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Editors' Choice

Harm reduction as a complex adaptive system: A dynamic framework for analyzing Tanzanian policies concerning heroin use

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ABSTRACT

Contrary to popular belief, policies on drug use are not always based on scientific evidence or composed in a rational manner. Rather, decisions concerning drug policies reflect the negotiation of actors' ambitions, values, and facts as they organize in different ways around the perceived problems associated with illicit drug use. Drug policy is thus best represented as a complex adaptive system (CAS) that is dynamic, self-organizing, and coevolving. In this analysis, we use a CAS framework to examine how harm reduction emerged around heroin trafficking and use in Tanzania over the past thirty years (1985-present). This account is an organizational ethnography based on of the observant participation of the authors as actors within this system. We review the dynamic history and self-organizing nature of harm reduction, noting how interactions among system actors and components have coevolved with patterns of heroin us, policing, and treatment activities over time. Using a CAS framework, we describe harm reduction as a complex process where ambitions, values, facts, and technologies interact in the Tanzanian sociopolitical environment. We review the dynamic history and self-organizing nature of heroin policies, noting how the interactions within and between competing prohibitionist and harm reduction policies have changed with patterns of heroin use, policing, and treatment activities over time. Actors learn from their experiences to organize with other actors, align their values and facts, and implement new policies. Using a CAS approach provides researchers and policy actors a better understanding of patterns and intricacies in drug policy. This knowledge of how the system works can help improve the policy process through adaptive action to introduce new actors, different ideas, and avenues for communication into the system.

Introduction

(Inter)national and local policies concerning the transportation, sale, and consumption of illicit drugs encompass a wide range of perspectives along a continuum from broad legalization to stringent prohibition. Many of us citizens assume these and other policies are composed and implemented in a rational, purposeful manner by a select group of government officials after careful consideration of all the available facts. This rational/technical model is the basis for the "evidence-based" turn in drug policy where some actors attempt to eliminate local values and political motives from the decision-making process, believing that sufficient knowledge of social problems, backed by sound research, will produce effective policies with predictable outcomes. Yet even in instances where scientific research informs decisions, local values and politics continue to define what constitutes proper "evidence" and how it should be applied, or ignored, in policy (Lancaster, 2014; Monaghan, 2011). Policy – encompassing both formulation and implementation – remains an unpredictable enterprise. The increasing democratization of policy engenders greater uncertainty, with more actors bringing their varied values, goals, and evidence to the process. How can we researchers and stakeholders better understand the complex environment in which policy occurs? How can we apply such knowledge to reduce uncertainty and improve the policy process? What is needed is an approach that accounts for the broad range of policy actors, structures, ideas, and technologies as they interact over time to enact policy within a continuously changing socio-political context.

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There are a variety of theories and models researchers can use to analyze policy related to drug use (see Ritter & Bammer, 2010). Models such as the advocacy coalition framework (Sabatier, 1988) and multiple streams theory (Kingdon, 2011) provide specific guidelines for analyzing policies according to certain basic assumptions about socio-political structures and processes. These guidelines are useful when the research question focuses on a particular practice or segment of policy, but the precision of such models does not permit a more expansive examination of policies when the structures and actions are not as clearly defined. Instead of specific models or theories, what is required in such situations is a more generalized theoretical analysis using what Ostrom (2011) describes as a higher-order *framework*.

> Frameworks identify the elements and general relationships among these elements that one needs to consider for institutional analysis and they organize diagnostic and prescriptive inquiry. They provide a general set of variables that can be used to analyze all types of institutional arrangements. Frameworks provide a metatheoretical language that can be used to compare theories. They attempt to identify the universal elements that any theory relevant to the same kind of phenomena needs to include. (p. 8)

One such framework uses concepts of complexity theory to depict policy as a *complex adaptive system* (CAS) comprised of many actors who organize around a particular social problem, bringing diverse ambitions, values, and facts to deliberate the issue and enact their decisions in a continuously changing social environment (Boulton, 2010; Klijn, 2008; Mitchell, 2009; Morçöl, 2012). Applying a CAS framework to policy does not necessarily supplant other models of policy – many of these models incorporate aspects of complexity theory – but instead contributes to our understanding as researchers and citizens by expanding the concepts and tools to include a broader range of components and their interactions in our analyses and subsequent actions.

In this study we examine harm reduction in Tanzania as a complex adaptive system, noting the interactions among different actors with competing perspectives on how to address the supply, demand, and use of heroin, and how these interactions produce new structures, institutions, and decisions over time. The Tanzanian situation serves as an interesting case study for several reasons. First, it is one of the few countries in sub-Saharan Africa to implement harm reduction. Since 2007, government agencies and non-government organizations (NGO) in Tanzania have carried out a variety of strategies to reduce the incidence of the human immunodeficiency virus (HIV) and other blood-borne infections among people who inject drugs, including targeted outreach, HIV counselling and testing, medically-assisted therapy, and needle and syringe programs (Ratliff et al., 2013). Second, because heroin entered the Tanzanian drug market relatively recently (in the 1980s), local policies do not reflect a lengthy and contentious history where the emphasis was on morality and criminality. This is in contrast to Western countries, where a century of strict prohibition has only recently given way to decriminalisation, legalization, and harm reduction approaches. Finally, as the authors of this study, our understanding of harm reduction as a CAS in Tanzania is based primarily on our perspectives as actors within this policy system where we have observed the emergence of harm reduction from the beginning, and we continue to work within and monitor the system as it unfolds.

As actors within the system, we have two distinct but overlapping objectives for applying a CAS perspective: (1) as an analytic framework to understand and represent current heroin policies Tanzania as a complex, emergent system, and (2) as a guide for taking *adaptive action* to foster policy within a dysfunctional system (Eoyang & Holladay, 2013; Mitleton-Kelly, 2003). After a brief review of complexity theory and the dynamic equilibrium model used in our analysis, we tell the story of harm reduction as it emerged in Tanzania over the past thirty years, describing the interactions of actors, institutions, and technologies in deliberating and implementing policy. We illustrate how this story represents a complex adaptive system, where actors are continually organizing system components to produce new policies. We conclude this paper by showing how stakeholders can use adaptive action to reduce the uncertainty of complexity, creating conditions where people can effectively work together to improve the socio-political legitimacy and sustainability of their policy decisions.

Integrating complexity in policy analysis: the dynamic equilibrium model

To better understand and facilitate these policy processes, it is important to define the relevant properties and capacities of complex adaptive systems we use in our analysis. There are several distinct theories and applications of complexity across the natural and social sciences (Mitleton-Kelly, 2003), but in the policy and public administration literature three characteristics of complexity stand out: non-linear dynamics, self-organization, and coevolution (Butler & Allen, 2008; Klijn, 2008; Morçöl, 2012; Teisman, van Burren, & Gerrits, 2009). *Non-linear dynamics* refers to the multifaceted, co-constitutive relationships between a large number of individual components – actors, materials, institutions, values, facts, places – as parts of the system, where changes in the properties and interactions of components and the system over time are difficult to predict. Prediction is difficult because such changes are *emergent* (Sawyer, 2005), as interactions among individual actors and other components can create or transform high-order structures, and these structures, in turn, change the properties of, and interactions between, the constituent components. Such interactions generate *feedback loops* that amplify what is happening in the system (*positive* or *reinforcing* feedback), or counteract changes to the system (*negative* or *balancing* feedback). Another aspect of non-linearity is that small changes among a few components can lead to extensive transformations across the entire system, or across multiple systems; policy actions do not produce proportional outcomes. The system is thus more than the sum of its components, and is not reducible to simple models or generalizable laws.

These dynamics prompt the *self-organization* of the system in question. Systems emerge as distinct entities through their internal, non-linear dynamics, and tend to resist influence from outside the system as they generate their own structures, properties, and behaviors. From a policy-making perspective, self-organization generates order (or *equilibrium*) so actors can reach some semblance of consensus and make decisions about social problems. A crucial dimension of self-organization concerns *boundary judgments*, where actors define the system according to their perceptions and ambitions. These boundaries are porous in that they allow for interactions between systems; boundaries are also fluid as they expand and contract to include or exclude components in the process of self-organizing. Perhaps the most fundamental example of a boundary judgement is in defining what the problem is. Studies of drug policy show how decision makers have created boundaries around certain drugs according to their perceived effects and harms rather than strong scientific evidence (Fraser & Moore, 2011; Monaghan, 2011). In turn, policy responses reinforce boundaries by defining people who use drugs and limiting the scope of interventions according to those constructs.

As researchers, we must recognize that we too create boundaries as part of our analytic endeavors (Morçöl, 2012): an earlier draft of this article defined the boundary for this study to