the reduction in violence is certainly a metric worthy of measurement and analysis in a military operation, it is unlikely that this is the best metric for assessing progress towards building the legitimacy of the host nation government.

Similarly, assessing the impacts of peacetime foreign aid is difficult and controversial. Between 2005 and 2009, 53% of executed OHDACA projects were not assessed within a month of completion and 90% of projects were not assessed a year later. Additionally, the GAO criticized the lack of measures of effectiveness for HCA progress, noting examples such as claims that "vaccinating cattle in Uganda helps counterterrorism efforts in Somalia" without evidence of this causation link (GAO, 2012). The GAO recommended implementing RAND's monitoring and evaluation process for humanitarian assistance projects; however, this guidance sidesteps the key question of how to measure if a project was effective at large-level impacts, but rather focuses on project-specific outputs and measures of performance scored by personnel executing the project (Haims et al., 2011).

Project assessments are much more difficult when the objective is to influence a population's perception of their government. Some HCA operations have objectives to gain influence of a host nation and build relationships, but evaluations fall short of proving these goals were achieved (GAO, 2012). Other studies are inconclusive on the impact of foreign aid; some authors have argued that providing aid fosters dependence on

aid and reduces the accountability of a government to their population (Knack, 2004), while others argue that the overall result of foreign aid may result in shifting countries from dictatorships to democracy only if certain conditions exist (Wright, 2009). A study from Afghanistan suggests that U.S. aid not only decreased the perception of legitimacy of the government in some areas, but it also increased corruption and violence in the province as parties feuded over the funds being distributed for projects (Fishstein & Wilder, 2012).

The National Solidarity Programme (NSP) conducted an extensive survey of the impact of their aid program at 500 locations within Afghanistan between 2007 and 2011. This study concluded that infrastructure projects increase access to utilities and improve government services for women, but irrigation and transportation projects do not have a significant impact. The study further states that NSP did not have an impact on economic development and that the quality of local governance declines as the power in the village shifts from the government to the NSP administration structure. Finally, the study also concluded that NSP temporarily increases the perception of legitimacy of the government during project execution, but that perception resets after funds are expended (Beath, Christia, Enikolopov, 2013). The study reinforces the notion that donors, while well-intentioned and executing quality projects that benefit people, may unintentionally subvert an existing government structure they intended to assist.

Despite extensive experience in humanitarian assistance since 2001, the U.S. military still struggles to assess the effectiveness of assistance in building the legitimacy of host nation governments. There are limited examples of personnel conducting surveys of a population to determine their perceptions of their government and public services,

but many of these surveys lack quantitative elements for analysis. The absence of these quantitative measures has made assessing the effectiveness of humanitarian assistance difficult and lacking in rigorous analytical power.

Citizen satisfaction models present an area to explore for assessing effectiveness of humanitarian assistance. A citizen's satisfaction with their government may be an appropriate measurement to gauge the effectiveness of humanitarian assistance when the assistance is in the form of an improvement to a government service or public infrastructure. A model of citizen satisfaction has been developed as an adaptation of consumer expectancy theory, from the marketing and business disciplines, to explain citizen satisfaction (Van Ryzin et al., 2004). The model measures a citizen's expectations, performance rating, and overall satisfaction with government services, as well as their perceived difference between their expectations and the quality of the service, which is termed disconfirmation. Figure 12 shows Van Ryzin's model (Van Ryzin, et al., 2004).

Subsequent studies and tests have confirmed its use in urban U.S. cities. One of the key conclusions is that a survey question rating of disconfirmation is a better method for measuring disconfirmation rather than a function of the difference between expectations and performance as the result, with the model explaining 75% of the variance in the model through a structural equation modeling analysis (Van Ryzin, 2005). The strength of this model presents this as a possible method to assess the impact of humanitarian projects executed with an intended goal of increasing a population's perception of their host nation government.

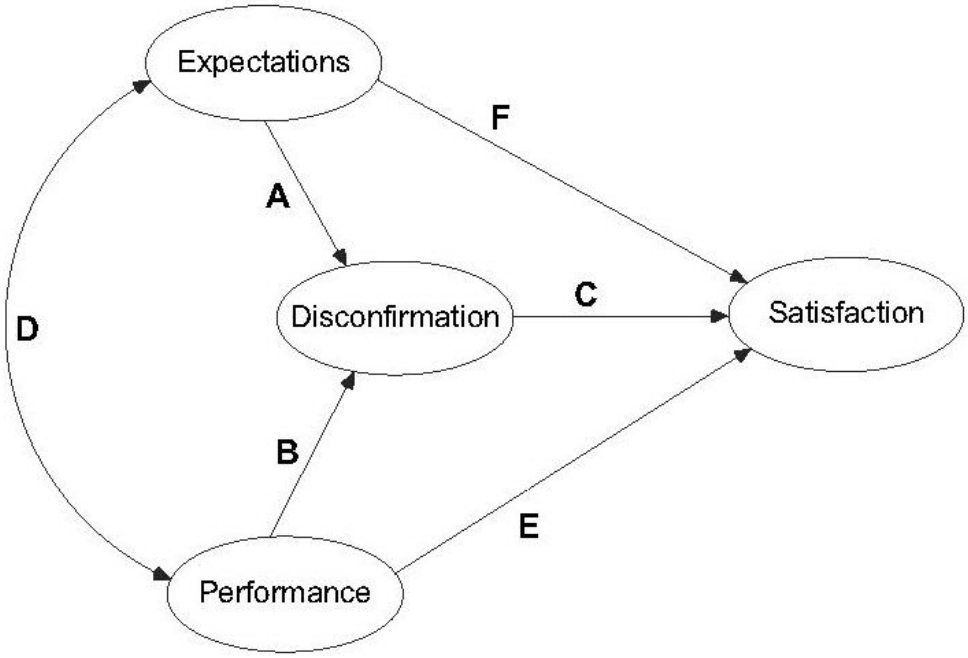

Figure 12: Citizen Satisfaction Expectancy Disconfirmation Model (Van Ryzin et al., 2004)

As part of U.S. Southern Command's (USSOUTHCOM) regional engagement strategy, the U.S. military executes HCA projects in selected countries within its area of responsibility. Operation NEW HORIZONS 2014 was executed in Belize from April to June 2014 with stated objectives to exercise USSOUTHCOM's ability to plan and execute a deployment of personnel and equipment, as well as build partnerships with host nation military personnel. Among the activities executed included the construction of four schools and one clinic in three communities. These projects ranged in costs from $75 thousand to $204 thousand and were executed by the 820th RED HORSE Squadron in concert with US Army, US Marine Corps, and Belize Defense Force (BDF) engineer units. While none of the exercise objectives were to build the legitimacy of the

government, the exercise presented an opportunity to measure the impact of a humanitarian project on a population's satisfaction with government services.

Belize is a former British colony in Central America, with a population of 340 thousand people and an annual Gross Domestic Product of $1.6 billion (CIA: The World Factbook, 2014). The economy is primarily based on tourism and agriculture with limited industrial capacity (World Travel & Tourism Council, 2012). Overall, Belize has the 3rd lowest satisfaction with municipal services rating in Latin America, with less than 20% of citizens rating services favorable (Montalvo, 2009; LAPOP, 2014). Considering this baseline information, it would be expected that on average government services are in need of improvement and that improvements may result in higher ratings of citizen satisfaction.

Methodology

Using Van Ryzin's model and survey instruments as a baseline (Van Ryzin 2004; Van Ryzin 2005), a survey was developed to test the impact of a humanitarian project on citizen satisfaction using a 1-5 Likert scale. The results of the survey were analyzed by Hansen (2015), who confirmed that effects, except the effect of expectations on disconfirmation, were statistically significant. The conclusion of his research is that the model shown in Figure 13 is a valid model for assessing citizen satisfaction with all effects confirmed individually. His model thus formed the basis for this research effort, which also used the same survey data set for additional analysis.

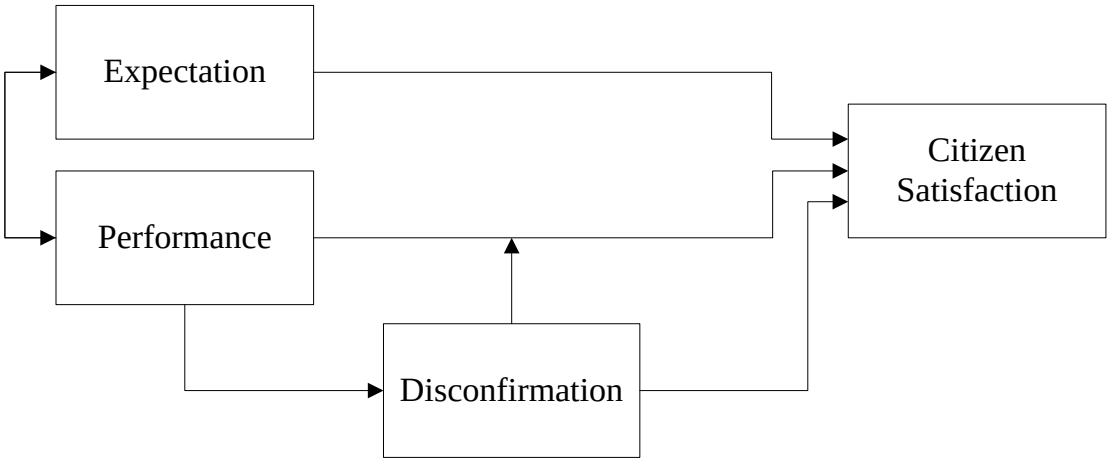

Figure 13: Citizen Satisfaction Model (Hansen, 2015)

Resampling is a method used to increase the sample size of a limited data set. By randomly selecting a set of values from a given data set and placing these values into a new data set, additional samples can be generated. Each set of values in the original data has an equal chance of being selected, and every subsequent resample may select an already sampled set of data. Using this method, it is expected that the values of the larger resampled data set will represent the true values of the mean and standard deviation of the population.

Linear regression was used to determine the relationships between the selected predictor variables and overall citizen satisfaction. Regression models were analyzed using JMP ® 11 Pro produced by SAS ® using the same data collected and analyzed by Hansen (2015). Regression models included single-factor, multiple factor, and interaction effects that were determined to be significant. These models were analyzed for percent of variance explained (R^2) as well as the coefficients of regression (β) for

each variable of interest. These regression models formed the baseline of further analysis of the strength of predictor variables and in developing a simulation of the response variable, which was defined as citizen satisfaction. Regression analysis was conducted on both the baseline survey data collected as well as the resampled data using the resampling methodology previously discussed.

Dominance analysis is a method used to determine the importance of predictor variables on the overall regression relationship. While regression coefficients can indicate the strength of the predictor on the outcome, this analysis can be problematic when predictors are correlated or even collinear (Tonidandel & LeBreton, 2011). A method introduced by Budescu in 1993 analyzes the change in the R^2 of a model by incrementally including each predictor into the model and ranks the predictors in importance (Budescu, 1993). Using this core method, Dominance Analysis has been refined and a method of pair-wise comparisons of the influence of each variable is conducted in order to determine which predictor has the greatest effect on explaining variance in the model (Azen & Budescu, 2003). This method was selected for use in this analysis due to the nature of the correlations of the predictor variables.

Additive regression modeling was used to explore the relationship and effects of the predictor variables on citizen satisfaction. The results of the regression analysis provided regression coefficients and an intercept which were used to build a prediction model for citizen satisfaction based on the most dominant predictors. Using this formula, various "scenarios" were developed based on the possible situations that could be encountered based on possible answers on a 1-5 Likert scale. The scenario analysis used these values of the selected predictors to determine a value for citizen satisfaction.

Results

Resampling analysis was conducted on the survey data. Table 3 shows that the summary descriptive statistics of the resampling data set were almost identical to the actual data and, as expected, did not yield significantly different results. Similar analysis was conducted on the data attempting to decompose the data into smaller subsets, but the results for all cases were identical to the original sample. These additional tables are included in Appendix D.

Table 3: Comparison of Original and Resampled Descriptive Statistics

	Original Data, n = 627				**Resampled Data, n = 10,000**			
Variable	***E***	***P***	***D***	***Sat***	***E***	***P***	***D***	***Sat***
Mean	4.50	2.96	2.87	2.58	4.50	2.95	2.87	2.57
Median	4.67	2.88	3.00	2.33	4.67	2.88	3.00	2.33
Std Dev	0.62	0.75	0.93	0.96	0.62	0.74	0.93	0.96

E = Expectation, *P* = Performance, *D* = Disconfirmation, *Sat* = Citizen Satisfaction

Building on the results from Hansen (2015), all variables were confirmed to be significant predictors of citizen satisfaction individually and were tested in an additive regression model. These results are listed in Table 4. While the initial research into these relationships indicated that all variables were significant, not all variables remained significant when all variables were considered in a single additive regression model. The predictor of expectations became insignificant at the $p = 0.05$ level, and the intercept of the regression equation was also insignificant. Of note is that the mean of citizen satisfaction from the Hansen survey data was 2.576, which is similar to the results of the LAPOP data (2014).

Table 4: Descriptive Statistics of Hansen Model, $R^2 = 0.565$

Predictor	Mean (μ)	Standard Deviation	Regression Coefficient (β)	p-Value
Intercept	-	-	0.032	0.8798
Expectation	4.503	0.622	-0.061	0.1348
Performance	2.956	0.745	0.566	<0.0001
Disconfirmation	2.866	0.929	0.380	<0.0001
Centered Performance - Disconfirmation Interaction	0.437	0.797	0.139	<0.0001
Satisfaction	2.576	0.957	-	-

Upon inspection of the regression coefficients listed in Table 4, it would appear that performance is the largest influencer of citizen satisfaction, with disconfirmation being the second largest influencer. However, this can be misleading as analysis based only upon inspection of regression coefficients may be inaccurate when variables are correlated. The correlation between all variables is presented in Table 5, which illustrates correlation coefficients greater than 0.6 between citizen satisfaction and both performance and disconfirmation, as well as between performance and disconfirmation. Due to the nature of the correlations between predictor variables, it is appropriate to analyze these predictors through a dominance analysis.

Table 5: Correlation Table of Variables

	Expectation	Performance	Disconfirmation	Satisfaction
Expectation	1.000	-	-	-
Performance	-0.022	1.000	-	-
Disconfirmation	-0.069	0.632*	1.000	-
Satisfaction	-0.064	0.684*	0.658*	1.000

* Correlation is significant at $p < 0.0001$

The citizen satisfaction data were analyzed using the dominance analysis method pioneered by Budescu (1993), with the results being presented in Table 6. The dominance of the predictors can be determined from the differences in R^2 of each model. In each of the models where a single predictor is used, the R^2 of that value accounts for the contribution of that predictor, which is indicated in the first row of Table 6 in the row titled "$k = 0$ Average." Similarly, for each row in the table, the contribution of the predictor is calculated by taking the value of the R^2 from the model where each predictor of that row plus the predictor of that column is included, and then the value of the R^2 for the model of that row is subtracted from it. For each category of *k*, the contribution from each predictor is averaged. The final row shows all of the predictors included in the model, thus the cells for each predictor in that row are empty. The General Dominance row represents the average of all of the *k* averages for that predictor. To calculate the Rescaled Dominance, the General Dominance of that predictor is divided by the sum of the General Dominance values for all predictors and multiplied by 100% to represent the percentage of R^2 change that the predictor contributed to the full model.

As presented in Table 6, performance is the largest contributor to R^2 in the models tested, with disconfirmation also being close. These two predictors together account for 94% of the change in R^2 in the models, but the interaction of performance and disconfirmation only accounts for 5.38% of the change in R^2. Furthermore, the contribution of expectation to these models is minimal, with one instance of expectation decreasing R^2 when added to the model with disconfirmation. While the best R^2 of these tested models was 0.565 with all four predictors included, the additional contribution of expectation only increased the model R^2 by 0.001.

Table 6: Dominance Analysis of Predictors of Citizen Satisfaction

Model	Model R^2	Additional Contribution of:			
		X_1	X_2	X_3	X_4
k = 0 Average		**0.002**	**0.467**	**0.433**	**0.033**
X_1	0.002		0.466	0.430	0.036
X_2	0.467	0.002		0.085	0.016
X_3	0.433	-0.001	0.119		0.015
X_4	0.033	0.005	0.450	0.414	
k = 1 Average		**0.002**	**0.467**	**0.433**	**0.033**
X_1X_2	0.468			0.083	0.018
X_1X_3	0.432		0.120		0.132
X_1X_4	0.039		0.448	0.409	
$X_2 X_3$	0.552	0.000			0.013
X_2X_4	0.483	0.003		0.081	
X_3X_4	0.448	0.000	0.117		
k = 2 Average		**0.001**	**0.228**	**0.191**	**0.054**
$X_1X_2X_3$	0.552				0.013
$X_1X_2X_4$	0.486			0.079	
$X_1X_3X_4$	0.448		0.117		
$X_2X_3X_4$	0.564	0.001			
k = 3 Average		**0.001**	**0.117**	**0.079**	**0.013**
$X_1X_2X_3X_4$	0.565				
General Dominance		**0.002**	**0.289**	**0.253**	**0.031**
Rescaled Dominance		**0.275%**	**50.3%**	**44.0%**	**5.38%**

X_1 = Expectation, X_2 = Performance, X_3 = Disconfirmation, X_4 = Centered Interaction of Performance and Disconfirmation, and k = Number of Predictor Variables in Model

With the conclusion that performance, disconfirmation, and the interaction of performance and disconfirmation contribute the most to explaining variance in citizen satisfaction, a new model was developed and tested. This new model did not include expectation as a predictor variable. The descriptive statistics for this model are included in Table 7. While the values for the regression coefficients did not change substantially for the predictor variables, the intercept value changed and became statistically

significant at the p = 0.05 level. This model is therefore more statistically accurate, although the R^2 of the model is still only 0.564, and returning a statistically-significant value for an intercept enabled a more accurate prediction model for citizen satisfaction. Using these values, an additive regression prediction formula was built using Equation 1, where Y = citizen satisfaction, β_n = regression coefficient, X_n = value of prediction variable, and μ_n = mean of prediction variable.

Table 7: Descriptive Statistics of New Model, R^2 = 0.564

Predictor	**Variable**	**Mean (μ)**	**Standard Deviation**	**Regression Coefficient (β)**	**p-Value**
Intercept	-	-	-	-0.248	0.0187
Performance	X_1	2.956	0.745	0.566	<0.0001
Disconfirmation	X_2	2.866	0.929	0.380	<0.0001
Centered Performance – Disconfirmation Interaction	X_3	0.437	0.797	0.139	<0.0001

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 (X_1 - \mu_1)(X_2 - \mu_2) \qquad (1)$$

Using Equation 1, the predicted values of citizen satisfaction were calculated for each set of actual values for performance and disconfirmation. The predicted values of citizen satisfaction plotted versus the actual survey values are presented in Figure 14. Since the measure of actual citizen satisfaction was an average of three questions on a 1-5 Likert scale, these data points cluster in increments of 0.33 along the x-axis. In some cases, a respondent did not answer all three satisfaction measures, which resulted in an average of two values and thus returned some values in increments of 0.5. In two cases,

the predicted value of satisfaction exceeded the maximum possible value of 5 on the survey instrument. If the prediction model were a perfect fit with a R^2 of 1.0, the data points would form a straight line upwards from the origin at a 45-degree angle; however, this model only had an R^2 of 0.564, which resulted in significant variation in the predicted data points.

To further explore the relationships of performance and disconfirmation on citizen satisfaction, Equation 1 was used to develop a scenario based on values of performance and expectation. The prediction formula was used to determine the predicted value of citizen satisfaction for both values of predictor variables. This analysis is presented in Table 8, with each possible value of disconfirmation represented by column, each possible value of performance by row, and the expected value of citizen satisfaction for each column and row combination of predictors in the individual cells. The results show that the rating of citizen satisfaction increases much faster as values of performance increase versus the values of disconfirmation. For example, citizen satisfaction only increases by 1.54 as disconfirmation increases from 1 to 5 when performance stays at 3, whereas satisfaction increases by 2.34 as performance increases from 1 to 5 and disconfirmation remains at 3. The value of 3 is closest to the mean of both predictor variables, which results in the interaction of the predictors having the smallest effect on satisfaction.

Overall, these results present the possibility that citizen satisfaction may be predicted given performance and disconfirmation, but the results are vulnerable to error. The R^2 of the model was only 0.564, which resulted in wide variation in the predicted results compared to the actual values of citizen satisfaction.

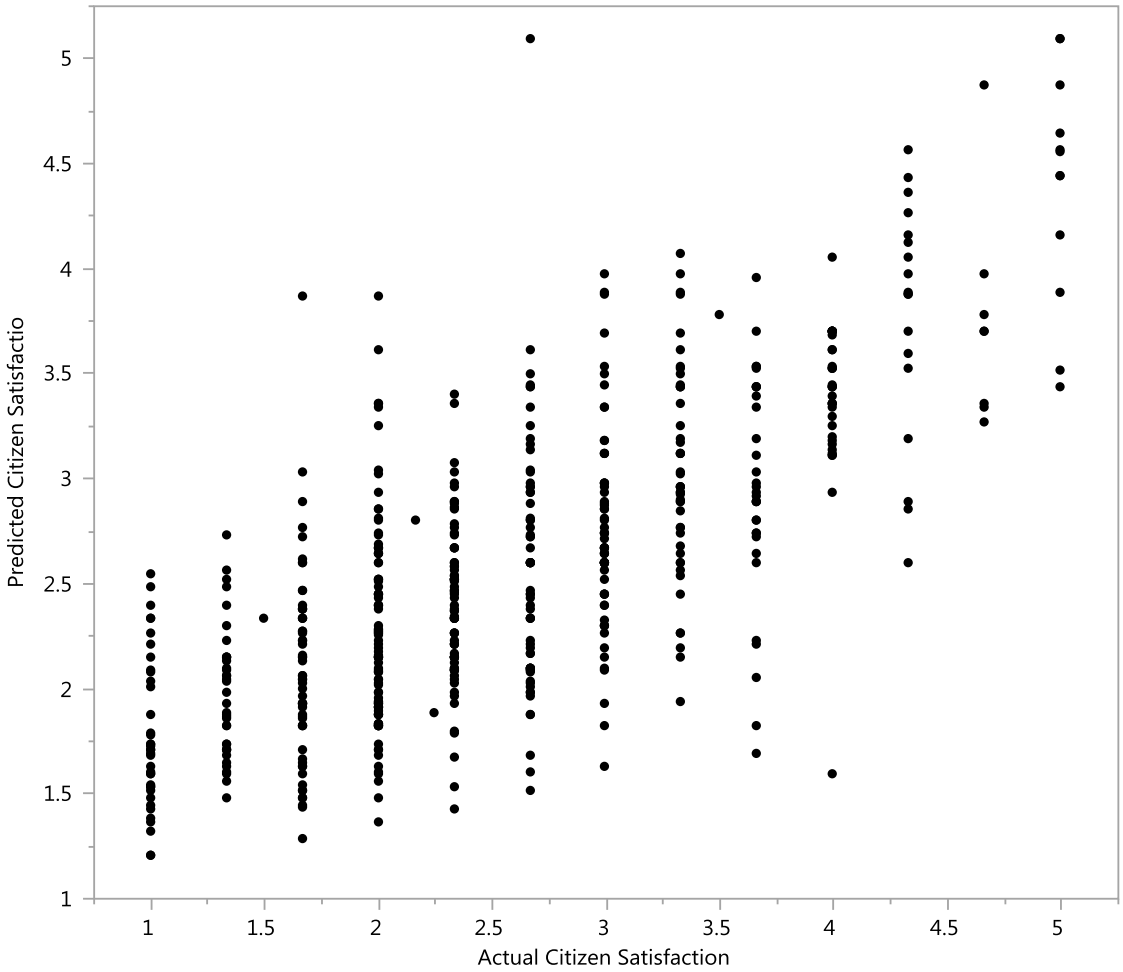

Figure 14: Predicted vs. Actual Citizen Satisfaction

Table 8: Scenario Analysis of Citizen Satisfaction

		Disconfirmation Value				
		1	**2**	**3**	**4**	**5**
Performance Value	**1**	1.21	1.31	1.42	1.53	1.64
	2	1.51	1.76	2.01	2.25	2.50
	3	1.82	2.21	2.59	2.98	3.36
	4	2.13	2.65	3.18	3.70	4.23
	5	2.43	3.10	3.76	4.43	5.00

Discussion

The methodology and results of this analysis partially confirm the models developed by Van Ryzin (2004) and tested by Hansen (2015); however, the effect of expectations on both disconfirmation and citizen satisfaction was not supported. Using the revised model, it is possible to predict citizen satisfaction given performance and disconfirmation data; however, this prediction comes with a wide prediction interval of approximately ±1.25, which makes it difficult to accurately predict satisfaction using a 1-5 Likert scale.

The results of this research can be improved with some changes survey execution methodology. Survey data collection was originally intended to be conducted using BDF personnel interviewing citizens of Belize, with BDF personnel recording the answers to surveys and the location of collection. The situation during the early portion of the exercise necessitated these surveys be distributed in print to BDF personnel to distribute to their home towns prior to an extended leave period in conjunction with Easter; in turn, many BDF personnel handed out paper copies of the survey for citizens to fill out, resulting in missing data, multiple Likert scale selections per measure, and various other data irregularities. This approach was also problematic considering that although the official language in Belize is English, only 3.9% of the population listed English as their language in the 2000 census, with the largest percentages of language being Spanish at 46% and Creole at 33%. Additionally, the country's adult literacy rate is 77% (CIA: The World Factbook, 2014). These factors may bring into question the validity of the survey data and by extension the overall results.

Another improvement to survey methodology is in the collection of surveys with respect to the areas of interest. In the initial round of surveys, only 56 of 172 useable surveys were collected from locations where a project was executed; in the following round, 247 of 455 useable surveys were collected from two of the three locations where a project was executed (Hansen, 2015). The lack of a sufficient number of surveys from the initial round limited the ability to compare the results before and after a project was executed. The survey collection also combined all non-project location survey data into a control group for analysis; however, this resulted in wide variation in the data that could be explained by location-specific issues, and some locations were not represented in both survey rounds. Future survey research should attempt to collect survey data in sufficient numbers from project locations, and should designate a specific control location for sampling.

The timing of survey collection was also problematic. Four of the projects executed were schools and surveys were collected initially in April and again in June. However, the citizens in the area around these schools are unlikely to have noticed any substantial change in government services as the children that normally attend these schools were on summer vacation during the June survey period. A citizen would likely not have an informed judgment on quality of school service until after schools reopened sometime in the fall of 2015. In the meantime, it is possible that the noise, dust, and truck traffic that accompanied construction of the schools may have irritated local citizens, resulting in biased survey data. Data fidelity can be improved by sampling citizens in the area around these project locations at a later time after construction and after school has returned to session.

Aside from survey execution issues, it is possible that citizen satisfaction may be influenced by another unmeasured variable. Expectation was shown to be an insignificant predictor, but the model only explained 56% of the variation in citizen satisfaction. Data from previous research indicates that Belize has a low rating of trust in government compared to other Latin American countries (LAPOP, 2014). This may indicate that trust in government, as well as other factors such as perceived justice, may influence a citizen's satisfaction judgment with government services.

Conclusion

This research presents a method for predicting citizen satisfaction. While the overall accuracy of the results leave room for improvement, it is possible that improvements in survey deployment and collection timelines may improve these results. This method may be useful in a stability or COIN operations for determining a population's baseline level of citizen satisfaction with government services. This information may help guide selection of humanitarian projects to address the needs of a population and improve their rating of satisfaction with their government. Additionally, this model and method may be useful in municipalities within the U.S. in selecting where to invest in public infrastructure.

III. Results and Conclusion

Research Questions Revisited

This research posed the problem of how to measure the effectiveness of a humanitarian project. The research applied citizen satisfaction models and statistical analysis techniques to evaluate a method for assessing citizen satisfaction in conjunction with a humanitarian assistance project. Results have been processed and the research questions can now be explicitly addressed:

Can satisfaction be predicted when the expectations of the population is known?

Initial results from Van Ryzin (2004, 2005) and Hansen (2015) indicated that expectation is a weak predictor of citizen satisfaction. Through regression and dominance analysis, it appears that citizen satisfaction cannot be predicted based on known expectations. Furthermore, expectation had an insignificant effect when combined in a model with performance and disconfirmation.

Can satisfaction be predicted when the population's rating of government service performance is known?

Results from previous research suggest that performance is a strong predictor of citizen satisfaction (Van Ryzin, 2005). When performance is selected as the only predictor of citizen satisfaction, the analysis results in an R^2 of 0.467; the model is responsible for 50.3% of the explained variance in regression analysis with additional

predictors. While performance is the strongest predictor of citizen satisfaction, it should be further combined with other factors to improve prediction accuracy.

Can satisfaction be predicted when the difference between the population's expectations and perception of government services performance is known?

Results from previous research suggest that the difference between the population's expectations and perception of performance, also termed disconfirmation, is the strongest predictor of citizen satisfaction (Van Ryzin, 2005). The result from this analysis suggest that disconfirmation, while a strong predictor with an R^2 of 0.433 when considered alone, is not as strong as performance but still accounted for 44.0% of the explained variance in regression analysis. These results suggest that disconfirmation is a good predictor, but it should also be considered with other factors to improve prediction accuracy.

Which factors are most influential on citizen satisfaction?

According to this analysis, the most influential factors on citizen satisfaction are performance and disconfirmation. This conclusion is also supported by previous research, but the magnitudes of these relationships are slightly different. In previous research, disconfirmation was shown to be the most influential, but these data support performance as the strongest predictor.

Can guidance be given in target selection to increase return on investment on infrastructure targets with respect to citizen satisfaction?

To maximize the effect of humanitarian assistance, targets should be selected in areas where citizens have low ratings of disconfirmation and performance of government services. This condition may represent a situation in which there is a potential to improve these ratings through investment in low-performing services that may result in higher gains in citizen satisfaction when compared to the costs or time necessary to improve quality of services that are rated as high performance.

Is the model of predicting citizen satisfaction sensitive to sample size?

The data analysis conducted through resampling returned statistically identical results as expected. As a result, the outputs of regression analysis were identical to the original data set. The model was not demonstrated to be sensitive to sample size given the suggested minimum samples for data analysis are met. This anticipated minimum sample size was 76 for each data point before and after the treatment (Cohen, 1992).

Review of Findings

Overall, this model was supported by the data, but there are improvements that can be made. Improvements in data collection may improve results, but further analysis of the model is warranted. The distribution of the model output of predicted citizen satisfaction appears similar to the actual data with some discrepancies. Figure 15 shows the distribution of the actual survey data, and Figure 16 shows the distribution of the predicted value of citizen satisfaction given performance and disconfirmation values.

Upon inspection, it appears that the model may return insufficient results in the extremes of citizen satisfaction. The actual data in Figure 15 show, a large number of surveys that rate in the 1, 1.33, and 1.67 range, but the predicted data in Figure 16 show few results below 1.33 but many more below 2; similarly, the actual data show many more results above 4, whereas the predicted values begin to taper off prior to values of 4. This is expected considering the regression analysis attempted to fit a normal curve to the data which inherently reduces the data points in the "tails" of the distributions.

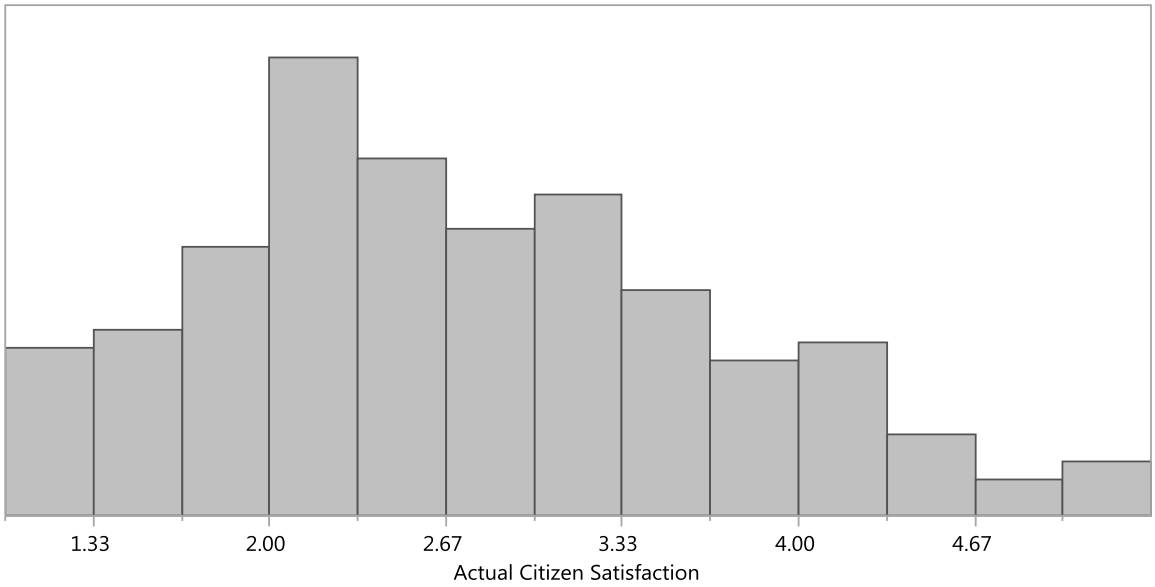

Figure 15: Histogram of Actual Citizen Satisfaction

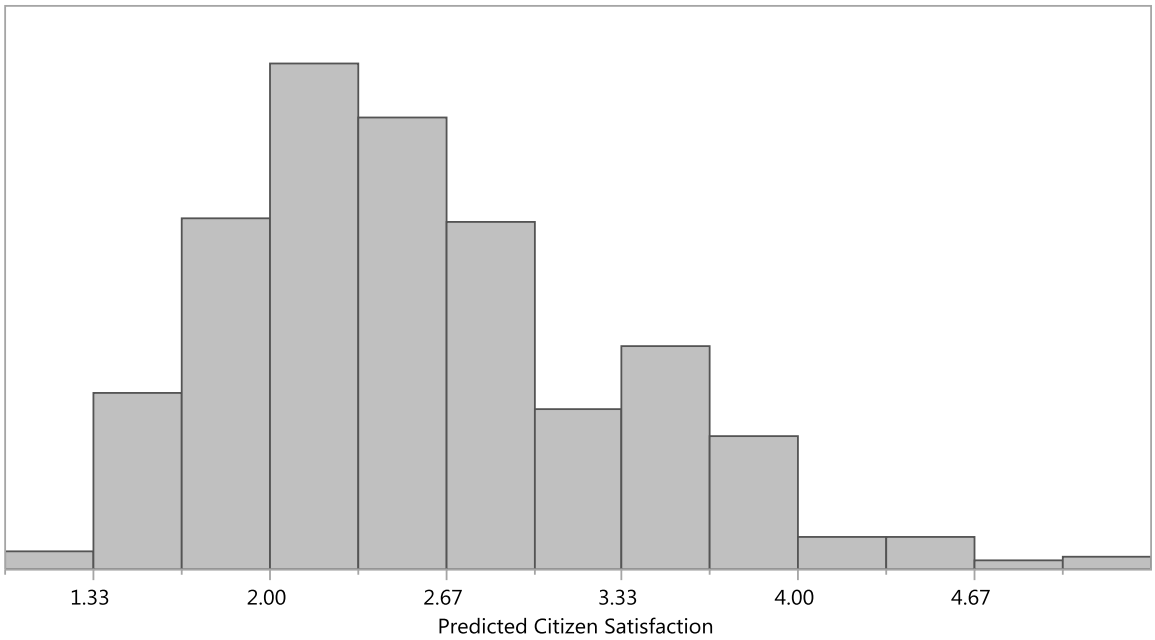

Figure 16: Histogram of Predicted Citizen Satisfaction

Further analysis was conducted on these values. The difference between the predicted and actual values was calculated for each record in the data. This difference was then divided by the actual value to return a percent error; a predicted value higher than the actual value is indicated by a negative percent error value, and a predicted value higher than the actual value is indicated by a negative percent error value. These results are plotted in a histogram in Figure 17. This figure indicates that the model is under-estimating the value of satisfaction frequently by a small margin, but also greatly overestimates the rating of satisfaction sporadically out to an extreme of 154%. The long tail in the data suggests that further analysis of these extreme values may yield further explanation.

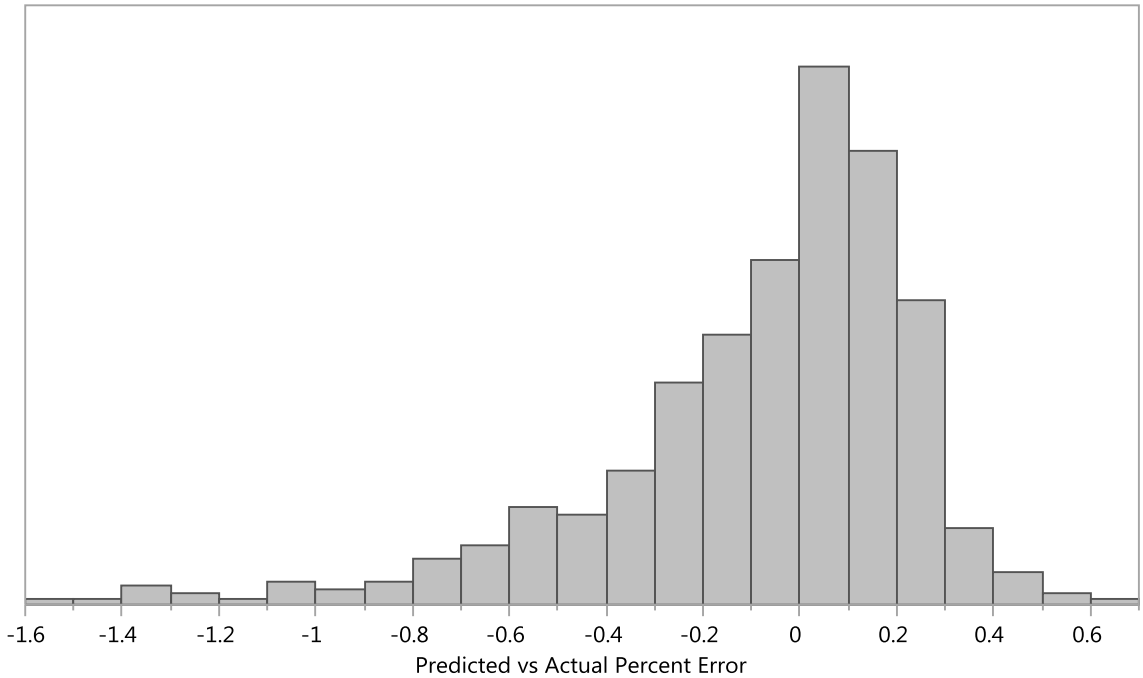

Figure 17: Histogram of Predicted vs Actual Percent Error

The previously discussed distributions also returned descriptive statistics, which are included in Table 9. These statistics indicate that the predicted values for citizen satisfaction have a tighter distribution around the mean with a lower standard deviation, where the actual vales have a flatter, less normal distribution. While both distributions have identical means, the predicted value distribution has a higher median value. Additionally, the distribution of error indicates that predicted citizen satisfaction is on average 7.76% higher than the actual value.

Table 9: Descriptive Statistics of Citizen Satisfaction Distribution

Distribution	**Mean (μ)**	**Median**	**Standard Deviation (σ)**	**Upper 95% Mean**	**Lower 95% Mean**
Actual Satisfaction	2.58	2.33	0.96	2.65	2.50
Predicted Satisfaction	2.58	2.48	0.72	2.63	2.51
Percent Error	-7.76%	0.07%	32.2%	-5.24%	-10.3%

A plot of the predicted values and prediction interval compared to the actual satisfaction values is presented in Figure 18. The vertical axis represents citizen satisfaction and the x axis indicates the row of data. The upper red and lower blue lines represent the 95% confidence interval of the predicted value, and the green stars indicate the actual value of citizen satisfaction. The values of predicted citizen satisfaction were listed along the x-axis from lowest to highest, with the predicted value of citizen satisfaction in orange between the upper red and lower blue lines. The actual values of citizen satisfaction were an average of three questions in the survey instrument, which resulted in the actual values clustering in 0.333 increments, with a few instances of a value that was averaged from two values due to a missing response. The degree of variation between the predicted and actual values does not appear to have a clear relationship or pattern. The scale for responses in the survey was a 1-5 Likert scale; therefore, the actual values all range between one and five, while the predicted values and confidence intervals range well outside both of these extremes.

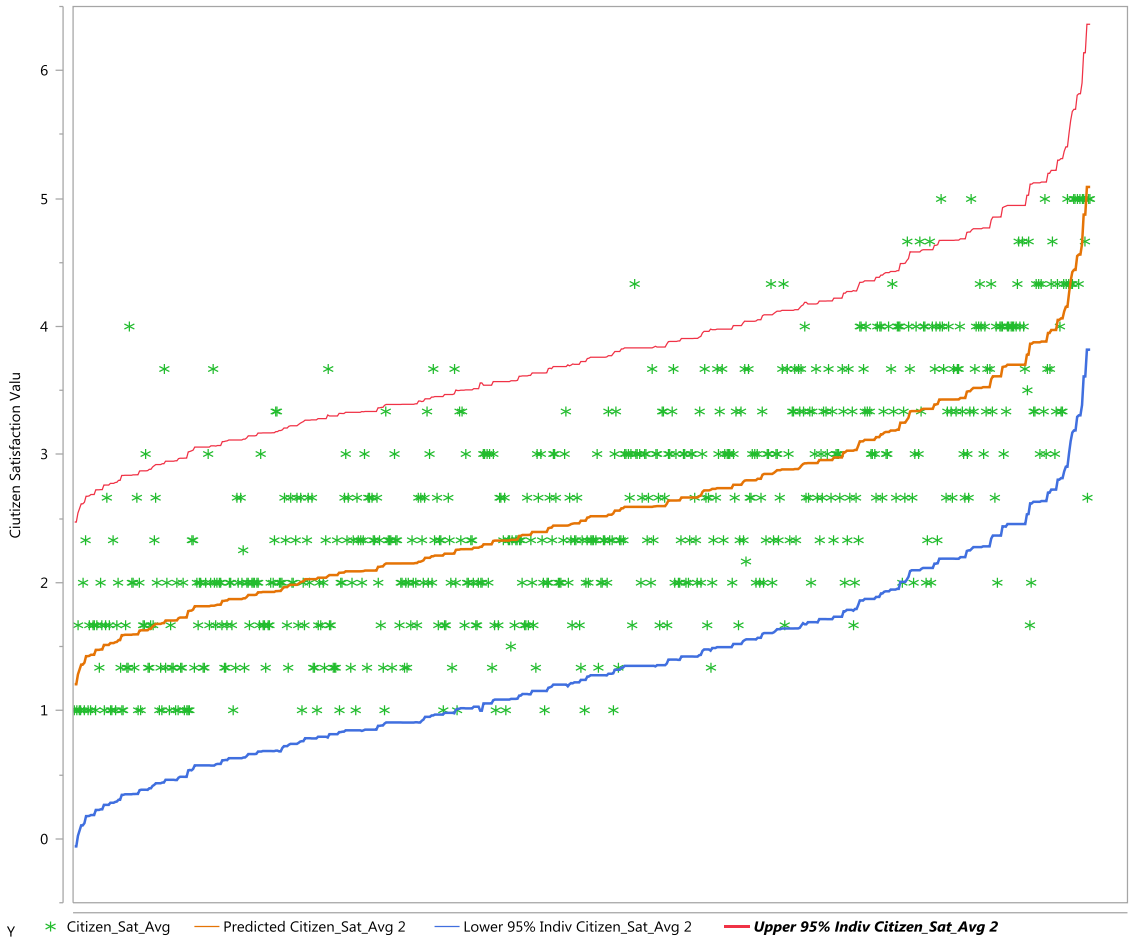

Figure 18: Predicted and Actual Citizen Satisfaction Values

The additional figures presented in this section yield interesting results. The histograms and plot graphically show the high degree of unexplained variation in the model. This may indicate that there is an unmeasured variable influencing the value of citizen satisfaction and merits further research.

Significance of Research

This research contributed to the body of knowledge regarding the relationship of expectation, perception of performance, and disconfirmation on citizen satisfaction with government services in a less industrialized country that may be applied towards a target selection methodology for humanitarian assistance projects. This research may also benefit municipal governments by contributing to the body of knowledge by further exploring the influence of government service performance on citizen satisfaction.

Future Research

Problems encountered with the survey methodology were discussed in Chapter II, but further explanation is necessary. Follow-on survey analysis of these project locations in Belize is warranted to determine the true impact of these projects after citizens have opportunities to evaluate the improvement of these government services, and a more robust sampling plan should be developed and implemented regarding the sampling of both control and treatment locations. Future survey data collection should be done verbally with data recorded by trained personnel. Additionally, the survey instrument should be translated into Spanish for another survey deployment, and should also be back-translated into English to confirm that the initial translation is accurate.

It is unclear whether variation in the data can be improved only by improvement in survey methodology, or if there is an unmeasured variable that is also influencing citizen satisfaction. Previous research by LAPOP have surveyed trust in government, which indicated that citizens in Belize have a relatively low rating of their government compared to other Latin American countries. Further research should include a series of

measures to survey a citizen's trust in government, as well as variables such as their perceptions of fairness and justice, to determine if these have an effect on a citizen's satisfaction with government services.

Determining the impact of foreign aid has been illustrated as difficult task in need of further research. In particular, the relationship of distance from a given project is not well understood (Fischerkeller, 2011). This relationship can be further explored using a combination of surveys and GIS software if the project location and attributes are known along with the location of the survey collection point or the respondent's residence location. Using these data sets, a relationship between distance, or areal units, to citizen satisfaction may be developed. For example, survey collected regarding a school project from respondents that live within that school district compared to respondents outside the school district may have different results. Does a citizen that lives within that school district reflect a higher level of satisfaction after a project is accomplished? Will a citizen that lives outside that school district see an increase in satisfaction due to this improvement, or possibly see a decrease in satisfaction due to an improvement that did not benefit him or her? These are important questions that could improve target selection for humanitarian projects.

An additional impact of foreign aid that is unknown is at what rate the impact of aid diminishes in the collective memory of the population. The relationship of decay of an impact with time is not well understood and is often cited as an important question for determining targeting and execution of further aid (Fischerkeller, 2011). This information could be used to maximize the sustainment of an increased level of

satisfaction with an optimization of resources expended over the course of several projects in series for a long-term impact.

Additional survey sampling of the areas where projects were executed in Operation NEW HORIZONS 14 in the following years can assist in answering both of the previously identified questions. Using the survey data collected in this research and comparing to follow-on results with higher resolution location information can build upon the body of knowledge in this area.

Summary

This research explored the relationships of expectation, performance, and disconfirmation on citizen satisfaction. This research built upon the analysis of Hansen (2015) and used the same survey data set for regression and dominance analysis which resulted in the development of a new model for predicting citizen satisfaction. This research proposed a model that may be used to predict citizen satisfaction given performance and disconfirmation, which may be useful in target selection for humanitarian assistance projects. This research was not conclusive in the determination of citizen satisfaction, but it contributes to the body of knowledge with respect to citizen satisfaction decisions.

Appendix A: Survey Instrument

Section 1: What do you believe are the three most important government services? Rank them from 1 to 3 where 1 is most important.	**1.1)** 1
	1.2) 2
	1.3) 3

Section 2:

On a scale from 1 to 5, with 1 being strongly disagree and 5 being strongly agree, how would you rate each of the following statements for your community?	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
2.1) I expect the government to provide quality education	1	2	3	4	5
2.2) I expect the government to provide quality health care	1	2	3	4	5
2.3) I expect the government to provide other public services	1	2	3	4	5
2.4) I am happy with the schools	1	2	3	4	5
2.5) I am happy with school management	1	2	3	4	5
2.6) I am happy with the health care	1	2	3	4	5
2.7) I am happy with the local police service	1	2	3	4	5
2.8) I am happy with the garbage removal	1	2	3	4	5
2.9) I am happy with the quality of drinking water	1	2	3	4	5
2.10) I am happy with the cleanliness	1	2	3	4	5
2.11) I am happy with the quality of roads	1	2	3	4	5
2.12) The government has met my expectations for education	1	2	3	4	5
2.13) The government has met my expectations for healthcare	1	2	3	4	5
2.14) The government has met my expectations for other public services	1	2	3	4	5
2.15) I am satisfied with the public services in my community	1	2	3	4	5
2.16) I believe my government is fair	1	2	3	4	5
2.17) I am satisfied with the benefits I have received from the government	1	2	3	4	5

Please turn to next page.

Section 3:					
Based on your overall experience in the last 12 months, please rate your community on a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree, for each of the following items:	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
3.1) I am happy with the overall quality of the school buildings	1	2	3	4	5
3.2) I am happy with the overall quality of the school teachers	1	2	3	4	5
3.3) I am happy with the overall quality of the learning materials available to students (examples: textbooks, homework assignments, and technology)	1	2	3	4	5
3.4) I am happy with the ability of schools to provide quality education	1	2	3	4	5
3.5) I am happy with the overall quality of the hospitals	1	2	3	4	5
3.6) I am happy with the overall quality of doctors and nurses	1	2	3	4	5
3.7) I am happy with the overall quality of the medical equipment at the hospitals	1	2	3	4	5
3.8) I am happy with the ability of hospitals to provide quality medical treatment	1	2	3	4	5
Section 4:					
On a scale from 1 to 5, with 1 being strongly disagree and 5 being strongly agree, how would you rate each of the following statements?	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
4.1) I am familiar with the types of assistance my country receives from the United States	1	2	3	4	5
4.2) United States assistance helps provide a better standard of living in my community	1	2	3	4	5
4.3) United States training in Belize is good for my country	1	2	3	4	5
4.4) My opinion of the U.S. has improved due to the assistance received	1	2	3	4	5

Section 5: Demographics
5.Age) Age (circle one): under 16 16-25 26-35 36-45 46+
5.Job) Job:
5.Children) Number of children:
5.Education) Highest education level:
5.Location) Location of survey:
5.Gender) Gender: Male Female
5.Date) Date of survey:

Thank you for your participation!

Appendix B: Research Approval Documentation

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE OHIO

10 Apr 2014

MEMORANDUM FOR DR. AL THAL

FROM: Jeffrey A. Ogden, Ph.D.
AFIT IRB Research Reviewer
2950 Hobson Way
Wright-Patterson AFB, OH 45433-7765

SUBJECT: Approval for exemption request from human experimentation requirements (32 CFR 219, DoDD 3216.2 and AFI 40-402) for the Impact of U.S. Investment for Civil Infrastructure in Developing Countries.

1. Your request was based on the Code of Federal Regulations, title 32, part 219, section 101, paragraph (b) (2) Research activities that involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior unless: (i) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) Any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

2. Your study qualifies for this exemption because you are not collecting sensitive data, which could reasonably damage the subjects' financial standing, employability, or reputation. Further, you are not collecting any demographic data which could realistically be expected to map a given response to a specific subject.

3. This determination pertains only to the Federal, Department of Defense, and Air Force regulations that govern the use of human subjects in research. Further, if a subject's future response reasonably places them at risk of criminal or civil liability or is damaging to their financial standing, employability, or reputation, you are required to file an adverse event report with this office immediately.

4/10/2014

X Jeffrey A. Ogden, Ph.D.

Jeffrey A. Ogden, Ph.D.
IRB Exempt Determination Official

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON DC

APR 29 2014

MEMORANDUM FOR AFIT/ENV
ATTN: ALFRED E. THAL, JR., PHD

FROM: AFMSA/SGE-C
Research Oversight & Compliance Division
7700 Arlington Blvd. Ste. 5151
Falls Church, VA 22042-5151

SUBJECT: Human Research Protection Official (HRPO) Review of **FSG20140013E**

References: (a) 32 CFR 219, Protection of Human Subjects
(b) 10 USC 980, Limitation on Use of Humans as Experimental Subjects
(c) AFI 40-402, Protection of Human Subjects in Research
(d) DoDI 3216.02, Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research

In accordance with Reference (a), 101 (b)(2) & Reference (d), the HRPO has reviewed and concurs with the Exempt Determination Official of the following:

FSG20140013E, "Support for the study titled: The Impact of U.S. Investment for Civil Infrastructure in Developing Countries".

Please contact my office to discuss any substantive change to this activity prior to implementation to ensure it does not impact the determination herein or compliance with the above references.

JAMES BENJACK, Lt Col, USAF, BSC
Director, Research Oversight & Compliance Division

Appendix C: R Code

```
library(e1071)

survey <- read.csv("JoelR12.csv", head=TRUE)
# reads .csv file from directory to dataframe "survey"

R = 10000
# sets R iterations of for loop, insensitive

S = 1
# sets S iterations of sampling, very sensitive

index = 1:length(survey$E1)
# sets index vector for mult variable sampling

rEAvg <- numeric(R)      # defines bootstrap data vectors
rPAvg <- numeric(R)
rDAvg <- numeric(R)
rSatAvg <- numeric(R)

bootData <- data.frame(rEAvg, rPAvg, rDAvg, rSatAvg)
#defines bootstrap data frame

for (i in 1:R)           # takes R samples w/ replacement
{
     bootindex = sample(index, S, replace=T)
     bootData$rEAvg[i] = survey$EAvg[bootindex]
     bootData$rPAvg[i] = survey$PAvg[bootindex]
     bootData$rDAvg[i] = survey$DAvg[bootindex]
     bootData$rSatAvg[i] = survey$SatAvg[bootindex]
}

# record summary stats to compare between actual (sumX) and
bootstrap (sumrX) data

x = 5
sumVar <- c("Mean", "Median", "StdDev",
     "Skewness", "Kurtosis")
sumE <- numeric(x)
sumrE <- numeric(x)
sumP <- numeric(x)
sumrP <- numeric(x)
sumD <- numeric(x)
sumrD <- numeric(x)
sumSat <- numeric(x)
```

```
sumrSat <- numeric(x)

sumData <- data.frame(sumVar, sumE, sumrE, sumP, sumrP,
     sumD, sumrD, sumSat, sumrSat)
# defines summary stats data frame

sumData[1, 2] = mean(survey$EAvg)
sumData[2, 2] = median(survey$EAvg)
sumData[3, 2] = sd(survey$EAvg)
sumData[4, 2] = skewness(survey$EAvg)
sumData[5, 2] = kurtosis(survey$EAvg)

sumData[1, 4] = mean(survey$PAvg)
sumData[2, 4] = median(survey$PAvg)
sumData[3, 4] = sd(survey$PAvg)
sumData[4, 4] = skewness(survey$PAvg)
sumData[5, 4] = kurtosis(survey$PAvg)

sumData[1, 6] = mean(survey$DAvg)
sumData[2, 6] = median(survey$DAvg)
sumData[3, 6] = sd(survey$DAvg)
sumData[4, 6] = skewness(survey$DAvg)
sumData[5, 6] = kurtosis(survey$DAvg)

sumData[1, 8] = mean(survey$SatAvg)
sumData[2, 8] = median(survey$SatAvg)
sumData[3, 8] = sd(survey$SatAvg)
sumData[4, 8] = skewness(survey$SatAvg)
sumData[5, 8] = kurtosis(survey$SatAvg)

#populates summary table data from actual data

for (k in 1:4) # populate summary table data from bootstrap
{
     sumData[1, (2*k)+1] = mean(bootData[,k])
     sumData[2, (2*k)+1] = median(bootData[,k])
     sumData[3, (2*k)+1] = sd(bootData[,k])
     sumData[4, (2*k)+1] = skewness(bootData[,k])
     sumData[5, (2*k)+1] = kurtosis(bootData[,k])
}

write.csv(bootData, file="resampleR12Avg.csv")
write.csv(sumData, file="sumR12Avg.csv", row.names=T)
```

Appendix D: Additional Resampling Results

Table 10: Round 1 Data

	Original Data, n = 172				Resampled Data, n = 10,000			
Variable	***E***	***P***	***D***	***Sat***	***E***	***P***	***D***	***Sat***
Mean	4.35	2.86	2.75	2.45	4.34	2.87	2.76	2.46
Median	4.42	2.85	2.67	2.33	4.33	2.88	2.67	2.33
Std Dev	0.68	0.70	0.89	0.91	0.68	0.69	0.88	0.91

Table 11: Round 2 Data

	Original Data, n = 455				Resampled Data, n = 10,000			
Variable	***E***	***P***	***D***	***Sat***	***E***	***P***	***D***	***Sat***
Mean	4.56	2.99	2.91	2.62	4.56	2.99	2.91	2.63
Median	4.67	3.00	3.00	2.67	4.67	3.00	3.00	2.67
Std Dev	0.59	0.76	0.94	0.97	0.59	0.76	0.94	0.97

Table 12: Non-Project Location Data

	Original Data, n = 322				Resampled Data, n = 10,000			
Variable	***E***	***P***	***D***	***Sat***	***E***	***P***	***D***	***Sat***
Mean	4.49	2.98	2.85	2.56	4.50	2.99	2.87	2.58
Median	4.67	2.88	2.67	2.33	4.67	2.88	2.67	2.33
Std Dev	0.64	0.79	0.95	1.01	0.62	0.79	0.95	1.01

Table 13: Project Location Data

	Original Data, n = 302				Resampled Data, n = 10,000			
Variable	***E***	***P***	***D***	***Sat***	***E***	***P***	***D***	***Sat***
Mean	4.51	2.93	2.89	2.60	4.52	2.93	2.88	2.60
Median	4.67	2.88	3.00	2.33	4.67	2.88	3.00	2.33
Std Dev	0.61	0.69	0.90	0.89	0.60	0.70	0.90	0.89

Table 14: Round 1 Data at a Non-Project Location

	Original Data, n = 114				**Resampled Data, n = 10,000**			
Variable	***E***	***P***	***D***	***Sat***	***E***	***P***	***D***	***Sat***
Mean	4.31	2.71	2.54	2.23	4.31	2.71	2.53	2.24
Median	4.42	2.67	2.50	2.00	4.50	2.63	2.33	2.00
Std Dev	0.74	0.68	0.86	0.83	0.73	0.67	0.85	0.82

Table 15: Round 1 Data at a Project Location

	Original Data, n = 56				**Resampled Data, n = 10,000**			
Variable	***E***	***P***	***D***	***Sat***	***E***	***P***	***D***	***Sat***
Mean	4.42	3.13	3.18	2.89	4.43	3.13	3.18	2.90
Median	4.50	3.00	3.00	3.00	4.67	3.00	3.00	3.00
Std Dev	0.53	0.66	0.80	0.92	0.52	0.65	0.79	0.91

Table 16: Round 2 Data at a Non-Project Location

	Original Data, n = 208				**Resampled Data, n = 10,000**			
Variable	***E***	***P***	***D***	***Sat***	***E***	***P***	***D***	***Sat***
Mean	4.60	3.13	3.02	2.74	4.60	3.13	3.03	2.74
Median	4.67	3.00	3.00	2.67	4.67	3.00	3.00	2.67
Std Dev	0.55	0.82	0.96	1.06	0.54	0.81	0.96	1.05

Table 17: Round 2 Data at a Project Location

	Original Data, n = 247				**Resampled Data, n = 10,000**			
Variable	***E***	***P***	***D***	***Sat***	***E***	***P***	***D***	***Sat***
Mean	4.53	2.88	2.81	2.52	4.53	2.88	2.81	2.53
Median	4.67	2.88	3.00	2.33	4.67	2.88	3.00	2.33
Std Dev	0.62	0.69	0.92	0.88	0.63	0.69	0.91	0.88

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Vita

Captain Samuel Logan graduated from James Madison High School in Vienna, VA. He was commissioned through AFROTC in 2006 with a Bachelor of Science degree in Mechanical Engineering from West Virginia University. Capt Logan's experience as an Air Force Civil Engineer included installation-level assignments in environmental compliance and project programming at Elmendorf AFB and across 18 remote long range radar sites and airfields throughout Alaska. He then served as the Interim Operations Flight Commander and later as the Readiness and Emergency Management Flight Commander at Minot AFB, North Dakota. He deployed twice to Iraq in support of Operations IRAQI FREEDOM and NEW DAWN as a headquarters action officer in charge of economic development, and later as a Facility Engineer Team Officer-In-Charge responsible for design and management of Commander's Emergency Response Program projects and base master planning in support of the drawdown of forces in Iraq. He also deployed to Afghanistan in support of Operation ENDURING FREEDOM as the Lead Engineer on a Provincial Reconstruction Team responsible for management and execution of the team's Commander's Emergency Response Program portfolio. He entered the Graduate School of Engineering and Management at the Air Force Institute of Technology in September 2013. Upon graduation he will report to the 65th Civil Engineer Squadron, Lajes Field, Portugal as the Operations Flight Commander.

REPORT DOCUMENTATION PAGE

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13. SUPPLEMENTARY NOTES

14. ABSTRACT
Assessing the effectiveness of humanitarian assistance and foreign aid has presented a challenge to personnel tasked with these operations. Answering the question "are we winning hearts and minds" has similarly eluded military personnel in Iraq and Afghanistan. This research presents a review of humanitarian assistance and foreign aid conducted by the U.S. government and literature on U.S. military doctrine regarding humanitarian assistance and infrastructure investment. The research builds upon expectancy disconfirmation theory to determine the strongest predictors of citizen satisfaction with government services. Case study data was collected in Belize before and after a U.S. military humanitarian and civil assistance construction project was executed, and this data was analyzed using an expectancy theory model. The results indicate that the model using performance, disconfirmation, and an interaction effect of both explains 56% of the variation in citizen satisfaction and proposes a predictive model of citizen satisfaction. This article proposes further research with improvement to the survey methods and instrument; it also discusses how the model may not account for an unmeasured variable. Further research is also suggested to determine the relationship of time and location on a citizen's satisfaction rating when considering the impact of a humanitarian project.

15. SUBJECT TERMS
Citizen Satisfaction, Humanitarian Assistance, Counterinsurgency, Infrastructure Investment, Foreign Aid

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