Using Phenomenological Research to Drive Dynamic Modeling

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ABSTRACT

One of the most difficult aspects in mathematical modeling and simulation is developing data to drive models and learning. This is particularly difficult when the subject involves intangible variables and concepts such as stress and perceptions that are difficult to ascribe a quantitative value to. This paper provides a description of how qualitative data collected during in depth phenomenological interviews with subject matter experts can be used to drive models. It also provides a case study of insurgency warfare and coalition and Afghan National Government performance during the last ten years. The U.S. government has spent more than $300 billion on the war in Afghanistan. Despite the employment of these resources, the goal of creating stability in the country has not been achieved. Twenty U.S. Army officers with six or more months of experience in Afghanistan were selected by random choice from a specific group. The participants were then interviewed to determine the meaning of their experiences in fighting an insurgency. Data analysis included organizing responses by question to identify the frequency of trends, patterns, and themes; and development of textural and structural descriptions of resource allocation and stability within the context of this study. Data was then transformed to create look-up tables that can be used to model, calibrate, and ascribe quantitative values to various variables in a dynamic insurgency model. A proof of concept model was then created to demonstrate the potential utility and power behind a model that combines the qualities of quantitative mathematical science and qualitative research methodology.

Keywords: Afghanistan, Dynamic Modeling, Insurgency, Phenomenology, Simulation, Systems Dynamics

INTRODUCTION

This multi-method study examined how resources are applied and how they contribute to the effectiveness of military operations in Afghanistan (Ma, 2009). Resource allocation is an important aspect of business, as well as governmental enterprises and organizations. It is the process by which a company or organization allocates limited resources to competing projects and programs with a goal of achieving maximum effectiveness (Lee & Lee, 2005; Norman & Bobrow, 1975). Various quantitative and qualitative research methods are typically used to accomplish this. This study utilized both the phenomenological research methodology and System Dynamics modeling to examine the problem.

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The primary application based focus for this research considered the observation that after more than ten years of fighting in Afghanistan, the overall stability in the country has not improved (Belasco, 2008; Jalali, 2009; Rashid, 2009; Warner, 2008). Indeed, there are many reports that indicate that not all resources contributed to sustaining the Afghan National Government and defeating the Taliban have not been used in an optimal manner (Dale, 2009; Rashid, 2009; Rubin, 2007). Jones (2009) demonstrated that there are two approaches to nation building, which he called top-down and bottom-up (p. 319). The top-down approach focuses on providing money, resources and assistance at the national level, and then using the host nation administration and organizations to distribute that assistance as needed throughout the country. The bottom up paradigm uses the opposite approach. This study uses qualitative techniques to assess the problem from a bottom-up approach, and then uses systems modeling to examine the problem from a top-down approach. It also exhibits the utility of using bottom-up originated qualitative data collected using a phenomenological investigative approach to provide data that informs mathematical models.

THE PROBLEM

Since 2001 the US and other coalition countries have gradually increased the amount of resources they employ in fighting the war in Afghanistan (Belasco, 2008). On average, the U.S. government alone was spending roughly $2.4 billion per month on the war in Afghanistan through the end of fiscal year 2008 and has spent a total of $15.6 billion on Afghan security forces alone over the course of the conflict (Belasco, 2008). Since 2008, this number has been increasing. Considering the employment rate in the United States and the growing governmental debt, there is an increasing pressure in Washington to ensure that national resources are allocated as efficiently as possible.

Despite an increase in the allocation of resources, many studies indicate stability is getting worse in the country and that the coalition is losing the war (Akhtar, 2008; Hrychuk, 2007; Johnson & Mason, 2007; Katzman, 2008; The White House, 2009). There has been a steady increase in violence in Afghanistan since 2005 in terms of incidents and the number of coalition soldiers killed and wounded (Aras & Toktas, 2008). In addition, the insurgency has continued to increase gradually since 2003 and insurgent attacks have intensified and become more sophisticated in terms of technology and tactics (Aras & Toktas, 2008; Reuter & Younus, 2009; Ruttig, 2009). In addition, many sources indicate that by 2007 30% of Afghanistan was under Taliban control, and some estimates placed this figure as high as 54% (Loyn, 2009). Based on these facts there is significant evidence that supports the argument that the Afghan government is losing the population’s support (Aras & Toktas, 2008).

Another negative indicator is that the Afghan government is losing control of a lot of the country to the Taliban and other warlords and criminal elements. As much as one-third of the country is controlled by these factions (Dale, 2009). One specific event that exemplified this gradual Taliban resurgence was the June 12, 2008 Taliban attack against the Sarposa prison in Qandahar that resulted in freeing 1200 inmates (Katzman, 2008; Mullen, 2009). In addition, both U.S. and international assessments have continuously indicated that the Afghan government is largely failing to stabilize the country, and areas that were previously considered secure, such as in the capital of Kabul, have experienced an increase in the number of military and civilian deaths (Katzman, 2008).

There is also evidence that the Afghan population is becoming disillusioned with the U.S. presence and the Afghan national government (Bassiouini, 2008; Bijlert, 2009; Fick & Nagl, 2009; Jalali, 2009; Jones, 2009; Rashid, 2009). There are two primary reasons for this. The first is that despite 7 years of U.S. presence in the country, Afghanistan continues to have one of the lowest per capita GDPs in the world at $350. This is coupled with an average life expectancy of between 43 and 44 years (Fick
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