**Dynamics of Urban Well-being**

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**Abstract:** The purpose of our study is to develop a model to estimate important dynamics within a modern urban environment, with respect to a population’s well-being, that could be influenced by US military operations. We retrieved data from the Organization for Co-operation and Development, World Bank, and Trading Economics databases to validate our assumptions, variables, and model. The core dynamic of an urban environment is the balance of supply and demand, represented through the well-being of the society. Due to the complexities of well-being, this project focused on the economic dimension to model the urban dynamics. Our results indicated that military debt relief and military economic investment drive the recovery time of the economy from degradation. Expanding this model to include the three dimensions of well-being will increase applicability to future military doctrine. Further exploration is necessary to determine a realistic timeframe for the urban environment’s recovery and military downsize.

**Keywords:** Urban Dynamics, Simulation Modeling, Military Operations

1. **Introduction**

An urban environment is composed mainly of physical infrastructure and human interactions that give life to a city. According to Buiel, Hart, and Vink (2008), a city is composed of the following three inseparable components: urban systems, physical terrain, and a population’s well-being. People occupy housing and participate in urban systems reflective of industries, transportation, and natural resources (Buiel et al., 2008). Physical terrain refers to the airspace and infrastructure on the surface and subsurface. Well-being refers to “the average balance of pleasure (or enjoyment) over pain, measured over the relevant period” (Dolan & Metcalfe, 2012, p. 415). Occasionally, one or more of these elements fail following the introduction of a shock event, necessitating the introduction of a military operation. For example, the earthquake that impacted Haiti in 2010 destroyed infrastructure and displaced much of the population (Pallardy, 2016). Multiple countries (including the U.S.) deployed military and relief forces to aid in the recovery and immediate health needs of the population. The responsive military force provided resources and stability, bringing hope to the quickly deteriorating situation (Pallardy, 2016).

Urban operations are different from traditional military operations because of the interrelationship between physical terrain, the population’s well-being, and urban systems; therefore, little is known about how the presence of a military operation affects the dynamics of an urban landscape. Due to the drain on resources and the change in the inhabitants’ daily lives, it is unknown for how long a military force can effectively deploy to a heavily populated area before the civilian population becomes discontent. Currently, the U.S. military has no doctrine involving urban operations so a focus on the assessed effects of these operations will allow the military to create effective operating procedures to combat such situations.

The purpose of our study is to develop a model to estimate important dynamics within a modern urban environment, with respect to a population’s well-being, that could be influenced by US military operations. Given the challenges of modeling a multilayered urban environment, we will focus on the well-being of the population as an aggregate measure of the dynamics of an urban environment. Our hypothesis is that when a shock event degrades a city, well-being of the population will decrease. Once well-being decreases beyond a certain tipping point, the deployment of a military force might be necessary to correct the issue. Even though we expect an initial increase in well-being, the military force may reach a point of diminishing returns where their negative effects on the resources are causing more harm than good. At this point, the local population’s well-being will be placed at risk, so they will want the military force to evacuate.