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The evolving relations between government agencies of innovation policymaking in emerging economies: A policy network approach and its application to the Chinese case

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ABSTRACT

Literature on innovation policy reveals little of how relations between government agencies as policymakers evolve. Taking the policy network approach, this paper investigates three mechanisms underlining the evolution of inter-government agency relations in emerging economies – policy agenda, power concentration and heterogeneity dependence, and applies them to the analysis of the evolution of innovation policymaking in China. Operationally, the paper proposes a social network analysis (SNA)-based method to quantitatively study China's innovation policy network, which consists of 463 innovation policy documents formulated by its central government ministries between 1980 and 2011. The findings show that the formal policy network for innovation has been not only sustained through the intervention of policy agendas but also self-organized because of policy network's nature of power concentration and heterogeneity dependence. The presence of such mixed mechanisms in China's innovation policy network's evolution differs from the findings from industrialized countries where self-organization plays a central role. This work advances our theoretical understanding of the evolution of innovation policy network and has implications for innovation policymaking in emerging economies.

1. Introduction

Research on innovation policy is problem-oriented rather than merely theory- or paradigm-driven (Morlacchi and Martin, 2009). As an institutional arrangement, innovation policy could remedy market failure, create a fertile environment, help to build innovation networks, and improve enterprises' innovation capacity (Lundvall and Borrás, 2005). Specifically, a country's innovation policy is designed to spur the country's economic competitiveness and increase its aggregate social welfare (Kuhlmann, 2001; Lanahan and Feldman, 2015). International experience suggests that the structural relations between government agencies, public and private organizations and other stakeholders are central to making innovation policy, solving practical problems and improving competitiveness (Hall and Taylor, 1996). However, as division of labor between government agencies makes it almost impossible for one agency to dominate policymaking, joint efforts involving different agencies are essential. Therefore, coordination, which entails mutual adjustment between these stakeholders and between the stakeholders and the environment against which policy is made, also affects the overall effectiveness and performance of the innovation policy mix (Flanagan et al., 2011).

Policy network has emerged as an approach that embraces the “structuralism” implicitly by emphasizing the structural relations in or the coordinated nature of policymaking. Such approach has a diverse disciplinary origin from political science, organizational studies, public policy studies, sociology, to social network studies (Klijn, 1996; Sørensen and Torfing, 2007), whose different knowledge backgrounds have generated different understanding and applications. There also has been little agreement as to whether policy network is a metaphor, a theoretical construct, or a method to describe and understand the policymaking process. But it is clear that policy is formulated through interactions of government agencies, or primary participants of policymaking, who collaborate and negotiate, and exchange resources so as to orient the policy toward their respective interests. As such, policy network describes and analyzes a shadow structure of interests (Dowding, 1995; Lewis, 2011).

Empirically, scholars have turned policy network into a real network by focusing on the relations between policymakers in the network. Particularly, policy network can be perceived as a “network” consisting of “nodes,” or policymaking participants, whose interactions around specific policy issues generate “structural relations” between them for the purpose of policymaking (Berardo and Scholz, 2010; Lee

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et al., 2012). Therefore, how to understand the construction and especially the evolution of such relations through resource exchange, collaboration, and interdependency becomes crucial to understanding the governance in policymaking (Compston, 2009; Rhodes, 2013).

Finally, policy network is situated in a nation's political context. In industrialized countries such as the UK, the US, Germany and France where the policy network approach has been developed, self-organization of government agencies around policy issues, including those related to innovation, is central to policy network's governance (Berardo and Scholz, 2010). Now, with their continental-sized economies and ambitions, BRICS countries (Brazil, Russia, India, Indonesia, China and South Africa) are emerging as new actors of global governance (OECD, 2013). National differences determine the structural and functional differences of policy network. In contrast to industrialized economies where entrepreneurship or the public-private partnership dominates innovation, emerging economies more likely adopt the developmental state model (Wong 2011; Zhang et al., 2011).

Of the emerging economies, China is particularly positioning itself to assert a global leadership in science and technology (S&T) and innovation in the coming decades with sources of competitive advantage for its ascent coming from its centralized power, state-sponsored policy and government support (Appelbaum et al., 2012; Huang and Sharif, 2016). In China, most policies are proposed by and negotiated between government agencies. Thus, it is of significance to explore the possibility of applying the policy network approach to the study of inter-agency relations in China's policymaking, bearing in mind of its fundamentally different political context (Zheng et al., 2010).

This paper represents a pioneering effort to propose and reveal evolutionary mechanisms of the relations between government agencies in policymaking through applying the policy network approach to the study of China's innovation policy. We are interested in not only the relational structure of the agencies but more specifically how such structure has evolved in the country's reform and open-door era (Klijn and Koppenjan, 2012). We first propose three hypotheses – policy agenda, power concentration and heterogeneity dependence – regarding policy network's evolution. Then we extract the structural relations between government agencies from China's innovation policy documents and use social network analysis (SNA) to analyze such relations so as to quantify how China's innovation policy network has evolved.

Our contribution is twofold. Theoretically, our work enriches the literature of innovation policy and policy network through pinpointing the evolutionary mechanisms in the innovation policy network, particularly how such policy network characteristics as policy agenda, power concentration, and heterogeneity dependence have structurally influenced the evolution of the relations between government agencies in innovation policymaking. We also investigate China's innovation policy network by performing a social network analysis of data extracted from policy documents, thus expanding the policy network approach empirically and methodologically. Our findings from the Chinese case also shed new lights on the literature of innovation policymaking.

2. Theoretical background and hypotheses

2.1. Theoretical background

To understand policy network's evolutionary mechanism is to understand the evolving relations of the network members. Policy network's evolution is a process in which government agencies and other stakeholders create and maintain relations with each other (Snijders et al., 2010). Evolutionary mechanisms of a network come from basic factors that drive or shape the network's formation, persistence, dissolution, and content of ties between its members (Ahuja et al., 2012).

In particular, several schools of thought have emerged to help understand policy network, especially its evolution.

The new institutionalism school considers policy network as an institutional setting in which public and private policymaking participants interact to make policy (Blom-Hansen, 1997; Rhodes, 2006). Such interactions happen in rather similar ways to reproduce more or less the same sets of rules and exchange heterogeneous resources, thus regularly shaping the structural characteristics of the policy network (Klijn, 1996). Therefore, policy network's evolution is an institutionalization process whereby government agencies produce new rules. By sustaining a stable policy network over a period of time, these new rules facilitate interaction, reduce transaction costs, and influence network's performance.

The social network school brings new insights to the study of policy network. A participant in an inter-agency policy network possesses two structural attributes, or its behavior can be described in two relational variables. *Social selection* and *network selection* represent the participant's attributes and relations respectively, leading to the formation or dissolution of its relations with other participants in the policy network (Robins et al., 2012). For example, some network participants tend to form more ties with those with higher popularity or through a preferential attachment mechanism (Barabási and Albert, 1999).

The power-dependence school treats policy network as resource-dependent government agencies/organizations. In particular, a government agency depends on other agencies for resources or has to exchange resources with others to realize its goal in policymaking (Rhodes, 2006). In doing so, each agency deploys its resources – legal, organizational, financial, political or informational – to maximize influence over policy outcomes while trying to avoid becoming dependent on other agencies.

The existing research suggests that policy network's evolution is a complex process driven by several mechanisms, three of which serve our purpose well. Policy agenda determines the change of the policymaking (Hays and Glick, 1997). From social network school's perspective, policy network evolves following the rules of popularity effect as social selection and those of preferential attachment as network selection (Barabási and Albert, 1999; Lee et al., 2012). And organizations in policy network also are resource- or power-dependent (Rhodes, 2006). We will construct our theoretical framework about policy network's evolution around these three mechanisms and generate hypotheses accordingly.

Policy network's evolution could be examined in periods, during each of which participating government agencies create and maintain relations. It is possible to empirically investigate the network's change by comparing these agencies' status in its different periods (Snijders et al., 2010). The period division reflects how the network evolves in the policy cycle through their status in the current and following periods. We divide the periods to observe how policy network evolves in responding to the creation and maintenance of the relations between government agencies.

2.2. Policy agenda and policy network's evolution

A policy network is embedded in and influenced by a nation's institutional context (Borrás and Edquist, 2013). The institutional framework shapes inter-government agency collaboration by dictating which organizational actions to be accepted and supported (Aldrich and Fiol, 1994). Within a specific institutional context, a policy agenda is a set of strategic ideology, issues and plans laid out by the top leadership as well as policies that government agencies try to influence current and near-future policy practice and trajectory. Hays and Glick (1997) demonstrated the importance of agenda-setting in reaching a more complete explanation of policymaking; that is, policy agenda can be treated as an independent variable to explain a network's evolution.

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